New Trends in Architecture, Planning and Design

EDITORS

Prof. Alper Çabuk Ph. D.,

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İçindekiler

MODERN TRENDS IN THE DIGITAL AGE OF ARCHITECTURAL LEARNING

Beyza ONUR[1]

1. INTRODUCTION

Architecture establishes a spatial framework for life, communicates many ideas, and conveys various perspectives on how people interact with their surroundings. Perhaps this explains why humans have a natural inclination to seek out deeper meanings in architectural artifacts rather than merely information about their function. Architecture reflects how people feel about their town, their home, or the area around them in general.

There are two dimensions to architectural design of structures and urban planning of neighborhoods, urban quarters, or generally complexes of items and their surroundings: utilitarian and cultural. The proposed solutions' quality will also be evaluated for both. Functionality indicates that the structure or urban complex must adhere to the program's underlying presumptions or concepts in a practical manner. The cultural dimension entails that the design or implementation of the space expresses more than just the superb quality of the technical procedure; it also creates a new non-material quality of the physical environment. The use of an object's economics and energy efficiency, which are both strongly related to the method and technology of solutions, enter the realm of architectural design concerns today (Little and Knihova, 2014).

Turner (1986), distinguishes five building components: the foundation, structure, enclosure, mechanical devices, and finishing elements. Each of these causes its own unique set of technical and construction issues and has been linked to studies of the relationship between economic efficiency and the concept of spatial (architectural) solution. The complexity and interdisciplinarity of architectural design, like that of ergonomic design, is what stands out the most. The simplest way to explain it is that each project is a presentation of an unified architectural vision in response to a specific functional program in a material form (drawings, visualization). This idea can be stated in a variety of ways:

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Architectural concepts combine knowledge from various fields of competence (in ergonomics, ecological, social conditions, etc.) with a seemingly simple premise;

-architecture's "language" is the shape of the item, which inspires to ask existential questions, but its function recedes into the background in this design phase; architecture is related with signs and symbols, and therefore with emotions formed on many levels;

-design that makes use of current technological knowledge creates solutions that are straightforward in terms of shape and spatial organization while creating intricate construction-related systems (Little and Knihova, 2014).

Besides, The challenges that educators are experiencing go hand in hand with technical and social developments, but they all share one thing in common: increasing accountability for the outcomes of educational processes. Every component of how learning is delivered and every kind of learning model are changing. This covers in-person instruction, blended learning, remote learning, and virtual learning environments (VLEs). The structure and content of e-learning courses are evolving. There are currently numerous other alterations being seen. For instance, student-centered learning is currently popular.

Additionally, social learning, experiential learning, and informal learning are all undergoing transformation. This calls for ongoing observation of both the teaching and learning processes on the part of educators as well as the creators and producers of educational resources. In terms of content creation, collation, and curation, they must also translate these monitoring operations into smart, proactive, and efficient solutions. To avoid their obsolescence, digital curation in this context refers to maintaining, preserving, and enhancing the learning content resources.

Since the advent of parametric and computational modeling technologies, the architectural design process has changed. Modern technologies facilitate conceptual design for architecture, carry out studies, and communicate ideas. Two decades ago, architects anticipated that the use of digital tools would improve the support of the design process.

The examination of current computer technology and virtual reality applications for architectural design was the main topic of the research discussed in this paper. The evaluation revealed its value as a teaching tool to enhance learning in the architectural design studio. The major objective was to determine how and to what degree VR in architectural design will benefit students.

2. POTENTIAL OF COMPUTER TECHNOLOGY

Today, the building sectors must employ computer-aided design (CAD) software; it is no longer an invention. This needs to be covered in the regular instructional process for architectural design. For modern architectural design and education, the development of digital tools for parametric-algorithmic modeling is crucial. Technologies that enable human-computer interaction in a virtual, sensory-rich world have been developed (Janowicz, 2020: 24).

Computer technology has given architects new options and is starting to replace conventional design methods. It is evident that computational tools enabled the efficiency, control, and intelligence; these techniques are increasingly seen as indispensable to architectural practices (Lang and Hovestadt, 2003). It is less clear how this technology has started to affect how architects practice their craft, the society they serve, and consequently how architects are educated. Computer technology, according to Qaqish and Hanna (1997), encompasses all computer applications, whether they are taught as stand-alone courses or as part of the design studio for architectural design and urban planning (Soliman et.al., 2019).

The use of digital technologies in the design studio curriculum has increased in the 21st century in architecture education. In addition to serving as important pedagogical hubs in the design studio, these diverse computer-aided drafting, modeling, and analysis technologies also began to influence the whole curricular framework of architectural education (Soliman et.al., 2019). In order to maintain a balance between the learning curve and the variety of software available to architects, they also required to be deployed as support courses. Traditional architectural education techniques are primarily based on actual 3D models and 2D sketching. Computer technologies have reportedly been incorporated into the educational process to replace conventional teaching aids, according to an experiment in architectural education (Angelil, 2003).

Today, educators and academics' main research focus is on fully integrating digital teaching. Their main objectives are to help students develop their skills and abilities while also employing computer applications as a design tool. Although there is currently no framework or core structure for the use of computers in architectural education, the majority of architectural schools and departments, particularly in industrialized nations, have developed their standards by incorporating more computer courses into their curricula (Zhu-Ting, 2016). The best way to determine when, when, and how computer applications should be used in architectural education is to have a thorough grasp of the pedagogies used at architecture schools. Therefore, a theoretical and analytical examination of the architectural schools

should be done first in order to investigate and analyze the existing state of architectural education. The next stage in creating the right framework for integrating computer applications with architectural curricula is to determine what the architectural profession needs.

The conventional setting of architecture as a profession and in education has changed as a result of the development of the information computer technology revolution and the corresponding digital Technologies (Breen, 2004). Over the past three decades, computer applications have been employed in the field to improve current processes by enabling the production of enormous numbers of drawings with high precision and in a shorter amount of time.

Digital technologies have allegedly been employed at architecture schools to oppose the modernizing vision of architectural practice, according to a study conducted by Andia (Schenk,2005). Andia (2002), claimed that the use of computers has changed the educational and professional landscape, having an impact on both practitioners and students' skills. At the same time, fusing conventional design methods with digital technologies successfully enhances architectural practice. In order to transform architectural imagination and practical potential, architectural schools have used computer applications.

However, the architectural studio itself has evolved into a platform to investigate the function of computers in architectural design, and architectural schools are now becoming laboratories for diverse digital design mediums. The conventional design studio culture has been impacted by students' growing propensity for using computer applications as well as their growing proficiency and engagement with using a variety of design mediums. Al-Qawasmi (2005) underlined that although the use of digital media in the e-studio has the potential to significantly alter the architectural design process, it may also have unforeseen restraints.

Henri (2003) cautioned, however, that this shift toward digital architecture should be reexamined in terms of both practice and instruction. First, digital design tools could displace more traditional ones like manual sketching, which frequently creates the crucial direct physical connection between the hand and the brain. Second, digital technologies have replaced physical architectural models with a collection of seductive graphics that are often intended to dazzle the audience, offering an enticing, simple, and affordable alternative.

Guney (2015) claims that using computer applications has the drawback of making pupils dependent on them and causing them to design projects without originality. The research of particular formal themes began with students using computer application tools at the conceptual stage (Schrader, 2016). However, rather

than using either method independently, many educators and practitioners advocate combining both physical and digital design methods. According to Breen (2004), combining the two processes allows the designer more "real" approaches to build, reevaluate, and improve any design. In order to adequately prepare students for practice, Breen also noted that the combination of the two strategies should be actively implemented into the educational curriculum (Al-Qawasmi, 2005).

3. POTENTIAL OF VR TECHNOLOGY

Virtual reality in architecture is presently concentrated in two areas. The first one has to do with turning a 3D file into a VR experience (like a Revit or SketchUp file). The second, which expands on the first, has to do with using the virtual reality environment to enter data into the design in addition to viewing it. This would eliminate the need for architects to switch back and forth between several pieces of software in order to design in the VR environment.

The field of virtual reality is developing swiftly, moving from static visualizations to the display of 360-degree panoramic views and finally the presentation of parameters. One advancement is mixed reality (MR) technology, which allows for the digital augmentation of real-world visuals. While MR technology permits the imposition of digital data on the actual world, VR technology allows users to experience the environment created through visualizations.

Virtual reality is used in architecture design as well as entertainment. Both practitioners and researchers in theory and architecture education are interested in the virtual reality aided design (VRAD) technology (Milovanovic et. al., 2017). Virtual reality is being used more and more in architectural design. Virtual reality gives designers new means to experience and comprehend a building or place before it is really built, together with technologies that enhance VR capabilities, such as augmented reality (AR) and mixed reality (MR). Since the 1990s, virtual reality technology has been used in classroom instruction (Abdelhameed, 2013). It was initially employed as a setting to foster the development of designs with potential for creativity and innovation (Achten and Van Leeuwen, 1999). Instead of focusing on the design process itself, many systems examined by design students (in the fields of architecture or interior architecture) considered the impact of VR on teaching (Petrova et,al., 2017). These studies examined the advantages of VR technology for enhancing students' abilities;

-Understanding a structure and its construction

-remote design student collaboration

-VR integration with design course curricula in architecture schools are a few examples.

-implementing a combination of VR, BIM, and AR technologies that can offer various possibilities for data representation;

-personally configuring the platform and software in accordance with the demands of the students, both in terms of design and communication (Gębczyńska-Janowicz, 2020).

Virtual reality encourages experiential learning, which is one method of learning. Through the use of computer simulation, real-world sensory data is replaced by virtual reality technology. It aids with instruction by supplying a setting that enables customers to actually engage with scenarios and situations as opposed to only picturing them (Abdelhameed, 2013). Up until recently, the cost of purchasing technology-related equipment and the challenge of learning how to use it served as the primary deterrent to the use of VR in architectural design education. Students today are proficient in using CAD software and graphics editing programs. The current generation of pupils has a greater command of software. Young people are accustomed to using IT equipment since they are very young, therefore integrating digital technologies into school seems to be essential (Aldwairi and Shuhaiber, 2019). The increased familiarity of computer-modeling graduates with virtual reality contributes to developments in architecture education and practice.

By overlaying rebuilt structures on the real image, virtual reality can help with memorial site design. Students can see the spatial effects of suggested solutions thanks to realistic idea visualization. It also enables the growth of new abilities for designers' future employment.

4. CONCLUSION

The intelligent and complementary use of numerous new tools, techniques, and learning delivery platforms must be used to improve learning architecture and design. The current goals of the virtual reality (VR) industry within architecture are to improve the workflow between BIM and VR and to make VR more of an input tool than a visualization tool. However, understanding about architecture opens up a completely new universe. First, virtual reality has the potential to be used for virtual reality tours, in which architects and students can be led around a building without having to physically visit it. These trips might end up being even more educational than the actual ones thanks to the utilization of augmented reality.

Students have the chance to prepare for the rise of digital technologies and, more importantly, to learn new skills appropriate for their future employment thanks to the

synergy of modern technological development. To make sure that the educational process is parallel to the practice field and is up to date with modern computer applications, it is helpful to examine and reevaluate it. Sharing knowledge and cutting-edge ideas on digital implementations and the incorporation of computer applications in architecture education is crucial. Architects like to learn new computer applications in order to have an advanced work rather than being interested in new trends because the main reason for increasing the practice of computer applications is improving their profession sector. If computer applications are incorporated into all phases of many disciplines, it might be more effective, as is the case at the international level, as opposed to national curricula that place more emphasis on the preparatory stage.

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EXAMINATION OF THE AWARENESS OF THE SUSTAINABLE CAMPUS CONCEPT OF LANDSCAPE ARCHITECTURE DEPARTMENT STUDENTS

R. Özge OCAK GEMİCİ[1],

Banu ÖZTÜRK KURTASLAN[2]

1. INTRODUCTION

The needs of people living in the ecosystem, population growth, changes in socio-economic conditions and globalization affect the world negatively. Environmental problems such as rapid consumption of resources, air pollution, increase of waste and drought occur. In time, with the awareness of these negativities and people's awareness, some concepts have been introduced and systems containing certain rules such as laws, regulations and certificate systems have begun to be implemented (Kuşat, 2013).

The sustainability approach, which is accepted at the community level in many countries, causes the buildings to be re-evaluated and defined. Sustainability adds buildings such as "nature, environment, energy conservation, comfort" to the definition of building, which is summarized as "durability, functionality, aesthetics", and causes its scope to change by expanding (Sakınç, 2006).

Universities are where the leaders of today and tomorrow are trained. Higher education institutions are expected to provide solutions to global problems by creating a model for society, conducting research, providing information and raising qualified individuals. Regarding environmental concerns and its educational mission, a sustainable university is important in many ways. Most importantly, it aims to educate students with a better environmental awareness. To achieve this goal, universities should be one of the main actors on the development of students. Students who are asked to gain environmental awareness should experience this change in the campus and gain a perspective through environmental activities. Proposed living standards for the campus should include its purpose visually and

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functionally. A campus life with these features can only be provided with a sustainable campus (Sancar, 2019).

The main purpose of the study is to examine the awareness of the concept of sustainable campus by the views of students studying at Selçuk University, Alaeddin Keykubat Campus, Faculty of Architecture and Design- Department of Landscape Architecture. For this purpose, S.U. Questionnaires on the subject were administrated to the Landscape Architecture Department stuedents. In the light of the survey results, various suggestions have been developed regarding sustainable campuses.

2. SUSTAINIBILITY AND SUSTAINABLE CAMPUS CONCEPTS

2.1. Sustainibility

The concept of sustainability has developed depending on the discussions within the framework of the concept of "eco-development", which was first included in the Report of the World Environment Conference held in Stockholm in 1972. The study titled "Limits to Growth" published by the Club of Rome in 1972 draws attention to the relationship between growth and resources. According to the report by the Club of Rome, "uncontrolled" growth must be stopped in order to fix or minimize the problems. This report, known as the "Zero Growth Report", caused intense debates between developed and developing countries due to the differences in approach and triggered the questioning between economic development, industrialization processes and the environment. Then, in 1977, with Dennis Pirages' Sustainable Society work, sustainability started to be discussed in scientific circles. The report titled "Our Common Future", published by the World Commission on Environmental Development in 1987, found high support in the relevant circles and "sustainability" has become a globally accepted concept (İnceday ı, 2004).

The main purpose of the sustainability approach is to reveal the necessary measures to stop and reverse the deterioration of the environment and to reorganize human actions in every field in line with this purpose. The concept of sustainability continues to develop and change in mutual interaction with political, cultural and social movements as a comprehensive and holistic approach that affects every aspect of life. The limited and non-renewable nature of the natural resources used for the reaching development, the excessive production and consumption throughout the world, causes the ecological balance to deteriorate gradually and threatens the sustainability of the world (Sakınç, 2006).

2.2. Sustainable Campus

Sustainable campus is defined as the areas where higher education institutions aim to minimize the effects of the problems that arise on a regional or global scale and negatively affect the environment and work to eliminate these negative conditions, research the necessary practices to ensure the transition of the society to a sustainable lifestyle and help the society to adopt it. (Velazquez et al., 2006).

Sustainable university; It can be defined as a higher education institution that works to minimize the negative environmental, social and economic effects while carrying out its own activities and leads the society in terms of a sustainable lifestyle. Sustainable university; It is also known as green university, green campus, eco-campus (Günerhan and Günerhan, 2016).

The first initiative of sustainable university campuses started with the Tallories Declaration published in France in 1990. With the publication of the declaration, the "National Wildlife Association of America" established the "Campus Ecology Program" in the same year. This program plays a major role in the history of the campuses. Sustainability in universities took off with this program and continued to develop. When talking about the sustainability of university campuses, it is inevitable to mention sustainability and development and include them in the chronology (Sancar, 2019).

2.2.1. United Nations Environment Program (UNEP) Green Universities Initiative

In line with the establishment of sustainability criteria in university campuses, the United Nations Environment Program (UNEP) has published a tool guide in order to support universities to increase their green spaces, use their resources effectively and develop and implement their own transformation strategies in the process of creating low-carbon campuses. Its focus is on the sustainable planning, design, development and management of university campuses. In addition, the guide aims to increase the sustainability performance of universities on the global platform (Oktay & Küçükyağcı, 2015).

2.2.2. International Sustainable Campus Network (ISCN)

The International Sustainable Campus Network (ISCN) provides a global forum for university and corporate campuses on their way to becoming leading campuses to support the exchange of knowledge, ideas and best practices to build sustainable

campuses and integrate sustainability into research and teaching. It has close to one hundred members worldwide and is managed by the secretariat of Sustainserv Corporation, which is a private formation, not an official structure, unlike other guides and organizations that regulate sustainability principles on university campuses. The secretariat carries out the member relations, network development, marketing, outreach, resource materials and strategic program management activities of this communication network. Its strategic development is guided by a board of representatives of the seven schools that host the network (Sancar, 2019).

2.2.3. Green Metric World University Ranking

As part of its strategy to elevate its international status at a time when many of the world's universities are taking steps to manage and improve their sustainability, the University of Indonesia hosted the International University Rankings Conference on April 16, 2009. In this conference, it was observed that the current criteria used to rank university campuses generally focus on issues such as reducing carbon footprints and struggling global climate change. Green Metric is an initiative of the University of Indonesia (UI) that launched the world university rankings in 2010. This ranking, which evaluates the sustainability studies in the campuses, was later named UI Green Metric World University Rankings. The ranking is prepared by creating an online survey to profile the sustainability programs and policies of universities around the world (Sancar, 2019).

The purpose of this ranking is to provide the result of an online survey of current status and policies regarding green campus and sustainability in universities all over the world. The ranking is generally based on the conceptual frameworks of environment, economy and equity. Every year, many universities from different countries are evaluated and ranked in areas such as education, transportation, water resources, waste, climate change and energy in the Green Metric ranking, in which universities all over the world participate. Ranking indicators and categories are arranged to be associated with each university. Indicators and their weights are designed as objectively as possible. Data collection and transmission is simple and takes very little staff time. A total of 95 universities from 35 countries in America, Europe, Asia and Australia participated in Green Metric's 2010 ranking. In 2017, the ranking evaluated 618 universities from 76 countries around the world. This shows that Green Metric is the first in its field and the only one in the world in terms of sustainability (Sancar, 2019).

3. A Research on Selcuk University Landscape Architecture Department Students About Awarenessof Sustainable Campus

On the subject of sustainable campus, this concept has been researched through a survey on undergraduate students of Landscape Architecture Department of Selçuk University. In this context, Selcuk University Alaaddin Keykubat campus is discussed.

Selcuk University Alaeddin Keykubat Campus is the Alaeddin Keykubat Campus of Selcuk University, which has 22 faculties, 7 institutes, 8 colleges, 1 state conservatory, 55 research and application centers and is among the largest educational institutions in Turkey with nearly 70,000 students. has been selected. According to the 2018/2019 data of the Higher Education Institution, Selçuk University is the 6th university with the highest number of students (excluding open education students) among universities in Turkey. Selcuk University Alaeddin Keykubat Campus, chosen as the study area, has a surface area of approximately 2.5 million square meters (Akay, 2021).

Selcuk University Alaeddin Keykubat Campus is located at latitude 38.022152 and longitude 32.513088. As a district/neighborhood, it is connected to Ardıçlı Neigborhood and Selçuklu district. Its altitude (altitude above sea level) is 1135 meters. Selcuk University GPS coordinates are 38° 1′ 19.7472" and 32° 30′47.1168" (Anonymous, 2021d). (Figure 1).

Figure 1. Selcuk University aerial view (Anonymus 2019)

Other materials used in the research can be listed as follows:

• Master's theses, doctoral theses, articles and scientific books made in various universities,

• Literature information obtained from the internet related to the research subject,

• Maps and satellite images obtained from the Google Earth program,

• Questionnaire form prepared for the research

Questionnaire method was used in the prepared study. A total of 98 students, including 18 students from the 1st year of Landscape Architecture, 24 from the 2nd year, 26 from the 3rd year and 30 from the 4th year in Selcuk University participated to the survey . The questionnaires consist of 20 questions. Questionnaire forms on the subject were prepared by using the sources of Karcı Demirkol and Birişçi, (2020), Yakut İpekoğlu et al., (2014), Güngör and Demir, (2018) and Selçuk University green campus and environmental awareness survey (Anonymous, 2022f). While analyzing all the questionnaires applied within the scope of the research, Google Forms were used.

With the questionnaires applied within the scope of his study, it is aimed to measure the awareness of the sustainable campus concept of the students studying in the Landscape Architecture Department, S.Ü.

4. Activities/Projects Carried Out within the Scope of Sustainable Campuses at Selcuk University Alaeddin Keykubat Campus

4.1. Smart and Green Campus Project

Selcuk University (SU) and KOP Regional Development Administration, within the scope of "Smart and Green Campus Implementation Project", S.Ü. Energy analyzers were installed in the buildings in Alaeddin Keykubat Campus. With the Smart and Green Campus Project, it is aimed to increase efficiency by reducing energy consumption in Alaeddin Keykubat Campus (Figure 2) (Anonymous, 2021).

Figure 2. Merve Mercan Park in Selcuk University Campus (Anonymus 2021)

4.2.Solar Power Plants

According to 2018 data, Selçuk University (SU) meets one third of its annual need with 5.5 million kilowatt-hours of electricity obtained from the solar power plant it established on an area of 20 thousand square meters (Anonymous, 2022b) (Figure 3).

Figure 3. Some solar panel samples in the campus (Original 2022).

4.3. Project of converting animal waste into energy

Biogas, which is one of the renewable energy sources, can be obtained from fruit, vegetable and food residues, animal wastes, industrial wastes and waste water treatment plant wastes. The Smart Hybrid Mobile Biogas System was prepared by the faculty members of the Mechanical Engineering Department of the Faculty of Technology, Selcuk University. Biogas can be produced by increasing the mixture of water and animal waste in the reactor to the right temperature. The energy to be

obtained with the project, which also makes use of solar energy, will reduce the energy costs of many sectors (Anonymous, 2022c).

4.4. Zero Wate Management Unit

A 'Zero Waste Management Unit' was established under the Administrative and Financial Affairs Department of Selçuk University. With the unit, it is aimed to minimize waste and ensure its recycling (Anonymous, 2022d).

The Zero Waste Regulation, prepared by the Ministry of Environment and Urbanization, was published in the Official Gazette on 12 July 2019 and entered into force. In accordance with the regulation, it has been stated that it is a legal obligation to establish Zero Waste Management Units until 31 December 2020 in educational institutions and dormitories with more than 250 students (Anonymous, 2022d).

In this context, Selçuk University provided the necessary equipment, especially waste collection boxes inside the buildings and temporary waste storage areas in front of the buildings (Anonymous, 2022d).

4.5. Electric vehicles

The use of high-tech products, which are prepared to reduce environmental problems such as carbon emissions, is becoming more and more widespread. One of them is electric vehicles. The most important contribution of electric vehicles to nature is minimizing carbon emissions. These vehicles, which are described as a revolution in the automobile industry, also reduce the expense of private sector and public institutions for fuel. Selcuk University has put into service 5 electric vehicles to be used in document transport between units. The maximum speed of electric vehicles working with a 72 volt battery (12VOLTX38 AH: 6 batteries) is 55 km. and the maximum distance is 50-60 km (Anonymous, 2022e). (Figure 4)

Figure 4. Selcuk University electric vehicles (Anonymus 2022e)

5. Evaluating the Results of Questionnaire

Within the scope of the concept of sustainable campus, "Sustainable Campus Concept Awareness" The data obtained by the survey study of "Analysis of the Students Studying in the Landscape Architecture Department" were evaluated in this section.

In the survey, the awareness of the concept of sustainable campus was determined by S.Ü. 20 questions were asked to be analyzed in terms of students studying in the Landscape Architecture department and the answers were analyzed as follows:

- The majority of the students participating in the survey are women. 77.8% of the 1st year students, 58.3% of the 2nd year students, 73.1% of the 3rd year students and 53.3% of the 4th year students are women.
- "I know about sustainable campuses." While 83.3% of the 2nd grade students agree with the statement, 70% of the 4th grade students agree.
- "I support sustainable campus practices." While 93.3% of the 4th grade students agreed with the statement, 91.7% of the 2nd grade students agreed.
- "Sustainable campus practices are beneficial for people and the environment." While 100% of the 2nd grade students agreed with the statement, 96.5% of the 4th grade students agreed.
- "Sustainable campus implementations are costly." While 62.5% of the 2nd year students agreed with the statement, 50% of the 1st year students agreed.

- “Sustainable campus practices provide savings in the long run.” While 88.5% of the 3rd grade students agreed with the statement, 86.6% of the 4th grade students agreed.
- “Studying or working on sustainable campuses increases productivity.” While 93.4% of the 4th grade students agreed with the statement, 91.7% of the 2nd grade students agreed.
- “Selçuk University Alaeddin Keykubat Campus is a green campus.” While 72.2% of the 1st grade students agreed with the statement, 53.3% of the 4th grade students agreed.
- “Environmental cleaning is sufficient in Selcuk University Alaeddin Keykubat Campus.” While 66.7% of the 1st year students agreed with the statement, 50% of the 2nd year students agreed.
- •While 53.3% of the 4th grade students agreed with the statement "open-green areas in Selcuk University Alaeddin Keykubat Campus are sufficient", 50% of the 1st grade students agreed.
- While 72.2% of the 1st year students agreed with the statement "Afforestation works in the Alaeddin Keykubat Campus of Selcuk University are sufficient", 60% of the 4th year students agreed.
- “Parking lots are sufficient in Selcuk University Alaeddin Keykubat Campus.” While 53% of the 1st year students agreed with the statement, 41.6% of the 2nd year students agreed.
- “The buildings in Selcuk University Alaeddin Keykubat Campus are intertwined with green areas.” While 61.5% of the 3rd grade students agreed with the statement, 57.5% of the 4th grade students agreed.
- “The abundance of open-green areas in Selcuk University Alaeddin Keykubat Campus draws attention visibly.” While 62.5% of the 2nd year students agreed with the statement, 61.15% of the 1st year students agreed.
- “Among the activities established within the Selcuk University Alaeddin Keykubat Campus, environmental awareness and environmental protection issues come to the fore.” While 55.6% of the 1st grade students agreed with the statement, 50% of the 4th grade students agreed.
- “Planning and design studies/applications in Selcuk University Alaeddin Keykubat Campus are done by protecting the environment.” While

61.1% of the 1st year students agreed with the statement, 42.3% of the 3rd year students agreed.

- “Non-smoking areas are determined in Selcuk University Alaeddin Keykubat Campus.” While 33.35% of the 1st year students agreed with the statement, 29.1% of the 2nd year students agreed.
- “Noise caused by vehicles in Selcuk University Alaeddin Keykubat Campus is limited.” While 38.5% of the 3rd year students agreed with the statement, 37.5% of the 2nd year students agreed.
- While 77.8% of the 1st year students agreed with the statement "The maintenance and cleaning of the open-green areas in Selcuk University Alaeddin Keykubat Campus are carried out properly by the officials", 70.9% of the 2nd year students agreed.

6. CONCLUSION AND RECOMMENDATIONS

The results of the questionnaire made to the students of the Landscape Architecture Department of the Faculty of Architecture and Design of Selçuk University are evaluated above. Looking at the results of the survey, it has been observed that the students of the Landscape Architecture Department have knowledge about the concepts of sustainability and sustainable campus.

Students think that Alaeddin Keykubat campus is described as a green campus and they think that sustainable campus practices within the campus are sufficient.

In line with the results of the survey, it is recommended to carry out the necessary studies to prevent the noise emitted by the vehicles and to reach the sufficient number of parking lots. In addition, smoking areas within the campus should be specifically specified and recycling trash cans should be increased within the campus.

Waste management is one of the important steps to be taken to ensure sustainability in Alaeddin Keykubat Campus. First of all, the number of recycling bins in the campus should be increased. Projects should be developed for more conscious use of recycling bins, which are separated as "paper, plastic, glass and other" criteria. If waste awareness is created and the issue is managed in a disciplined manner, an important step will be taken in terms of sustainability.

The majority of campus users are students. The creation of hanger areas where these students can reach usable second-hand materials, books and clothes can make a great contribution to social sustainability. For this reason, clothing banks should be established in certain parts of the campus so that students in need can benefit.

Existing water mixers and siphon systems should be replaced to reduce water consumption. After the dirty water has undergone the necessary treatment processes, it should be recycled by means of feeding ground water and irrigation. Rain water should be collected by roofing or drainage applications to contribute to the natural water cycle, and necessary infrastructure works should be carried out for rainwater harvesting.

In lighting elements, low lighting elements that do not cause light pollution should be preferred in order not to adversely affect the fauna in the campus. Reflection should be prevented on illuminated surfaces. In order to save energy, sun sensors and timed conditions should be used and the number of existing solar panels in the campus should be increased.

New building projects should be prepared in accordance with the 'sustainable building' criteria. The number of sustainable buildings should be increased within the campus.

At the Alaeddin Keykubat Campus, workshops, meetings, short films about the subject, promotions and posters should be made and informative activities should be carried out in which the participants can take an active role.

Faculties should be encouraged to include environmental sustainability in their curricula. In order to raise awareness, green campus activities should be organized, and the use of social media and other paperless media types should be ensured. Awareness should be increased by frequently using visual elements related to environmental sustainability in social media tools frequently used by university students and faculty members.

In order to reduce the use of vehicles in transportation to the campus, the comfort of shuttle services should be increased and public transportation services should be made attractive. Studies should be carried out to increase the number and use of bicycles and electric scooters (thousand, seagull, hop). By increasing the bicycle lanes in the campus, it should be contributed to reduce the vehicle density in the campus.

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INVESTIGATION OF FORMAL CHANGE IN AKŞEHIR CITY CENTER IN THE HISTORICAL PROCESS WITH MORPHOLOGICAL REGIONS METHODS

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Mehmet Topçu[2]

1 Introduction

Urban fabric is a concept that provides an effective framework for describing and determining the physical features that constitute the specific character and identity of a city (Kropf, 2018). It is also a concept that is difficult to understand because it has been shaped by many actors such as architects, city planners, administrators, and the public throughout the historical period. Studies to understand this structure are based on analyzing the morphological form of the city in an accurate and intelligible language. Urban morphology is an approach that enables, through various analyses, comprehension of the form, formation and transformation processes of settlements, their spatial character, processes of historical development and the constituent parts that make up the settlements (Kubat & Topçu, 2009). In its general definition, it is called "a study on urban form" (Michael P. Conzen, 2001; M. R. Conzen, 2004; Cömert, 2015; Gauthiez, 2004; Gu, 2010; Küçük & Kubat, 2015; Larkham, 2006; Ünlü, 2018; Whitehand & Larkham, 2000).

Urban morphology studies began at the end of the 19th century. Urban morphology has been influenced by many factors such as social, economic, political, climatic, historical, and religious ones. Depending on these factors, urban morphology has been applied in many different types of research such as architecture, geography, and archaeology (Whitehand & Larkham, 2000). This research began to investigate the physical changes and the transformation processes of cities under the leadership of English, French and Italian schools, which are different educational schools. Morphological studies in Germany, which started with

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Schlüter (1899), generally handle morphology within a geographical perspective, while Phillipe Paneria and Jean Castex and sociologist Jean-Charles De Paule (1972) in France deal with morphology within the scope of sociology and architecture. On the other hand, Muratori (1960) in Italy started to evaluate typo-morphological studies from an architectural dimension (Cömert, 2015). While these approaches are closer to mathematical models and quantitative evaluations with respect to spatial analysis based on form, they are predominantly used for qualitative evaluations in terms of historical-geographical approach and process typology (Ünlü, 2018). Conzen (1975), the founder of the historical-geographical approach, states that as a balanced whole, the city emerges when urban patterns produced at different stability levels of lower, middle and upper scales integrate with each other (Ünlü, 2018).

In his morphological studies, Conzen analyzes layers forming the city by considering the street and connections of the street, land plots and building blocks, as well as buildings and their location within the building blocks. Thus, Conzen seeks to understand certain relational patterns of culture and society that constitute architecture and urban design.

When studies on urban morphology in the literature are examined, it is observed that they mainly focus on morphological analysis (Fan, Zipf, & Fu, 2014; Soleimani, 2020; Topcu & Kubat, 2012) in the context of the analysis of urban patterns and the analysis of urban form. Studies focusing on urban morphology have examined multi-layered cities that reflect different genius loci (spirit of the place) in terms of geopolitical location, climate, and socio-cultural values as a sample area. This situation provides resource diversity to the field of urban morphology. In this direction, the fact that the urban morphology of Akşehir, which has a rich cultural mosaic, has not been studied shows a gap in the urban morphology literature. In this study, Akşehir city morphology is examined and provides a new contribution to the morphology literature.

The aim of this study is to examine, through morphological analysis, the physical change of the city of Akşehir, one of the Anatolian cities shaped under the effect of various cultures in the historical process, and to reveal the changes in the historical urban pattern. To this end, the historical change of the conservation area where the Akşehir Houses are located, which reflect the characteristics of traditional architecture, was examined with specific reference to the block-based street, building and plot relations by applying the morphological regions method developed by M. R. G Conzen. As a result of the analysis, the change in the historical urban pattern of Akşehir has been revealed. Akşehir can be a source for the continuity of the values of the place considering the information obtained from the traditional form and pattern drive from the urban morphology. In addition, The Akşehir urban

conservation area analysis can provide an important data source for both morphology and today's planning areas.

2 Material and method

M.R.G. Conzen developed a detailed theoretical method for the interpretation of urban form, called "morphological region". While doing this, he divided an urban area into morphological regions and attempted to determine the physical development of this area. He began to implement his method with the analysis of the cities of Alnwick and Ludlow towards the end of the 19th century. He dealt with the periodical planning and morphological processes of these cities in all details.

Conzen states that a city is formed because of the integration of the urban patterns at different stability levels (Ünlü, 2018). He explains the emergence of the urban fabric by dividing it into three basic form components: town plan, where streets, building blocks, plots and building plans converge; building types and land use (M. R. G. Conzen, 1960; Whitehand & Larkham, 2000). These components are examined as follows:

- Town plan is examined based on its general characteristics and the regions it creates by considering the relationship of the building with the plot on which it sits and the neighboring plots, the street/square and the block it is located in.

- The building type is analyzed and grouped according to its importance in different historical periods.

- In land use, on the other hand, first, the function of each land is evaluated, then general topics are determined and finally it is considered what kind of a land use pattern is created by the identified uses.

The overlaying of the three specified components allows the explanation and description of the morphological features of the region. Each component is a morphological region with unity in form that distinguishes it from other surrounding components. This region is arranged in a hierarchical order within itself. In the end, morphological regions are created by overlaying the three determined components. For example, Conzen investigated the morphological regions of the English market town of Ludlow in a four-stage hierarchical-region model (Fig. 1). According to Küçük and Kubat (2015), the hierarchy by which Conzen divides the city into morphological regions can be explained as follows:

1. A historical city within its main boundaries constitutes the first order area. A peripheral settlement or residential areas can also be taken as a basis in determining this area.

2. Master plan units are expressed as urban parts, urban neighborhoods, or small residential regions.

3. Intermediate plan units, street units or the street – building – plot groups in a neighborhood are determined as tertiary areas.

4. Small plan units are areas defined as cells or morphotypes showing building types (Küçük & Kubat, 2015).

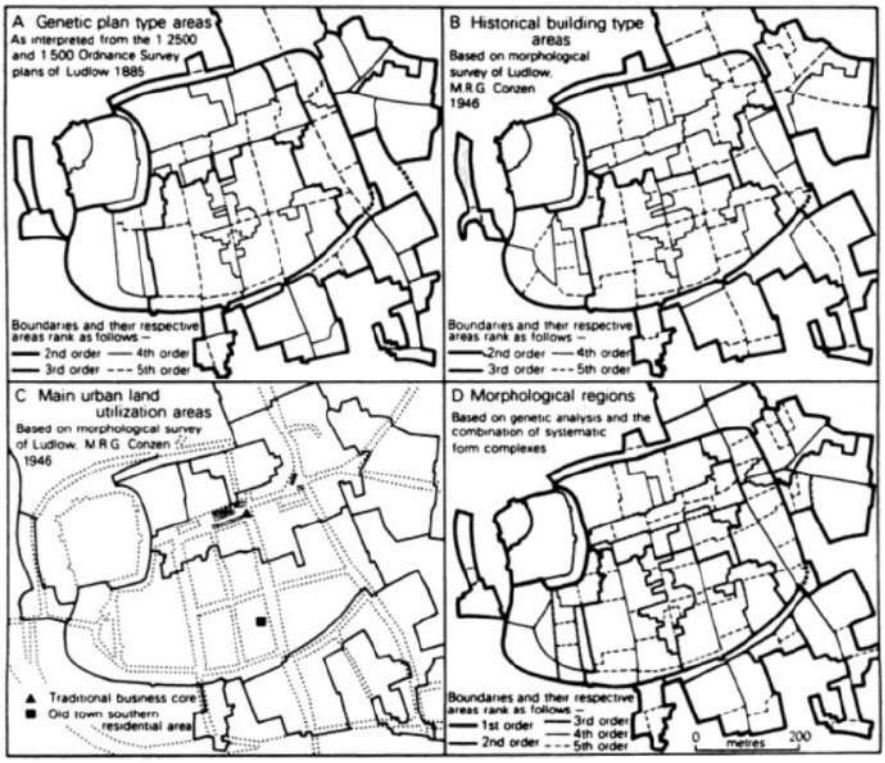


Figure 1: Map showing the morphological regions identified by Conzen in Ludlow (Source: (M. Conzen, 1988))

In this study, three levels, namely land use, building type and town plan, were analyzed within themselves, based on Conzen's morphological regions approach,

and then morphological regions were created by overlaying the results of the analysis.

In 1467, Akşehir entered the domination of the Ottoman empire. Before 1467, Akşehir reflects the traces of the period of the principalities and the Seljuks. Especially during the Seljuk period, traces of Central Asian and Iranian culture were reflected in Anatolia. After 1467, the first applications of ideas that would form the basis of the classical period took place. The use of domes for large openings in architecture became widespread. In 1923, the republican period began. In the Republican period, a new order was established that differed from the Ottoman state in many respects as political, social, economic, etc. This order brought about a different style in both the city and architecture. After 1950, a multi-party ideology was adopted politically. This ideology effected the planning and architectural discipline. It has been observed that the different styles brought by the periodic breaking moments are reflected in the city of Akşehir. For this reason, the historical process of 4 periods is discussed in the study (Figure 2). The detailed history of Akşehir is explained under the 4th title.

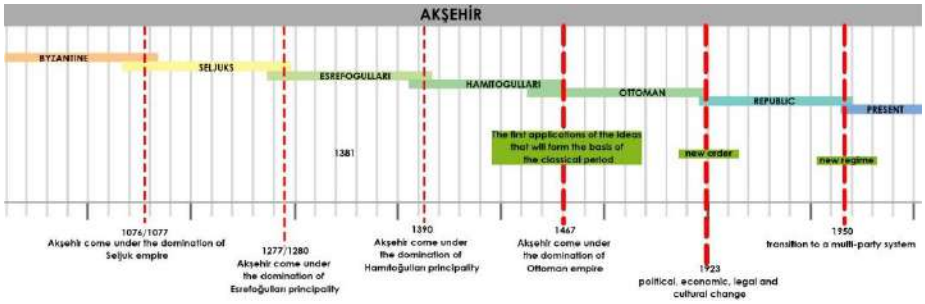


Figure 2: Akşehir's historical process (illustration: authors).

The study was conducted in 5 stages (Table 1):

In Stage 1, the current land use of the Akşehir urban conservation area was analyzed by dividing its historical process into four phases, namely "pre-1467, between 1467 and 1923, between 1923 and 1950 and post-1950" in four-order boundary regions.

In Stage 2, the current building type of the Akşehir urban conservation area was analyzed by dividing its historical process into four-order boundary regions as "pre-1467, between 1467 and 1923, between 1923 and 1950 and post-1950".

In Stage 3, the current Town Plan of the Akşehir urban conservation area was analyzed by dividing its historical process into four-order boundary regions as: "pre-1467, between 1467 and 1923, between 1923 and 1950 and post-1950".

In Stage 4, the morphological regions map was obtained by overlaying the analysis results of the first three stages. With this map, the morphological character of the Akşehir urban conservation area has been revealed in its historical process.

In Stage 5, the street fabric reflecting the morphological character of the Akşehir urban conservation area was revealed using the Morphological regions map. The importance of the streets was determined by presenting Grand Mosque, Middle Bath, Seyyid Mahmut Hayrani Tomb, Armenian Church and Nasreddin Hodja Archaeology and Ethnography Museum in Grand Mosque and Flour Mill Street, which reflect the urban character of Akşehir.

Table 1: Stages of the Study Method

STAGE 1	Determination of the Current Land Use and Land Use in the "Pre-1467, Between 1467 and 1923, between 1923 and 1950 and Post 1950" periods
STAGE 2	Determination of the Existing Building types and the building types in the "Pre-1467, Between 1467 and 1923, between 1923 and 1950 and post-1950" periods
STAGE 3	Determination of the current Town Plan and the Town Plan in the "Pre-1467, Between 1467 and 1923, between 1923 and 1950 and Post 1950" periods
STAGE 4	The morphological regions map obtained by overlaying the analysis results of the first three stages
STAGE 5	The street fabric reflecting the morphological character of Akşehir has been revealed. Grand Mosque, Middle Bath,

Seyyid Mahmut Hayrani Tomb, Armenian Church and Nasreddin Hodja Archaeology and Ethnography Museum on Grand Mosque and Flour Mill Streets, which reflect Akşehir's urban character, are presented.

3 Study area (Akşehir city)

Akşehir, which stands out in terms of its historical background, geopolitical location and social-cultural assets, is a multi-layered center that has hosted many civilizations. Due to the difficulty of examining the borders of Akşehir district at the urban scale, the new settlement areas that have not undergone much change in the historical process have been excluded from the study. In the present study, the periodical change of the conservation area in the center of the city where Akşehir Houses are located has been determined as the study area due to its undisturbed urban fabric and multi-layered settlement area (Figure 3).

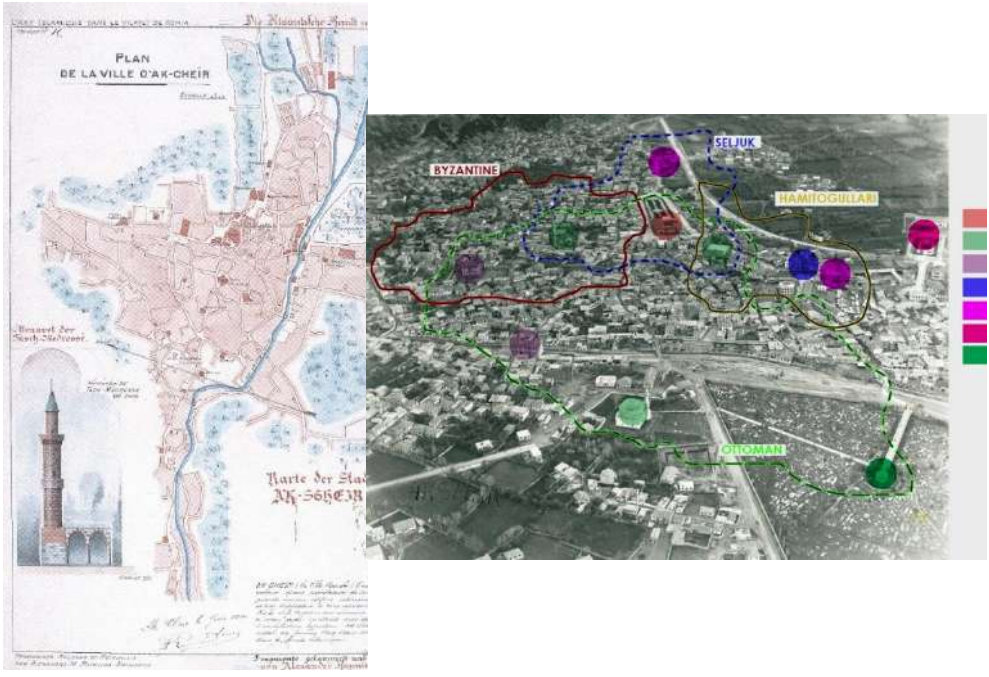
Figure 3: Aerial view of the study area (illustration: authors).

4 Historical developments of Akşehir

The first settlement in Akşehir began in the Neolithic Age and has continued to the present day. Chalcolithic, Old Bronze, Hittite, Phrygian, Hellenistic, Roman, Byzantine, Seljuk and Ottoman periods followed this initial settlement (Akşehir Municipality Immovable Cultural Heritage Inventory, 2012). Enjoying a rich cultural mosaic, Akşehir has hosted many civilizations. It was called "Philomelium", or the city of honeyphiles, in the Roman period perhaps because its residents were engaged in beekeeping or sweet conversations, (Küçüktop, 1978). Following the Persian and Hellenistic rule, the city came under the Roman and then the Byzantine domination (Akşehir History, 2020). One of the sultans who came here described it

as "Akşehir", inspired by the flowering trees he saw there (Akşehir Municipality, 2018).

The city has hosted the Seljuk (1076-1281), Hamitoğulları (1281-1467), Ottoman (1467-1923), and Republican periods, respectively. Having been home to different civilizations, Akşehir entered a period of renewal and development after it was destroyed by many attacks, invasions, looting and destruction (Figure 4a). New regulations with modern approaches were implemented in the renewal and development process of the city. These arrangements formed the background of the changes that would occur in the morphological structure of the city. These modern approaches applied in the city did not spoil the old traditional fabric of Akşehir. Every civilization that ruled in Akşehir grew in harmony with the old settlements. To achieve this harmony, downtown Akşehir grew to the east and south during the Seljuk, Hamitoğulları and Ottoman periods (Figure 4b).



a b

Figure 4: a) Akşehir city plan 1910 (source: Raymund, 1910); b) The developmental process of Akşehir city center in 1955 (illustration: authors).

5 Analysis of Akşehir conservation area

In order to reveal the spatial morphological differences in the city, an area that reflects the unique pattern of Akşehir's historical urban conservation area was selected. This is an area where land use is predominantly for residential purposes. Generally, the building blocks and road pattern are organic. This layout also reflects the traditional lifestyle.

When the area is analyzed spatially, it is seen that generally the heights of the buildings vary between 6 and 9 m. The buildings were designed with the human size in mind. However, low-rise buildings in Akşehir city center in the 1950's were replaced by 5-6-storey reinforced concrete buildings over time (Figure 5).

a)

b)

c)

Figure 5: Buildings in the center a) 1896 Akşehir (source: Sarre,1896); b)1950 Akşehir (source: Pinterest,2022); c) 2019 Akşehir (source: authors).

In both Seljuk and Ottoman periods, religion was at the center of urban formation. In parallel with this, the center of the Akşehir Urban Conservation Area is the Grand

Mosque. The fact that the Grand Mosque is both perceptible and accessible from every point of the historical city has made it a center of attraction. Throughout the historical period, each civilization has shaped its own city formation around this center. Takkasızlar Mansion (1), Gazi School (2), Traditional Akşehir House (3), İplikçi Mosque (4), Seyyid Mahmut Hayrani Tomb (5), Middle Bath (6), Armenian Church (7), Grand Mosque (8) are examples of registered architecture that shaped the formation of the city within the Akşehir Urban Conservation Area (Figure 6).

The area where the Akşehir Urban Conservation Area is located has a topography that rises towards the Tekke Boğazı (eastward). Topography is an important factor that shapes the urban fabric of Akşehir historical city center. The topography of Akşehir historical settlement offers The Akşehir Stream flowing through the Tekke Boğazı and green, clean and comfortable climatic conditions.

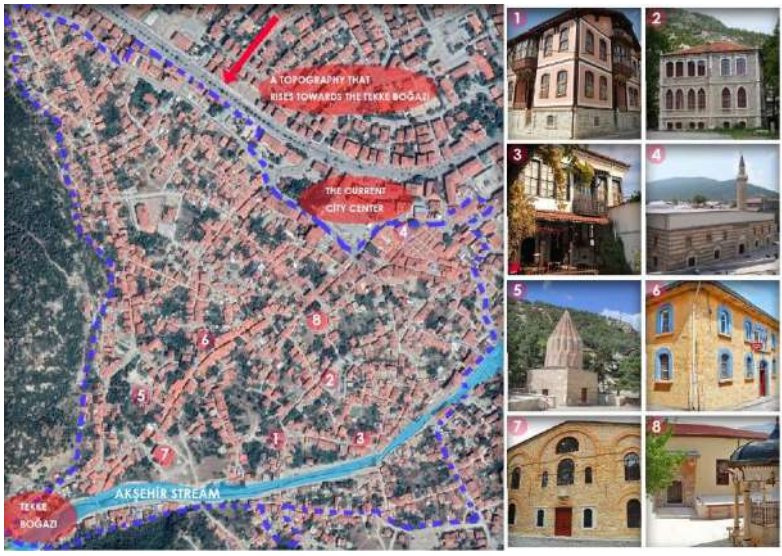


Figure 6: Akşehir urban conservation area (source: Aerial photo from google earth, 2021; other photos are from the personal archive of the authors)

Access to Tekke Boğazı is provided from Grand Mosque Street via the northeast-southwest main arterial road or from the road parallel to the Akşehir Stream. The fact that the main arterial roads directly open to Tekke Boğazı creates a microclimate effect. Vehicles, pedestrians and bicycles use these two main arterial roads

intensively. The other streets that provide transportation between the current city center and Tekke Boğazı contain the original characteristics of the traditional street fabric. Small squares, one of the most important components of the traditional social fabric, form at the intersection of these streets, which generally have an organic structure. The fact that the streets are wide enough for only one vehicle to pass and the houses are adjacent to each other has improved neighborly relations.

When the building-plot relationship of the urban conservation area is examined, it is observed that the settlements are generally houses with a front, back, side garden or without a garden. Access to these houses is usually provided by an entrance with an organic street pattern at the ground floor level (Figure 7). While the facades of the houses facing the street have oriels, consoles and decoration, the facades that do not face the street are simpler.

Figure 7: Entrances of old Akşehir houses facing the street (illustration: authors).

Most of the buildings in the Akşehir urban conservation area overlook the street, are generally adjacent to each other, and have a garden and a basement. Here, we also see the two basic elements of the traditional Turkish House plan, namely the room and the hall, the examples of which we see in almost every region of Anatolia (Eldem, 1954). This is also true for traditional Akşehir houses. According to Kaçar (2015), it is seen that the houses in the Akşehir urban conservation area have the following layouts according to their plan typologies:

The plan type with an outer hall; These houses usually consist of rooms lined up on one side of the hall. Plan type with corner hall is another application of

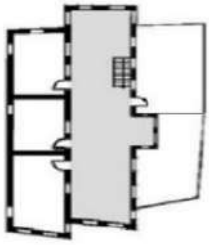
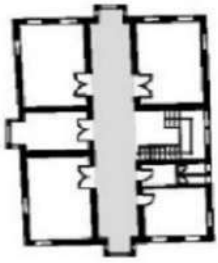
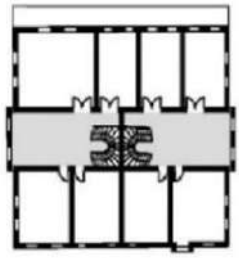
the outer hall plan type. It is a plan involving addition of a room to one corner of the hall.

The plan type with an inner hall is divided into two groups within itself as one-section and two-section.

In houses with a single-section inner hall, the part of the hall facing the road overflows into the street as a ledge. This plan scheme is found in most of the houses that have a plain oriel in the middle of the facade.

In the plans of the two-section inner hall type, the basic unit is copied and the two are pasted to each other, so that they display the feature of a twin structure. The units are interconnected inside. However, each unit is a whole in itself (Kaçar, 2015) (Table 2).

Table 2. Plan typology of Akşehir houses according to the location of the hall

Outer hall	Inner hall	
	Single-section	Two-section
		

Source: Kaçar (2015)

The buildings in the Akşehir urban conservation area are generally one or two-storey ones. Th0e second floor of the buildings have an oriel, with consoles or bay windows. These structures are built taking into account a certain ratio and proportion regarding the street so that they do not prevent the penetration of daylight into the building nor the vista opening to Tekke Boğazı. When the door and window analyses are examined, it is seen that the door is directly connected to the street, while the window is closed to the north but open to the south (Figure 8).

Figure 8: Door and window sections of old Akşehir houses (illustration: authors).

6 Investigation of Akşehir Urban Fabric with the Morphological Regions Method

The Akşehir urban conservation area, which includes the old Akşehir Houses, was examined by applying the morphological region method. As a result of this examination, attention was drawn to the developments observed in the urban fabric of Akşehir.

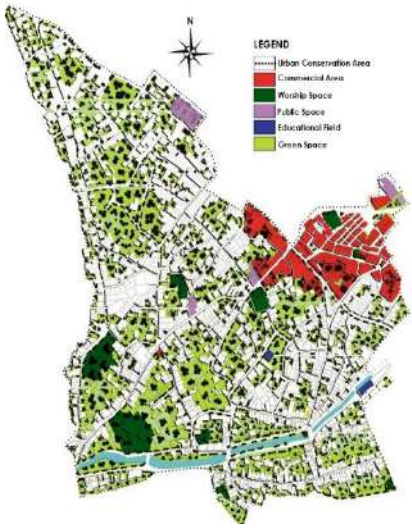
The following sections of the study include the analysis of the land use, building type and town plan of the city of Akşehir.

6.1 Land use and Morphological Regions

Multifunctional land use was observed in the conservation area, including Traditional Akşehir Houses, as well as buildings of trade and worship, madrasahs, Turkish baths, and educational buildings (Figure 9). It has a homogeneous land use. Traditional Akşehir Houses constitute the majority within the conservation area. Akşehir conservation area has survived to the present day by preserving its commercial function throughout the historical process. However, in the course of time, the roads in the conservation area have narrowed, expanded, or remained the same in terms of width. Each period left its own mark on the road pattern.

The periodical change of the conservation area where Akşehir Houses are located has been examined. The conservation area constitutes a multi-layered region where different cultural periods live together. The current land use of this area was examined by dividing it into four-order boundary regions as "pre-1467, between 1467 and 1923, between 1923 and 1950 and post-1950" periods and its morphological regions were thus determined. The morphological region of the land use was made considering the land uses in the Byzantine, Seljuk, Hamitogullari, Ottoman, Late Ottoman, and Republican periods. Changes have occurred in land use due to factors such as cultural transformations and population growth in the course of time. These changes caused the city to develop in a northerly direction. The transition between the spaces is provided with the traditional street layout. The commercial area has expanded, worship has continued in places of worship, the madrasa has been used as a museum, educational buildings have continued to provide education and baths have continued to function as baths. The continuity of the spatial traces of the past indicates the historical importance of the conservation area, where Akşehir Houses are located. Accordingly, it has been determined in the morphological region results of the land use of the Akşehir urban conservation area that the traditional houses with unchanging architectural typology on Grand Mosque Street and Flour Mill Street reflect the urban character of Akşehir.

Land Use



Morphological Region of Land Use

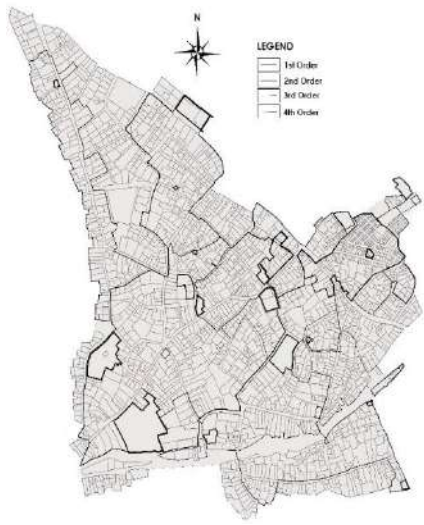


Figure 9: Land use and its morphological region in Akşehir urban conservation area (illustration: authors).

6.2 Building type and its morphological region

In the analysis of building type, the floor heights and materials of the buildings are taken into consideration. According to the analysis, it has been observed that Old Akşehir Houses are generally one or two-story buildings while new settlements are four or five stories. Old Akşehir Houses, which have one or two floors, are made of wood and adobe material. The buildings in the new settlement area are made of reinforced concrete. Most of the buildings in the city center of Akşehir, which has a cultural mosaic, are from the 18th-19th centuries and lie to the south and west. The most recent period of construction has filled the empty plots in the north (Figure 10).

Building Type *Morphological Region of Building Type*

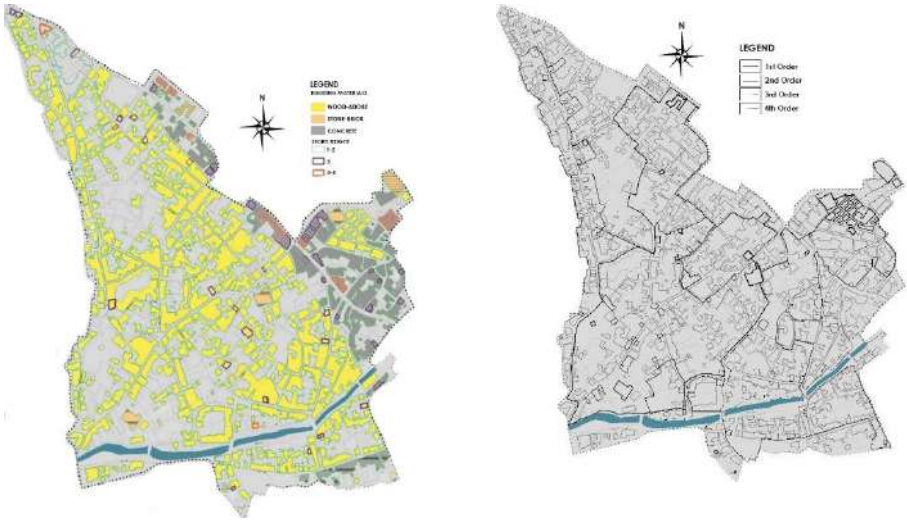


Figure 10: Building type and its morphological region in Akşehir urban conservation area (illustration: authors).

The periodical change of the type of the buildings in the urban conservation area, where Akşehir Houses are located, has been examined. The morphological regions of the existing building type in this area were examined by dividing the existing building type into four-order boundary areas, i.e., "pre-1467, between 1467 and 1923, between 1923 and 1950 and post-1950". As a result of the morphological

region of the building type, it has been observed that low-rise buildings made of wood-adobe or stone-brick materials on Grand Mosque Street and Flour Mill Street have a fabric that reflects the urban character of Akşehir. With the increase in population, new buildings began to be constructed to the north of the city. The city center reflects an evolution where new and old co-exist.

6.3 Town Plan and its morphological region

The morphological region of the town plan consisting of streets, plots, and buildings in the traditional city center of Akşehir has been examined. This provides a better understanding of the historical process of the town plan and an analysis of the building layouts. In Figure 11, buildings, streets, and plots have been grouped and a morphological region map has been created for the urban conservation area. From this point of view, there has not been much change in the fabric of Old Akşehir Houses throughout the historical process. However, the city center, which is between the new and old settlement areas, has undergone changes in the process. Generally, this change did not spoil the physical pattern of the city. With the increase in population, the city expanded towards new residential areas.

The periodical change has been examined via the Town Plan in the conservation area hosting the Akşehir Houses. In this area, the morphological region of the town plan was made by dividing the historical Town Plan into four-order boundary areas, namely “pre-1467, between 1467 and 1923, between 1923 and 1950 and post-1950” periods. As a result of its morphological region, it has been observed that Grand Mosque Street and Flour Mill Street have preserved their fabrics. When the size, depth, and façade of the plots on these streets, which maintain their characteristics, were examined, no major change was observed in areal size (Figure 11). It was also observed that these streets function as social interaction areas at the nodal points where they intersect. Other streets and plots within the urban conservation area have undergone transformation in the process.

Town Plan *Morphological Region of Town Plan*

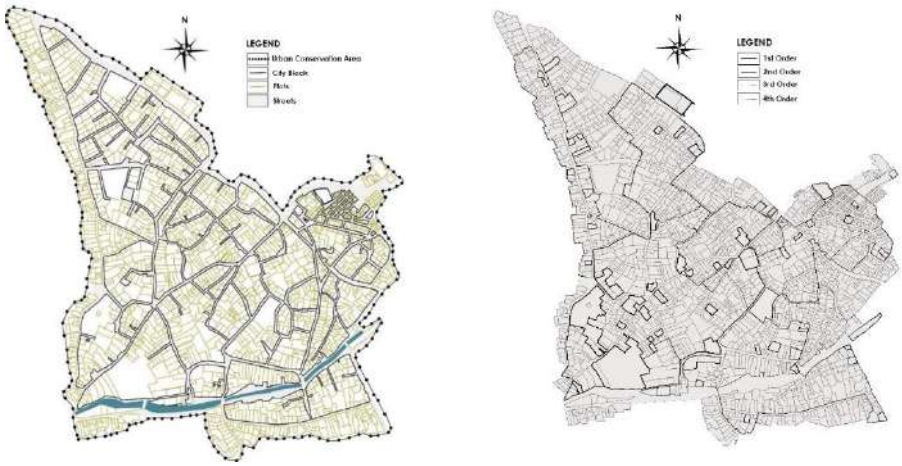


Figure 11: Town plan and its morphological region in Akşehir urban conservation area (illustration: authors).

7 Research Findings

It is understood that the change in the urban space has emerged with the integration of the regions and areas of the city that enjoy different characteristics and has been shaped in the historical process. Each new period brings with it some spatial elements from the cultural lifestyle of the previous periods. Thus, the spatial structure of today's city emerges.

Conzen not only reveals the spatial structure of today's cities, but also ensures that the urban fabric that contains social experiences, historical background and the context of the space are exposed.

Conzen (1960) argues that it is possible to analyze the character of urban space with the analysis of land use, building types and town plan to create distinctive sub-regions in an urban area. Based on this approach, analyses of the sample area of Akşehir Urban Conservation Area were carried out in three stages: land use, building types and town plan. Overlapping these stages enables us to see on a single map the transformations of the city in its developmental process as well as its historical layers (Figure 12). With this map, the morphological character of the city that has formed throughout the historical process is revealed. As a result of the morphological regions, it has been observed that Grand Mosque Street and Flour Mill Street, which

connect Tekke Boğazı and the Historical Bazaar, reflect the urban character of Akşehir.

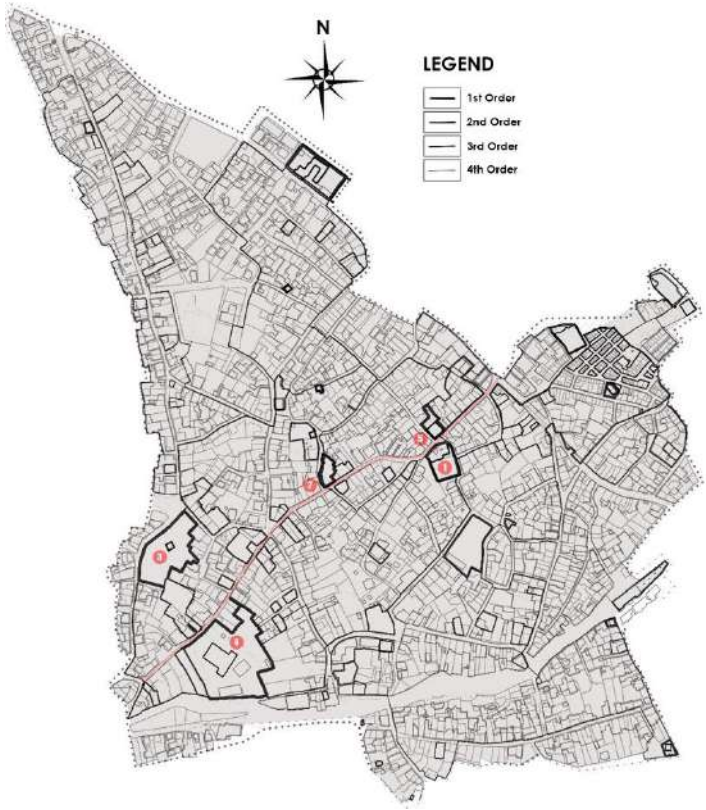


Figure 12: Morphological regions of Akşehir urban conservation area (1- Grand Mosque, 2- Middle Bath, 3-Seyyid Mahmut Hayrani Tomb, 4- Armenian Church, 5-Nasreddin Hodja Archaeology and Ethnography Museum) (illustration: authors).

Grand Mosque Street and Flour Mill Street, which reflect the urban characteristics of Akşehir, form a strong pedestrian-vehicle axis connecting Tekke Boğazı to the city center. These organic streets bear the traces of Akşehir's undisturbed traditional road fabric (Figure 13). The houses opening to these streets generally have a low-rise plan type, with gardens and inner and outer halls that keep neighborhood relations strong. The importance of the street is highlighted by presenting Grand Mosque, Middle Bath, Seyyid Mahmut Hayrani Tomb, Armenian Church and Nasreddin Hodja Archaeology and Ethnography Museum on Grand Mosque and Flour Mill Streets, which reflect the urban character of Akşehir.

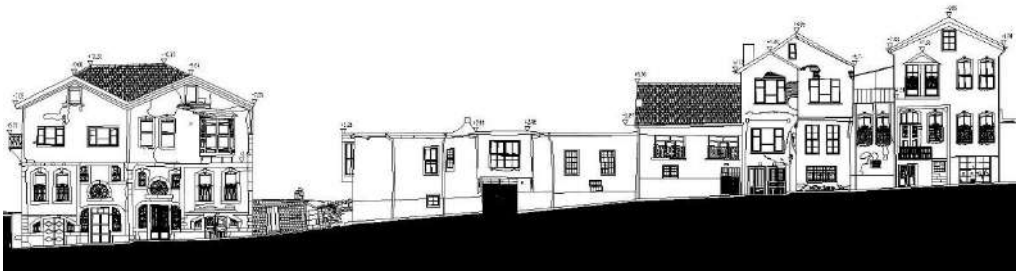


Figure 13: Silhouette of flour mill street (source: Akşehir municipality,2020)

7.1 Typological examination of the buildings reflecting the characteristic features of the city, which emerged as morphological regions result.

Conzen's morphological regions approach analyzes an urban space at three levels: land use, building types and town plan. By overlapping these levels, it enables us to see on a single map the transformations the city has undergone in the development process as well as its historical layers. The characteristics of an urban space are analyzed with this map. Based on this approach, analyses of the Akşehir Urban Conservation Area, i.e., the sample area, were conducted in three stages, namely land use, building types and town plan. By overlapping these levels, the transformations of the city in the developmental process were revealed (Figure 12). As a result of the application of the morphological regions method, it has been determined that Grand Mosque Street and Flour Mill Street, which connect Tekke Boğazı and Historical Bazaar, reflect the urban character of Akşehir. The importance of the street was emphasized by making a typological examination of Grand Mosque, Middle Bath, Seyyid Mahmut Hayrani Tomb, Armenian Church and Nasreddin Hodja Archaeology and Ethnography Museum located on these two streets, which reflect the urban character of Akşehir.

A multi-functional land use was observed within the Urban Conservation Area, including Traditional Akşehir Houses and buildings of trade, worship, and education as well as madrasahs and Turkish baths. Grand Mosque is the first architectural example that has shaped the spatial structure of Akşehir and reflects its urban character under the influence of Islamic culture. Just as it did it in the past, Grand Mosque still functions as a place of worship today. Commercial areas around Grand Mosque that have traded in grains, ropes, rugs, fish, leather, etc. have been operating as bazaars from past to present. While the fish trade is based on the existence of Akşehir Lake, the commercial activities related to tanning are based on the existence

of the Akşehir Stream (Özcan, 2005). When viewed from the perspective of spatial organization, it has been observed that commercial activities are concentrated around Grand Mosque. In this sense, the commercial areas around Grand Mosque and Old Akşehir Houses reflect the urban character of the past. The total floor area of the Grand Mosque and its courtyard covers an area of approximately 1200 m2. The mosque consists of an irregular rectangular space on the south-north axis. Its minaret is positioned on its north-east façade. It is composed of two parts, namely the courtyard and the harim. Cut stone, rubble stone and brick were used as materials in its construction. The multifunctional use of Grand Mosque and its surrounding spaces shows that it is Akşehir's main node (Figure 14).

(a) **(b)** **(c)**

Figure 14: Buildings reflecting the urban characteristic of Akşehir (a-Grand Mosque's Plan b-Grand Mosque's Exterior c-Grand Mosque's Interior (illustration: authors).

It is seen that the ground floors of the residences overlooking the main Street (Grand Mosque Street), which is located at the central focal point of Akşehir, serve as commercial units. In addition to examples where the use of the ground floors is for purely commercial purposes, there are also examples where only parts of the ground floors are used as commercial spaces. The floors above the ground floor are generally used for residential purposes and have a plan typology with a two-section

hall. The commercial and residential spaces on Grand Mosque Street reflect the traditional urban character of Akşehir.

Middle Bath is the second architectural example reflecting the urban character of Akşehir on Grand Mosque Street. Middle Bath continues to function as a bath as it did in the past. Middle Bath has a four-iwan typology. Cut stone, slate stone, rubble stone and brick were used in construction of the bath (Figure 15).

(a) **(b)**

Figure 15: Buildings reflecting the urban characteristics of Akşehir (a-Middle Bath Plan b-Middle Bath Street-Facade Relationship (illustration: authors).

The third architectural example reflecting the urban character of Akşehir on Grand Mosque Street is the Seyyid Mahmut Hayrani Tomb. The tomb has a square plan and was built with cut stones and bricks. It contains geometric decorations shaped by laying the bricks in various ways (Figure 16).

(a) **(b)** **(c)**

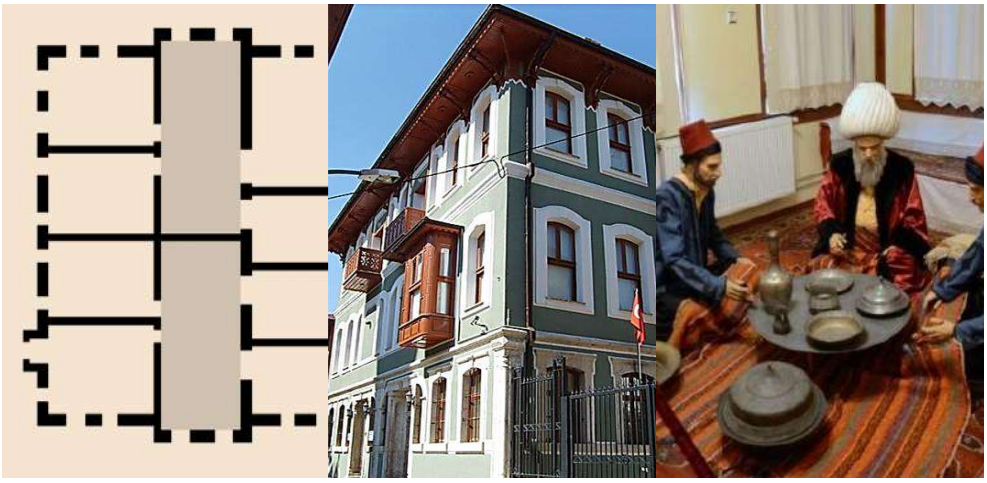
Figure 16: Buildings reflecting the urban characteristic of Akşehir (a-Seyyid Mahmut Hayrani's Tomb Plan b-Tomb's Facade c- Tomb's Interior (illustration: authors).

The fourth architectural example on Grand Mosque Street reflecting the urban character of Akşehir is the Armenian Church. The church is entered via Flour Mill Street. There are wooden additions to the right and left of the church entrance that provide access to the mezzanine floor. The church has a basilica plan, is made of masonry and rubble stone, and covered with a vault. The church is divided into three naves with two rows of columns. The middle nave is wider and higher than the others. There is a domed roof supported by six marble columns perpendicular to the apse in the middle nave. There are round arched windows and niches with protruding apse parts (Figure 17).

(a) **(b)** **(c)**

Figure 17: Buildings reflecting the urban characteristics of Akşehir (a-Historical Armenian Church Plan b-Church Facade c-Church Interior (illustration: authors).

The fifth and last example on Grand Mosque Street reflecting the urban character of Akşehir is the Nasreddin Hodja Archaeology and Ethnography Museum. The museum has a plan type with an inner hall, which is often used in traditional Turkish houses. Symmetry has been considered in both the architectural plan and the façade layout. Stone, brick, wood, adobe, and iron materials were used in its construction. The entrance to the museum is from Grand Mosque Street. The halls facing the Grand Mosque Street are in a protruding form. Ornamental motifs have been used on the wooden oriels (Figure 18).



(a) **(b)** **(c)**

Figure 18: Buildings reflecting the urban characteristic of Akşehir (a- Plan of Nasreddin Hodja Ethnography and Archaeology Museum b-Museum Façade c-Museum Interior) (illustration: authors).

When the general fabric of the region is examined, it has been determined that street types create small social areas at the intersections of narrow streets. When the size, depth and façade of the plots are examined, it is seen that in the course of time, the sizes of the plots have decreased, the depths have increased, and the façades have narrowed.

8 Conclusion and Suggestions

M.R.G. Conzen's morphological region method examines the physical change of a city center from past to present. The physical change of the city is graded depending on the historical layers. Thus, it aims to prepare a development plan and to ensure the continuity of the city. For this purpose, the Akşehir urban conservation area was analyzed in terms of land use, building type and Town Plan by applying Conzen's morphological region method. As a result of the analyses, changes were observed in the Akşehir urban conservation area in the historical process.

Akşehir city center developed around mosques dating from the Seljuk and Ottoman periods. Commercial areas have emerged around this center in the course of time. Within the urban conservation area, residences exist around Grand Mosque

where ground floors are used completely as commercial spaces or only a part of the ground floor is used as a commercial space. The Historical Bazaar, located near İplikçi Cami, has served as a trading center from the past to the present. The commercial spaces around Grand Mosque and İplikçi Cami and business spaces on the ground floors of residential buildings reflect the traditional urban character of Akşehir. With the increase in population, new settlement areas developed around the center that had developed in the vicinity of the mosques. Accordingly, Akşehir exhibits urban expansion with the mosques in the city center and the roads opening to the commercial areas. Grand Mosque Street and Flour Mill Street connecting Tekke Boğazı and the center form a strong pedestrian-vehicle axis. The traditional road fabric has developed with the side streets organically connected to this axis. Each civilization has built houses that open to these streets in a way that reflects their own cultural traits. The houses generally have a low-rise plan with gardens and a design feature that keeps the neighborhood relations strong.

In addition to providing a basis for studies investigating the formal change in urban space, the present study also provides a method for decisions to determine new settlement areas for the development of the city, its expansion towards the periphery as well as its sustainability. Studies should be conducted in the light of the information obtained from traditional forms and fabrics to ensure the continuity of the landmarks of the place and to make decisions regarding them. In this context, the characteristic fabric of Akşehir urban conservation area provides a source for and contribution to the development of an innovative approach towards the field of morphology and planning of historical preservation.

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Ethics of research and publication was observed in this article. Ethics committee approval was not required for the study. Support was received from Akşehir Municipality in obtaining some of the data used in the study. We would like to thank Akşehir Municipality for providing the necessary data.

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BUILDING A NARRATIVE SPACE IN THE ARCHITECTURAL DESIGN STUDIO: THE BORGESIAN LIBRARY OF BABEL

Beyhan Bolak Hisarlıgil[1]

Hakan Hisarlıgil,[2]

INTRODUCTION

In this study, the construction of the narrative space in literary texts is explained in the architectural design studio. In such architectural design works, literary texts are interpreted through spatio-temporal metaphors. Based on the texts of Jorge Luis Borges, the design works of students, which are carried out in the Architectural Design Studio in the Spring Semester of the 2019-2020 Academic Year at the Architecture Department of the Faculty of Engineering and Architecture of Istanbul Rumeli University, are the outcome of the experiences of such spatio-temporal metaphors. The fruitful metaphorical content of these texts allows students to experience space in numerous way that are incomplete, ambiguous, disfunctional and extraordinary. For this purpose, students were expected not only to represent their own spatio-temporal experiences based on such fictional qualities but to investigate the limits of representation techniques in terms of design work. Accordingly, students were asked to design the Borgesian Library of Babel, the lost and legendary labyrinth built in Borges' labyrinth stories as a case study. The Borgesian Labyrinth, which is a true literary labyrinth, is an architectural symbol that virtually contains all characters of all possibilities and all the actions of the universe. Challenging the limits of their personal imagination, the students realized their designs by examining the multi-layered depth of such a labyrinth that went beyond a personal orientation. Through such a labyrinth, Borges suggests making a turn to the left at every intersection point, which is the road that is paved to the heart of a labyrinth. Therefore, while students investigate various spatio-temporal experiences in which they themselves bifurcate, they design a library based on the experience of bifurcation in time and space.

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This study aims to explore the essence of spatial qualities that focus on the creative process of design through the translation of literary fiction into architectural narratives, rather than sculpting an architectural object with direct reference to the forms associated with creativity. For this purpose, based on the texts of Jorge Luis Borges, the spatio-temporal experience based on metaphors is discussed through student studies integrated into the architectural design studio. With these studies developed in the second year, students are directed to interpret, synthesize and spatially translate the given texts of the author. In this process, literary texts are interpreted through spatio-temporal metaphors. Rather than being limited to a specific design program, architecture students are encouraged to design works as a construction of the narrative space in literary texts to develop spatial reasoning skills and tools.

THE BORGESIAN LOST AND LEGENDARY LABYRINTH

Since the day it was understood that photons show both wave and particle properties at the same time, our view of time and space has become much more different. Now, the possibilities of photons being there and elsewhere at the same time are being investigated in the scientific world. According to quantum physics, time is a two-way street; accordingly, it is claimed that the time dimension is both progressive and regressive. According to this view, the motion of quantum particles carries no "time dimension" because it is faster than light. Based on this dimension, according to the parallel universes view put forward by the American physicists Hugh Everett III and Bryce Dewitt in 1957, it is thought that "dead and living universes can exist at the same time" (Clark, 2021). In the texts of the Argentine short story and essayist Jorge Luis Borges, a thought close to parallel universes prevails: everything is simultaneously real and dream, dead and alive, finite and unlimited, meaningful and meaningless. Because they are texts that are only a few pages long, with exemplary economy of expression, and because his stories frequently adopt the outer form of a genre from popular literature, a form proven by long usage that produces almost mythical structures, Italo Calvino (2017) believes that each of Borges' works contains a model of the universe or of an attribute of the universe (infinity, the innumerable, time eternal or present, or cyclic).

The labyrinth metaphor is used in his stories titled "The Garden of Forking Paths", "The Library of Babel", "Tlön, Uqbar, Orbis, Tertius", "The Immortal", "The Secret Miracle", "Ibn Hakkan Al-Bokhari, Dead in his Labyrinth", "The Two Kings and The Two Labyrinths", "The Lottery in Babylon", "Death and the Compass" and "The House of Asterion". Author Franz Kafka was also a precursor to Jorge Luis Borges, who widely uses the metaphor of the labyrinth to denote not only space and

time, but also the complex nature of being and existence that are inextricably intertwined in his articles. Thus, his primary philosophical concerns are the nature of reality and the nature of how we perceive it, so the labyrinth—in all of its infinitely varied spatial, temporal, logical, and psychological manifestations—becomes in his essays an architectural metaphor for the epistemological complexities of time and space (Redekop, 1980).

Borges, in his essay “The Garden of Forking Paths”, describes a labyrinth taking on a temporal structure (Lewald, 1962: 631): “diverse futures, diverse times which themselves also proliferate and fork” (Borges, 1962: 37). Among all the events and the multitude of options, Borges describes Dr. Stephen Albert's House as follows (Borges, 1962: 33, 34):

"The house is a long way from here, but you won't get lost if you take this road to the left and at every crossroads turn again to your left."

This phrase reminds the character of the story that he is always instructed to turn left: “the common procedure for discovering the central point of certain labyrinths” (Borges, 1962: 34). Students of architecture were expected to delve deeply into the multi-layered profundity of this labyrinth-library when asked to create a Library of Babel based on Borges' labyrinth stories. The labyrinth metaphor in Borges can be read through concepts such as probability, bifurcation, time-space, and infinity (Figure 1). Students design a labyrinth-library based on the experience of bifurcation in time and space, while living various spatio-temporal experiences in which they themselves bifurcate during the design phase: countless alternatives in which one is selected and the others are eliminated when each option in space is encountered. Students follow the instruction to turn left at each intersection, which is the road to the heart of a labyrinth. The dilemma that results from this condition is similar to the one from the "Library of Babel" in that the universe is seen as eternal and constantly starting over.

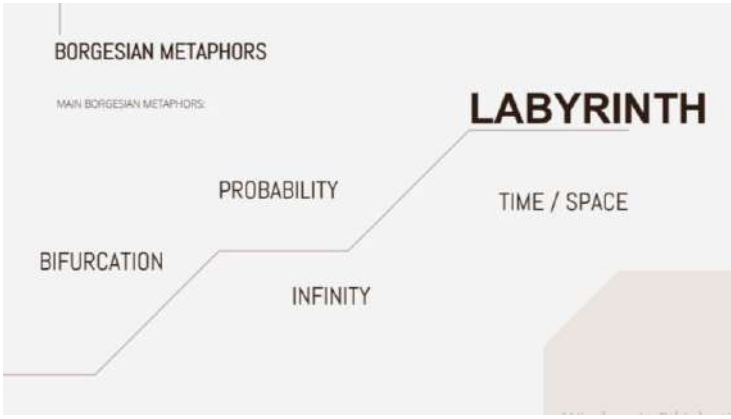

Figure 1. Main Borgesian Metaphors

The "Library of Babel" story is an endlessly repeated library alongside Jorge Luis Borges' "The Garden of Forking Paths," which features the synchronicity that develops in a murder narrative split into countless possibilities; the story "Tlön, Uqbar, Orbis Tertius" describes a place where the past and the future exist in the "now," but where the "now" is also uncertain, even where "all time" has already come to an end. There is no time outside of the present in any iteration of the labyrinth, but the present is also deceptive. In "The Immortal" and "The Secret Miracle," time and the past are altered; whereas an event only lasts for a brief period of time in real life, it lasts far longer in the mind of the person experiencing it. Labyrinth is the idea that this short time can last a long time. The individual comes into contact with his alternative possibilities in repeating and repetitive spaces. The labyrinth is also the coexistence of things that seem (considered to be) very different from each other. The Borgesian labyrinth encompasses the notion of a multidimensional universe made up of unknowable factors, as well as the concepts of mixing and dissolving simultaneously. People have the chance to see the area in a variety of dimensions while they are in the labyrinth; this process entails repetition and mistakes. In Borges' story, this sensation in all the spaces around the human corresponds to the universe.

THE ARCHITECTECTONIC CONTENT OF BORGES' LIBRARY OF BABEL

The concept of assembling all of humanity's acquired knowledge in one distinct location dates back to Antiquity. The most well-known methodical attempt to bring this idea to life was probably made when the Library of Alexandria was created in the third century B.C. (Theodor, 2009). In response to this utopia, Kurd Lasswitz, a German scientist, philosopher, and science fiction writer, published a story in 1901

titled Die Universalbibliothek (The Universal Library), which described a library in the sense that it not only contained all existing manuscripts but also all possible works (Lasswitz, 1997). According to fiction that serves as an example of elementary combinatorics, the number of books that might be produced using this method is an impossibly large number made up of a "1" and 2000000 zeros. It also claims that it would take far more room than the observable cosmos to fit this enormous amount of books into boxes with 1000 volumes each. An accurate example for understanding the "Universal Library's" mind bending statistics would be as follows: Each atom in the universe functions as a printing press, producing as many printing machines as there are atoms, each of which is capable of producing as many books in a millionth of a second as there are atoms (Theodor, 2009). Kurt Lasswitz's imaginary universal library served as a forerunner to the virtual libraries on the Internet like Google, which was called in 1938 by 8-year-old Milton Sirotta and his uncle Edward Kasner as a shortened form of googol (Nath, 2013).

Jorge Luis Borges expanded on "The Universal Library" in 1941 as "The Library of Babel." Lasswitz, a mathematician and philosopher, went into practical detail while Borges used magical imagery to describe the library. The narrator of Borges' short story "The Library of Babel" describes a library with hexagonally arranged passageways. The library area, where the hexagons are endlessly interconnected, is a universe of possibilities that contains all the books ever written (Millen, 2015). In an interview with Christina Grau that is published in “Borges y la Arquitectura”, Borges explained the reason for selection of the hexagons in his set:

I first imagined a succession of circles since the circle gives the impression of being disoriented, but the gaps left between the circles troubled me. Later, I chose hexagons since they fit together without the need for additional figures (Basile, 2018).

According to Fernandez, Borges' account is not a hazy [desdibu-jado] dream; rather, his lucid nightmare portrays the library with the accuracy of an expert of an architect (Basile, 2018). Corollary, a number of artists and architects have been inspired by the library's evocation in the text to create a visual or evocative rendering of the inside that are easily accessible online at present: Packer's bold expressionist frontispiece in the Folio edition of Labyrinths, Stefano Imbert's drawing that adorns the cover of this book, Piranesi-like drawings of Desmazières, Toca's symmetric honeycombs in Architecture and Urbanism. However, all of these designs somewhat compromise the accuracy of the architecture as it is described in the text. This can be explained by the designers' desired outcome or by the paragraph's ambiguity, which allows for designers' boundless creativity and the spatiality of the library, which raises the question of the structure's form and coherence (Bloch, 2008).

THE ARCHITECTURAL STUDIO WORKS OF LIBRARY OF BABEL

In a similar vein, the students questioned the spatial/architectonic content of the library, which included not only that cryptic, mind-bending text but also Borges' essays that give an creative environment to experience limitless labyrinth-like constructions. In the first student study chosen, hexagonal spaces are arranged inside of one another using Borges' metaphor based on the numbers 14, 9, 7, 4, and 3. This intertwining means that the past and the future are all intertwined. All sweepstakes open up to other sweepstakes: from each venue to other venues, and when moving to another venue, some have 3 more venues, some have 7 more; in some, this place is empty. This library is multiplying and forking. The spiral staircase described in Borges' story is one of the main decisions of this design. This staircase itself also functions as a library (Figure 2).

In terms of space, Wichmann (2003) claims that we are dealing with a static, symmetrical labyrinth that lacks a center and entrances, yet the symmetry and rigorous structure show that the Library was created by a Creator or Design.

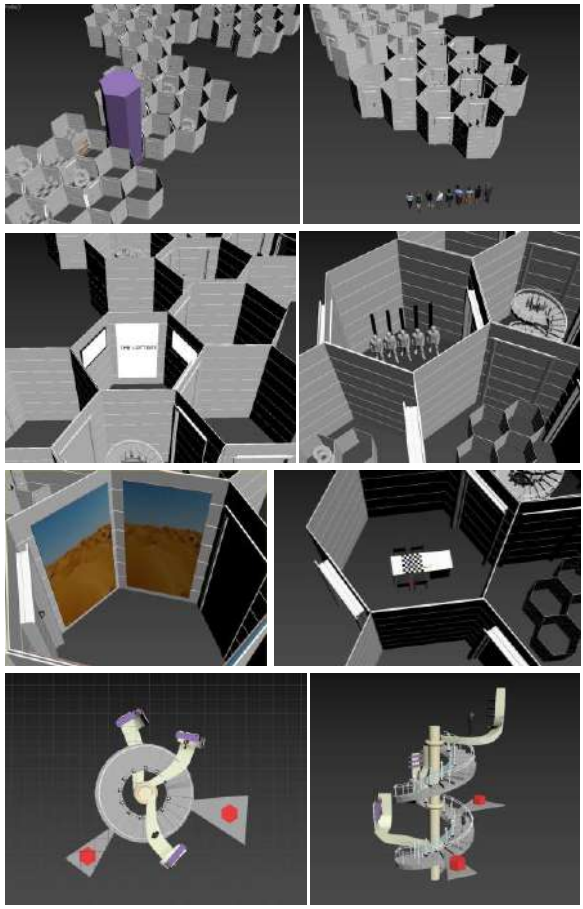

Figure 2. Design of Library of Babel by E. Keskin

In another labyrinth-library design, there is a labyrinth created by the person who enters it. This labyrinth is constantly moving and expanding; it evolves into an infinite geometry, spherical form (universe). It is a sphere of hexagons packed with no spaces between them. At the end of the labyrinth, it always connects to a red center and this center allows to pass to the other labyrinth layer (Figure 3).

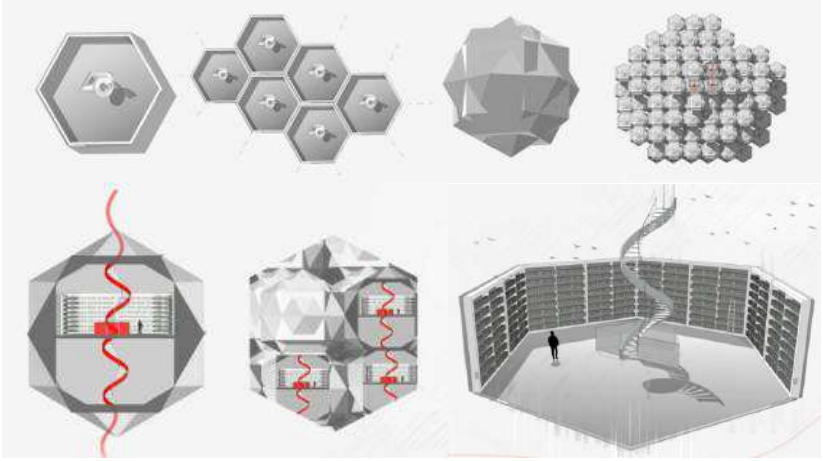

Figure 3. Design of Library of Babel by V. Kılıçarslan

In the design named “Infinite Maze”, an endless labyrinth consisting of hexagons is considered (Figure 4). Each hexagonal room of the labyrinth is a library. This library contains an infinite number of books. In order to find the exit of this maze, it is necessary to find the clues and make choices in the bifurcated corridors. In fact, the exit of this labyrinth is a new life and eternity. People enter this labyrinth without realizing it. People cannot choose the room of that labyrinth, but they can make their way with the options presented to them. Hexagonal chambers with multiple exits are full of multiple possibilities. It is not clear whether the choices to be made will take the person one step further or backwards, on the contrary, they can drag them to another eternity. A single book can be searched among the books, a single guide can be. People may want to find their way out by their own means. However, in this case, what will happen behind the next door cannot be known and it cannot be turned back. In this maze, synchronization is up and down, not left and right. The vertical circulation between the labyrinths is solved with a spiral staircase. Some of the labyrinths have a red sphere in the center of a hexagonal shape. Some of them, which will become visible after we believe the labyrinth's exit has been reached, are the doors of the stairs leading to other rooms. Each room tells a different story, such as one about a prison cell, a library, a garden, or a desert (Figure 4). The volumes in the Library of Babel have words made from letters mixed up. These gibberish words are sought after by people seeking knowledge.

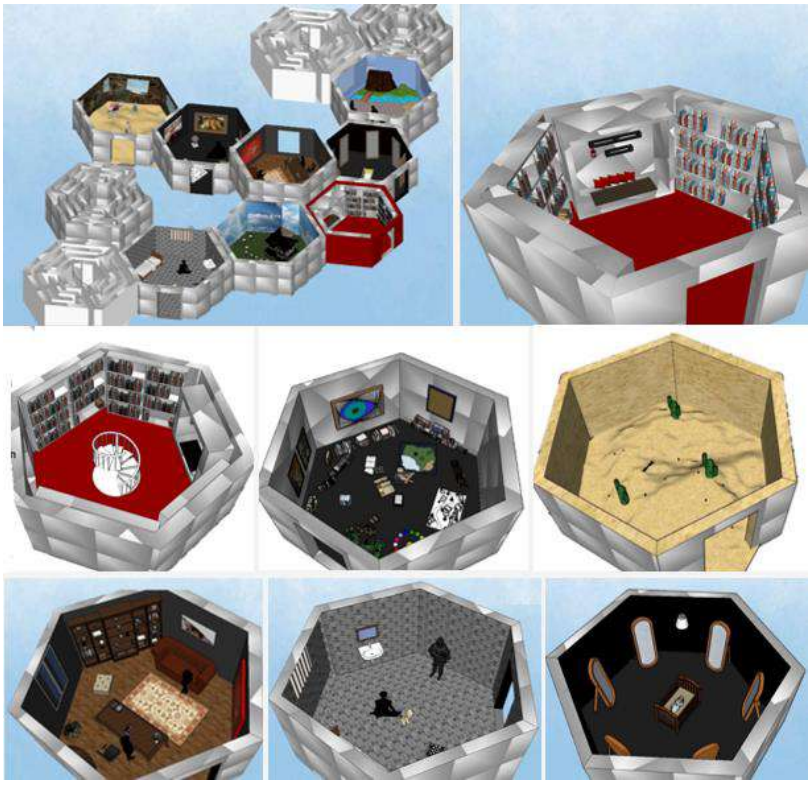

Figure 4. Design of Infinite Maze by T. N. Cil

In another design work, the mass of ramps that ring a spiral high tower has three labyrinths on each floor. The library is accessible once these labyrinths have been traversed. This is the place that Borges' novel refers to as the "red sphere." A part of the labyrinth leading to 4 locked chambers was designed in response to the recurring numbers 3, 4, 7, 9, and 14.There are doors that allow passage to only two of them; one is the input and the other is the output (Figure 5).

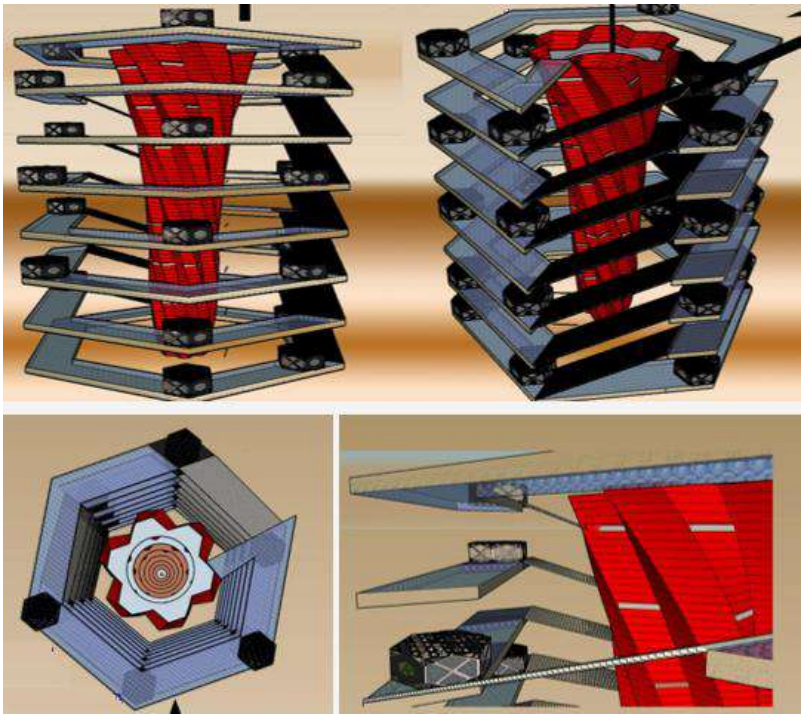

Figure 5. Design of Library of Babel by A. Tatlı

In another design work, there are reading areas at the entrance of the library, then study rooms and in another section collective study areas. The hexagon in the middle is designed as a cafeteria. When you go to the upper floor, you can reach the terrace. There are 9 sections designed in this way in the labyrinth-library. These sections are history, religion, philosophy, novel, literature, etc. grouped by content. The labyrinth is divided into various rooms from the entrance. Then, the hexagon in the middle is reached, the codes given in the rooms are deciphered and the transition to the other sections is provided. Those who cannot solve the codes are constantly wandering in the labyrinth, but they can find their way in the towers with the instructions given to them in order. Those who remain in the labyrinth have hope of a permanent exit. The entrance to the labyrinth is from the area indicated by the red hexagons in the plan; It is provided from the area after the red tower. The labyrinth is gradual. It starts from the red area and progresses, and at the end, the exit is provided from the same area. While the region consisting of red hexagons describes the beginning of life with related books, one level more advanced information can be reached in the region consisting of blue hexagons; the black hexagons section contains the next level of information. The only way to get out of this labyrinth is to reach the red tower and use the necessary information to open the doors of the red area (Figure 6).

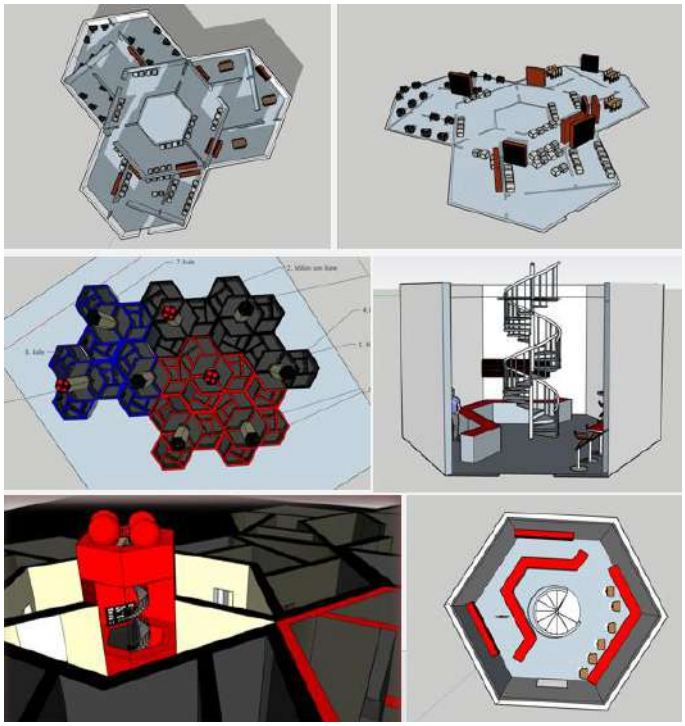

Figure 6. Design of Library of Babel by E. Yıldız

In another design work, the module labyrinth consisting of hexagonal rooms has six different exits. These outputs are derived by combining with modules consisting of other hexagons, and are thought to continue indefinitely. Each hexagon module contains its own unique passwords. These passwords are stored in the books in the bookshelves in the hexagonal rooms. The codes in the books show which doors are the correct exit doors. The labyrinth has no beginning or end, the journey in the labyrinth can start from any room. All passwords lead to the red hexagon, where the books containing high-level information are located (Fig. 7).

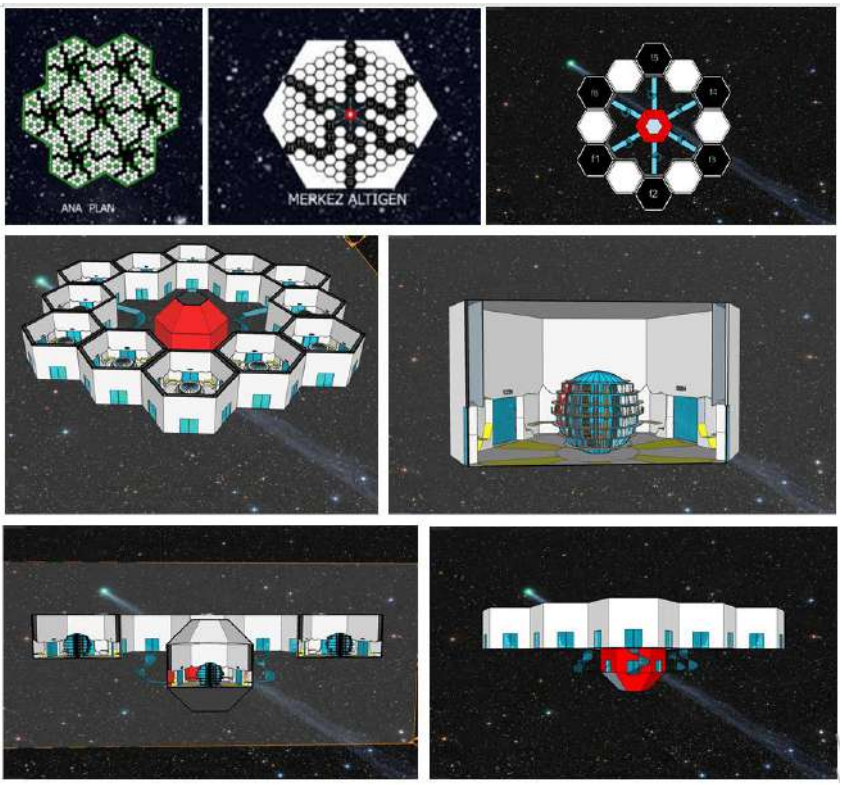

Figure 7. Design of Library of Babel by S. Bingol

Generally, there is a spatial construct derived from hexagons in student works, which creates the perception that it can be derived forever. Some designs used the spiral staircase directly, while in others this spiral was explained with the space setup. In almost all studies, Borges' instruction to turn left was applied to find direction in the labyrinth. The red globe and red hexagons were included in the fictions, and these spaces were given the quality of access to high-level information. Navigating these labyrinth-libraries allows us to feel the existence of bifurcation in space and time in an endless universe of infinite possibilities between accessing information, using the information correctly, and finding the opportunity to get out of the labyrinth.

CONCLUSION

Works of literature such as Borges's stories offer new fruitful material experiences that open up ways to question the boundaries of architectural space by for exploring spatial forms beyond our conceptual understanding of its abstract character and theoretical content. In this context, this study brings a critical perspective to architectural design that can develop productive provocative thinking

in design studies, which are mostly reduced to a specific program in curricula. Through the use of narrative tasks and activities, both instructors and students can increase their capacity for creativity aspects in terms of flexibility and innovation imagination. While creativity is often seen as being associated with the concepts of "genius" or exceptional talent, it may be possible to think of design studios as a trend towards productive narrative activity where creativity can be used productively. With these examples, it has been shown that narrative-oriented design guidelines that include problem-solving and problem-posing tasks and activities can help architecture students develop a more creative process for spatial inquiries.

ACKNOWLEDGEMENTS

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PSYCHOACOUSTIC SPACE PERCEPTION CRITERIA

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Ümit ARPACIOĞLU[2]

1 ENTRANCE

Space is a volume with physical, sensory and perceptual dimensions. In order for a space to meet user requirements, it must meet a variety of comfort requirements. Acoustics is one of these comfort conditions. Sound is one of the physical parameters that are effective in the identification and perception of the space. It can increase or decrease the comfort and quality of the space and change the user experience by making the space perceived differently than it is.

The process of accessing the sound to the receiver, making sense and reactivating it in the receiver is related to psychoacoustics. This study was conducted on interior spaces and its purpose is to explain the effects of spatiality on psychoacoustic by examining the factors between sound and space perception.

The conscious and unconscious responses we give by feeling the external world stimuli with our senses and making sense with our knowledge can be defined as a whole perception. Perception is basically an unconscious event that starts from the moment of birth, develops over time thanks to the experience and knowledge gained, and becomes both a conscious and unconscious process. Psychoacoustic is a branch of science that studies our reactions to what we perceive as auditory. Biological and spiritual processes such as the frequency, magnitude, tone and time-dependent characteristics of sound and the transfer, interpretation and reaction of sound to the brain after it reaches the human ear are included in the field of psychoacoustics research. It can be integrated with different disciplines and disciplines.

Although sound is mostly taken into consideration for hearing spaces, it is important for every space and is one of the physical elements of the space. It can reinforce the message that the space wants to give and increase the effect it will have

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on people. Space and sound are integrated with each other, so space has a great role in the perception of sound. Changing the physical stimuli of the space affects the perception of sound and the thoughts of the user about both the space and the sound.

2 SOUND IN ARCHITECTURAL ACOUSTICS

Architectural acoustics is an area that includes acoustic planning, sound guidance, acoustic material selection and placements to meet the audio comfort needs of humans(Bilmez and Arpacıoğlu 2022). Acoustic planning in places where auditory actions take place determines the quality of the sound and enables musicians and listeners to have a better quality experience.

In architectural acoustics, sound is divided into two to be examined: speech sound and musical sound. Acoustic planning is made according to this separation in the structures. According to the action that takes place in the space, the main function is speech or music sound. Determining the type of sound, source and receiver placement are important for the completion of the space setup. In addition, any type of sound other than sound, which is the main function type of the space, will be considered as noise for the space.

Speech sound: It occurs when regular or irregular sounds continue to follow each other over time. It consists of vowels and consonants. Voice letters are located in lower frequency ranges and silent letters are located in higher frequency ranges. The frequency range of vowels can range from 10 to 5,000 Hz and the frequency range of consonants can range up to 16,000 Hz. For this reason, the intelligibility of speech mostly depends on the silent letters in high frequencies. The sound power of the voices is greater than that of the mute(Küçük 2000).

Musical sound: It has a regular rhythm, has a wide range of frequencies. It has characteristic variables according to the type of music, the size of the orchestra, and the instruments in the orchestra. Each instrument has its own sound, instruments can make sounds in different frequency ranges. Instruments that make noise in the widest frequency range can be given as an example of organ, piano and harp(Özkartal 2011). The music, it's too loud. It consists of different instruments and has the opportunity to host a wide spectrum and countless rhythms thanks to its ability to appeal to different societies. The fact that each instrument can be played in different tones within itself allows different composers to create various harmonies even with the same rhythms while ensuring harmony between each other. In this way, music has universal qualities and can be shaped and enriched around certain foundations. Since music is a phenomenon inherited from the period of our common ancestors, it contains universal evidence. For this reason, it appeals to all humanity and brings

people closer together with a secret bond. The fact that there is a certain standard of human physiology and that certain characteristics of music are universal shows that studies in the field of acoustics are also universal.

There are certain types of sources for sounds in the literature. There are 3 types of sound sources in architectural acoustics. These are: point source, line source and plane source. Calculations and planning in both volume and structure acoustics are made through these resource types. Two sources with the same physical characteristics can create different effects in different volumes and can be perceived differently. For this, the function and sound type (music or speech) in the space should be determined and appropriate acoustic planning should be made. Elements such as the type of music, the length of the playback function, the type of source, and the type of instrument are among the factors that directly affect the acoustic planning of the space. Thanks to this planning, the quality of the listening function in the space increases. In this study, the common psychoacoustic perception criteria for both speech and musical sound were examined by considering all the functions in the space.

3 SPACE PERCEPTION

Space is a physical volume integrated with time. We see the space with its physical dimensions and make sense of it with experiences and senses. The meaning attributed to space is the most important factor in the perception of space. Time is an objective and consequently subjective parameter as a process that enables establishing a relationship with space, having knowledge about space and developing images in memory, and dreaming with space.

The perception of space takes place sensitively and mentally through two successive processes. The data obtained in the sensory process are interpreted in the mental process and a reaction and attitude are formed against them(Taşçıoğlu 2013). Problems that may occur in the sensory process may mislead the perception that affects the mental process. Thanks to the perception process, the existing concrete space is made meaningful and can be handled with its abstract dimension. The Seeker expressed the multidimensionality of the *space as "Although there is a similarity between the space transmitted by the senses and the perceived space, it is very rare that they are identical."* and mentioned how perceptions can change the actual space(Arayıcı 2018). Perceived space is the physical and concrete space in the real world shaped by impressions and reflections on the individual.

In order for the acoustic perception process to start, the sound must be able to reach the receiver clearly. The less changes the sound undergoes between the

receiver and the source, i.e. the less changes it undergoes with space and time, the better the receiver can hear the sound(Jung Ryu, Jae Park, and Hoon Haan 2016). In order for the sound to be less affected by the spatiality: the access of the sounds in the outdoor area to the indoor area should be reduced or interrupted, and planning should be made to ensure that the sound in the indoor area reaches the receiver in accordance with the function.

4 PSYCHOACOUSTIC PERCEPTION

Depending on the physical environment in which the sound is located, the process of being heard and perceived by the listener, making sense of the components of the sound or the whole in terms of the listener is examined with psychoacoustics. Psychocacustic examines not only the perception of sound, but also the emotions that sound evokes (triggers) the feelings that it evokes in the receiver. It enables the place of sound in both individual and social memory to be revealed. Sound perception is more than just the process of reaching and making sense of sound waves to the listener. There are many parameters that affect perception. While some of these parameters change the structure of the sound, others may affect the environment in which the sound passes and cause deterioration in the physical properties of the sound.

The process of interpreting sound in the receiver depends on the physical characteristics of the sound and the space as well as the receiver. Sound can physically exhibit similar characteristics with light as well as perceptually exhibit similar characteristics with light. The sound can mislead perceptions like the light. Sound, like light, can make physical and psychological connotations in people.

Psychoacoustic perception is concerned with how sound can change our feelings and thoughts about space, object, or event, and how space, object, or event can change our feelings and thoughts about sound.

Studies on psychoacoustic perception are about investigating how human perception is shaped in the face of all kinds of sounds. Since the subject of perception can be integrated with different disciplines, the studies conducted include different places and different events. Some of these studies are listed below to explain the study area of psychoacoustics:

- Sound is a physical criterion that can make preconditions, and some voices are directly related to hunger, satiety, fear, disgust, sadness, happiness, anger, desire feelings. This conditioning is also used in today's food and beverage sector(Kolbeinsson et al. 2022). As in the "Little Albert" experiment, certain sounds may be related to the feeling of fear

in humans(Sarıyer 2019). Such sounds can be social as well as individual. Although the sound of the iron rod in the little Albert experiment reflected only fear for Albert, Daniel Libeskind made pain, sadness and fear felt socially with the stepping sound of iron fragments in the hallway of the Holocaust in the Jewish Museum in Berlin(Young 2000).

- The concept of sound landscape is the expression of the connection between sound perception and space. It is a sufficient concept to extract socio-economic and social data, and as it is reduced (subjectivated) to individual data, inconsistencies may occur in the results obtained. Man processes the spaces whose acoustic conditions are protected (sound landscape protected) better into his memory and identifies those spaces through the subconscious. Keeping the acoustic conditions at the optimum level according to the function of the space provides sufficient suitable space for cognitive actions in the space. This applies to both indoor and outdoor spaces. When the sounds, which are the components of this sound landscape, are analyzed one by one, there can be supervised and pleasing sounds, as well as sounds that are free and disturb the ear. For example, in a study on the sound landscape of protected areas around the world, the perceptions and attitudes of people visiting these areas were examined and sound landscape analysis was performed. The Coyhaique National Reserve in southern Chile, Patagonia, was chosen as the pilot region. Study: It revealed the dominant sound sources and types, disturbing sounds and their causes, which are the components of the sound landscape. According to the result: While the sound they constantly hear during the visit was bird and wind sound, the most dominant sound was human-induced sounds (such as breathing, clothes, talking). While foreign visitors stated that they constantly heard the human voice, they evaluated the wind and bird sounds in the second place(Gale, Ednie, and Beeftink 2021). In other words, although the space has its own voice identity, the user of the space can sort the components of this identity according to himself. This result showed that sound allows definitions to be made with subjective perception.

- In another study investigating the relationship between auditory perception and emotion regulation, participants were given a task and informed in advance about the sound they would hear during the task. (The sound they will hear is set to a neutral pink noise and lacks any emotion.) The first of these informations is that the voice they will hear will disturb them very much, and even the previous participants are very

uneasy. The second information is that the voice they will hear will comfort them and previous participants are very pleased to hear this voice. Although the task given was the same, the rate of reaching the result of the first assignment at the end of the study was lower than the second. The creation of a subjective bias about sound has stumbled on the manipulation of participants. The participants misled their own perceptions by attributing emotional values to the voice. This study: It is the first study in the field of voice (auditory stimulus) that reveals the relationship between emotion regulation and strategy(Kolbeinsson et al. 2022).

- In another study, it was shown that sound perception can also affect visual perception when appropriate ambient conditions are provided. It has been revealed that alpha oscillations in the visual cortex of the voice can disrupt the sinus waveform, thus changing the visual perception(Romei, Gross, and Thut 2012). In another study supporting this, it was revealed that auditory perception affected rhythmic brain activities(Snyder 2015).

4.1. Psychoacoustic Space Perception

Sound is a powerful physical factor and cannot be considered independent of space. Sound is one of the main components of the space. Lack or excess can completely affect the perception of space. Sound can belong to a space and make sense of that space, enable the exploration of space boundaries according to the way it spreads in the space, and reinforce the purpose of building the space. Psychoacoustic space perception: It has a wide research area that examines all the connections between sound and space. It examines how a space can be shaped by sound, how the sound can make a space feel, how the sound in the space reaches the receiver and covers the systematization of the connection between them.

Today, interactive spaces (metaverse, virtual universe) are formed by the combination of light, sound and color trio with different combinations to create augmented reality. Thanks to the correct use of the difference and transition between the right ear and the left ear, the effects of the voice on humans strengthen the feeling of a real space(Fitoz and Fergökçe 2013). Knowing the criteria of psychoacoustic perception and managing sound will increase comfort in real spaces and realistic impression in fictional spaces.

5 PSYCHOACOUSTIC SPACE PERCEPTION CRITERIA

5.1 Subjective Sound Quality, Reflection Time

Sound quality is a bi-directional comfort parameter. It is important for both the musician and the listener. In terms of the listener: If the sound cannot reach the receiver clearly in a space designed for listening or speaking, the experience the receiver will have in the space may have a negative impression about the space. He/she may start to spend less time in the space or not spend time in the space according to the size of the negativity he/she will experience or the situation that affects the individual. From the perspective of the musician (or speaker): It is necessary to hear the version of the work from the instrument regardless of the place. It is important for him to be able to connect with his own instrument in terms of managing it. Especially when the orchestras are considered, everyone should be able to hear the sound of their own stretching and the sound of the nearest instruments discretely from the smallest ring.

Sound quality was first examined by Leo Beranek in 1954 with the title "acoustic quality" within the scope of architectural acoustics. In this study, acoustic comfort expectations of both musicians and listeners were determined by examining the auditorial halls. As a result, a common language was found and subjective sound quality concepts between space and music emerged in 17 items. Today, although there are small differences between disciplines in terms of term names, there are no radical changes. These 17 items are: Echo, texture, clarity (definition), vitality, temperature, tone and tone color, embrace, surrounding the listener, acoustic glow, brightness, mixture (blending), unity, proximity to response (responsiveness), damage to tonal quality, balance (moving range), homogeneity of sound (proper distribution), resonance. These items include details from the bass ratio in the sound to the ringing time and tone differences. Thanks to these substances, a musician can express the acoustic quality differences between two different halls where he exhibits the same work(Beranek 2004).

The occurrence of an echo in the space or the damping of the sound before it reaches the receiver also disrupts the clarity of the sound. After leaving the source, the sound reaches the receiver from different angles and distances. Direct sound: sound coming from the source and reaching the receiver directly, indirect sound: It is the sound that reaches the receiver by reflecting from the space surfaces after leaving the source. With both types of transportation, the prolongation of the 60dB reduction time of the sound is called the reflection time, in other words, the time interval in which the sound is reflected with the surfaces until it becomes inaudible

after leaving the source(Johns-Manville 2019). Reflection time that is not suitable for the function negatively affects the comfort of the space and reduces the sound quality. The fact that the reflection time is longer than it should be causes the music or speech to turn into noise. The reflection time required to be indoors depending on the function is determined by regulations and literature, and this time is provided by acoustic planning. The texture of the sound: It is related to the early reflections and masking sounds in the music. Early sound reflections of music reach the listener's ear smoothly. Vitality of sound: It is related to the reflection time. The longer your voice stays in the living room, the more vivid it is. Voice clarity: Clarity is the noticeability of musical sounds. Apart from sound, the clarity (identification) of the sound is divided into two. These are horizontal and vertical identification. The definition depends on both the hall design and the variables of the music. Horizontal identification is related to the harmony between consecutive sounds in music; vertical identification is related to the sudden pause of consecutive sounds in music and its effect on the whole music. Acoustic hugging: It is the sound that reaches and surrounds the listener by making reflections after leaving the source. Acoustic glare: It is when a note or a part of a musical composition is heard more agitated than the rest of the composition. Acoustic temperature: It is the excessive bass (low frequency tones) in the music. Acoustic temperature can be evaluated on the basis of both music and instrument. Tone and tone color: Tone is one of the distinguishing features for sounds. Tone color, on the other hand, refers to the harmony of the orchestra and the balance between sounds at low, medium and high frequencies. Resonance: It is the event where an object vibrates and vibrates other objects with the same self frequency around it. In volume acoustics, it is a great acoustic defect that music resonates with one or more materials in the hall at any note. Mixing and unity: The components that make up music are not completely discrete or completely lost to the ear; it is transmitted as a whole with a balanced composition. The mixture is related to both instrument balance and the orchestra conductor's management skills. Balance: The transition between the solo section and the multi-voice section in the music is in a way that does not distract attention. Homogeneity of sound: It is the equal and high quality delivery of sound to each listener(Beranek 2004).

Welding Location, Number

Depending on the function, one or more sources can be placed in the space. Having a source in the space will make it more oriented. These orientation reinforcements formed thanks to sound can be supported with form and geometry and the identity of the space can be reinforced.

The use of multiple resources and the fact that these resources are placed in different parts of the space ensure that the sound does not create orientation within

the space. It is undesirable to have no orientation for a space with listening function and it is considered as a defect in terms of comfort. The use of multiple resources for a space where actions that do not require orientation such as mutual speech, rest, chatting, and eating take place will not create any problems. The Figure 1layout plans that can be made schematically according to the location of the single or multiple audio source are shown in.

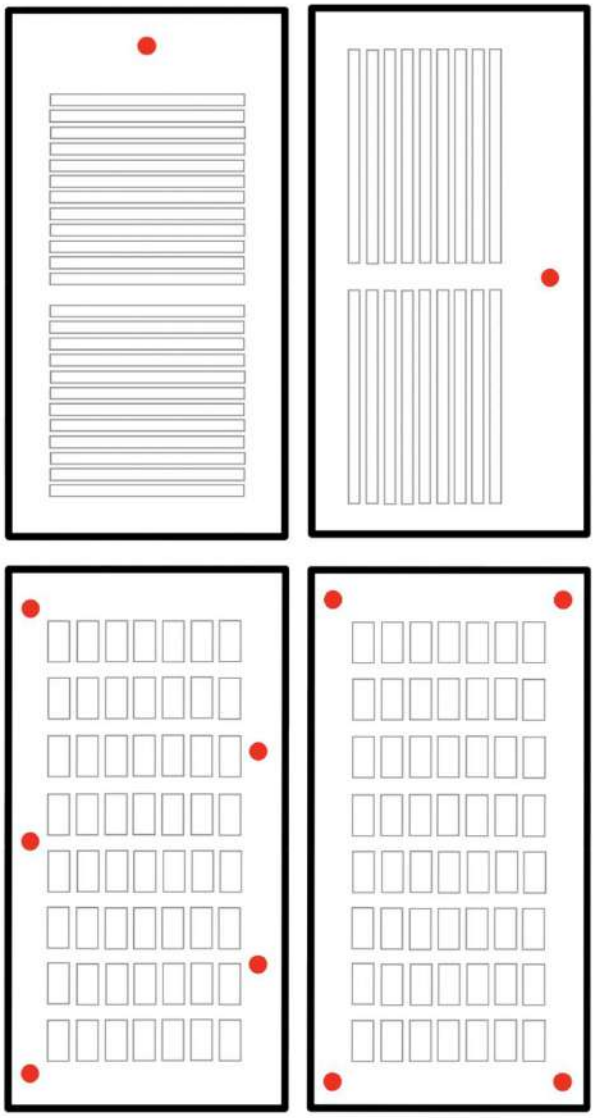

Figure 1: Place Placements by Source Location and Number (Red Spots: Sound Source, Gray: Session Areas)

Since the mid-20th century, the electroacoustic field has emerged as a result of the use of electrical energy with acoustics. Today, the placement of sound sources in different places in the space and the reproduction of a single sound source is possible with electroacoustics. Examples of electroacoustic devices include amps, loudspeakers. While these devices are also used in venues such as cafes and restaurants whose main function is not hearing, they are used indoors or outdoors in concert venues. The biggest difficulty encountered in electroaustic devices is that the shapes of the components of the sound change as the volume of the sound is increased. Although this problem has decreased with advancing technology day by day, it has not been completely overcome(Tarcan 1978). This situation causes psychoacoustic perception to be affected both in terms of source type and source location.

5.2 Form, Reflection

In order to examine the behavior of sound against the surface, it is necessary to know the characteristics, strengths and weaknesses of the sound wave. Sound is a type of mechanical wave that moves smoothly in a linear direction. In general: It has features such as reflection, refraction, image giving, swallowing, resonance. Sound waves exhibit behavior according to their frequency ranges. Low-frequency sounds have large wavelengths and amplitudes and low vibrations, which are bass sounds. When an obstacle is placed in front of low-frequency sounds, although the wavelength is large, they cannot overcome even small obstacles due to low energy and create an acoustic shadow. Medium frequency sounds are called medium tones. They usually coincide with the sound of speech. The wavelength and amplitude of high-frequency sounds are low, their vibrations and energies are high. High-pitched sounds are high-frequency sounds. High-pitched sounds can re-complete the full wave and prevent the formation of acoustic shadows after encountering small obstacles due to their high energy(Tarcan 1978). For architectural acoustics, sound is studied in the 6 frequency range, which is called the octave band. These octave bands: 63-125 Hz, 125-250 Hz, 250-500 Hz, 500-1000 Hz, 1000-2000 Hz, 2000-4000 Hz. Sounds around 500 Hz are medium frequency, sounds between 63-500 Hz are bass, sounds between 500-4000 Hz are treble sounds. For detailed acoustic calculations, 4000-8000 Hz and 8000-16000 Hz ranges can be added to these six octave band values.

5.2.1 Sound Reflection

Surface geometry affects how the sound reflects, the direction of its reflectance, or how many times it reflects. Sound can reflect differently depending on the flat surface or the inclined surface. It can reflect at different angles and amounts according to the type of material between two surfaces with the same geometry. When it encounters a surface, some of the sound is absorbed by turning into heat energy, some is transmitted to the other side of the surface and some is reflected back into the space. Materials with high reflection rate on the surface are called sound reflectors and materials with high swallowing rate are called sound absorbers. Since the placement of these materials in the volume can increase or decrease the acoustic comfort of the listener, it is important to make acoustic planning. In addition, it allows the listener to feel differently in terms of acoustic comfort compared to both the sound source and the absorbent and reflective surfaces in the hall. For this reason, the designer should know how the sound reflects in which surface shape.

The imaginary line dividing the wave by its center at a right angle is called wave normal. The wave normal is used to make physical calculations of the wave. The sound reflects negatively with the angle it comes to the surface. The angle between the normal (line perpendicular to the surface) drawn from where the sound wave hits the surface and the wave is the angle of its reflection (or refraction) (Figure 2shown by theta in). As it moves to an environment of different density, it changes the angle of fracture (coming to the surface) and continues on its way. If the surface it crosses is denser than the surface it comes from, it follows a path closer to the surface and the angle of refraction increases. If the surface it passes is less dense than the surface it comes from, it moves away from the surface and the angle of refraction decreases.

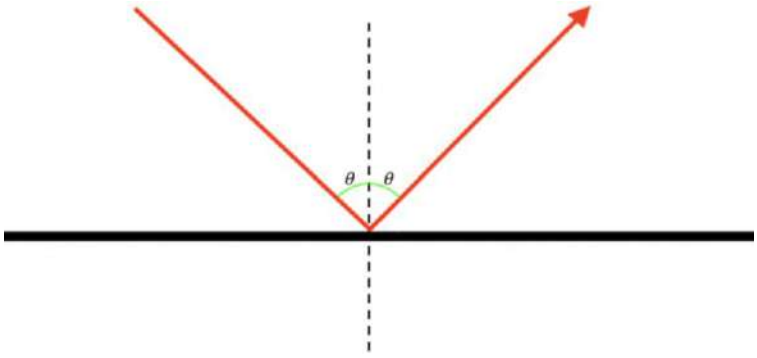

Figure 2: Sound Reflection on Flat Surface

Concave surfaces collect sound and reflect it in a way that corresponds to the center point. Dome, arch and vault surfaces have a concave feature and collect sound.

In terms of acoustic planning, such geometries are more difficult to solve and plan. If it is not planned well, it may cause echo, echo and acoustic shadow formation, and acoustic glare may occur at the focal point where the sound is collected. Convex surfaces dissipate the sound and reflect in a way that corresponds to the extension of their inner centers. Convex surfaces can be used in the overhead plane to facilitate lateral transmission in volume acoustic planning. The degree of curvature of the surface and the material of the surface allow to determine at which frequencies the sounds will be transmitted to more distant points(Bilmez and Arpacıoğlu 2022; Yüğrük Akdağ 2017).

Inner or convex surfaces can increase the acoustic comfort of the space if it is planned correctly and improve the user experience and enable the space to establish a stronger connection with the buyer. It can increase the perceptual value of the space. Sound-reflective surfaces are needed in all hall types. In the hall types whose main function is conference (speech), surfaces where sound can reflect properly are needed. For this reason, halls with speech function are designed mainly with flat surfaces. In the halls with music functions, surfaces that distribute sound are needed to reach the back rows. (Bilmez and Arpacıoğlu 2022; Yüğrük Akdağ 2017)

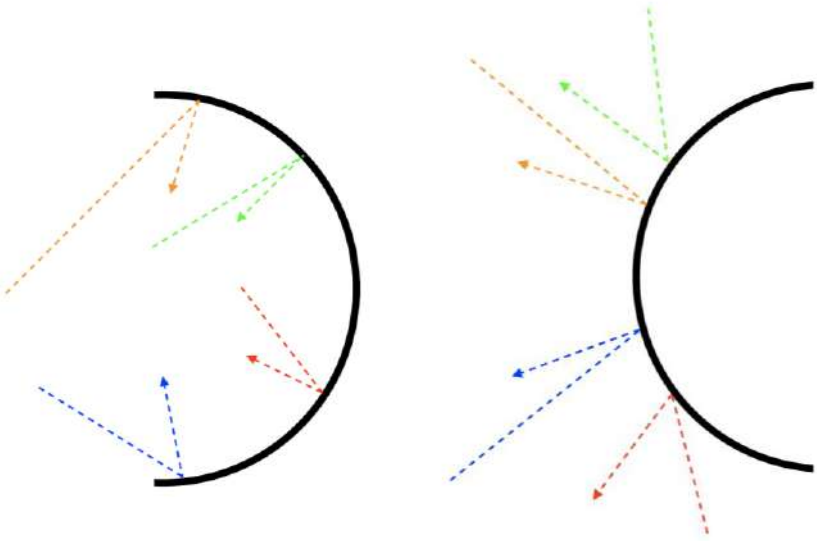

Figure3: Reflection of Sound by Surface Shape, From Left to Right: Concave Surface and Convex Surface (Bilmez and Arpacıoğlu 2022)

The characteristics of the sound do not have the same value in all frequencies. This difference is not limited to energy, violence or speed, but can go as far as shape change(Tarcan 1978). When the sound encounters the same surface at different

frequencies, reflection at different angles and in different amounts can change the total time the sound stays in the space and the amount of reflection it will make. If this feature of the sound wave is ignored, it may not be able to spread within the space as planned.

5.2.2 Venue Format and Sound

The seating areas in the Ancient Greek and Ancient Roman colosseum, stadium and theater structures have a semicircular (two-dimensional parabolic surface close to the semicircle) plan. Although these areas show concave surface characteristics and cause the sound to be collected, this plan type was preferred in terms of visual comfort(Bilmez and Arpacıoğlu 2022). Thanks to the natural resonators placed between the seating areas at that time, this noise prevented them from collecting. These natural resonators are periodically made of stone, soil and copper (or bronze) material and are placed according to their absorption at different frequencies. For example: resonators that swallow low-frequency sounds are placed closer to the stage, while those that swallow higher frequencies are placed farther away(Vitruvius 2015).

Today, in horseshoe and semi-circular plan type halls, the audience areas serve as concave surfaces. By using sound absorbing materials and ensuring that the number of viewers is at least two-thirds of the hall capacity, the amount of sound that can focus can be reduced. The vertices intersecting perpendicularly indoors exhibit a concave surface from an acoustic point of view. The short distance at the intersection point causes the sound to reflect more in a short time. In addition, the higher space height compared to the human size causes the behavior of ceiling and wall joints such as concave surface to increase further and the sound to create more focal points(Bilmez and Arpacıoğlu 2022).

Even if the space has a uniform geometry and similar dimensions, physical parameters such as dividing elements, surface shapes and floor height in the space affect the distribution of sound. For example, when the rowed columns in the space are placed between the source and the receiver, it may cause an irregular distribution of the sound and cause the clarity of the sound that the receiver can hear without the columns to be lost. Figure 4In the plan plane, the sketch of various volumes and the form of sound propagation are given. Sequential column placement and concave surface use are exemplified.

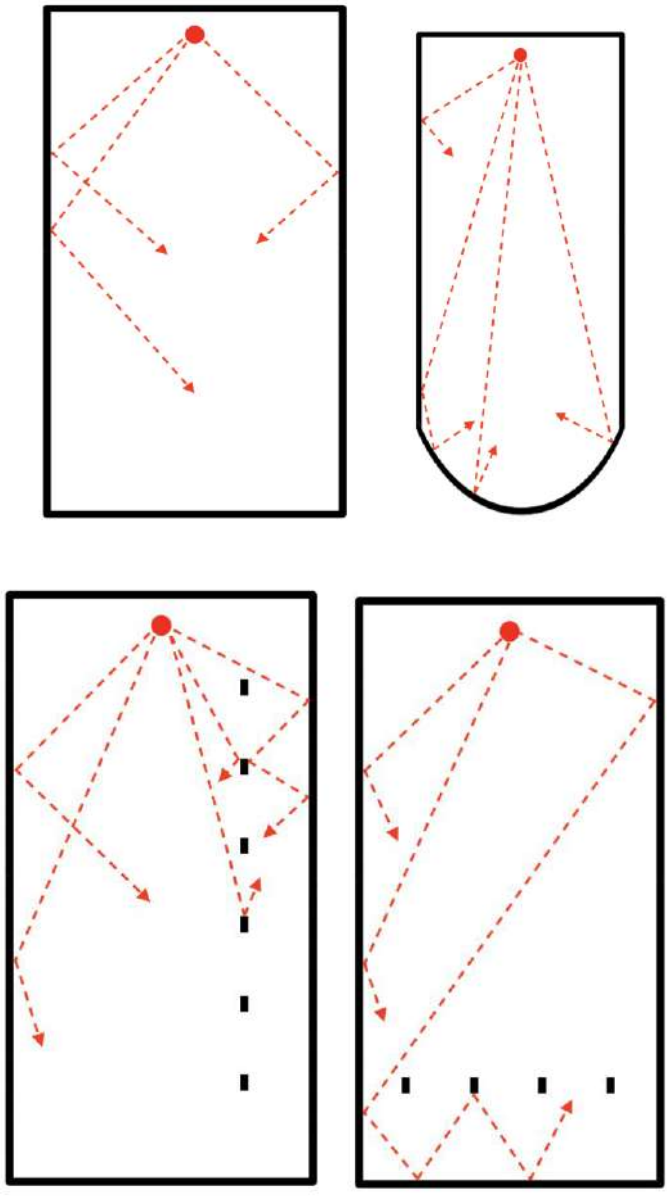

Figure 4: Sound Reflection Shape According to the Shape of the Space (Red Spots: Sound Source)

Reflective surfaces placed in parallel with each other in the space can allow sound to reach much more distant areas and prolong the reflection time. This can occur between the side surfaces or between the ceiling and the ground plane. Absorbent material can be used or surface parallels can be changed to prevent the sound from

reflecting so much. If the sound reaches more distant places than necessary, it may cause the space to be perceived as thinner, longer and negative than it is. The perception of negative spaces as a transition space, not a posture, causes the overall quality of the space to decrease(Frederick 2009). In places intended for listening, the transmission of sound is made consciously. This transmission takes place predominantly through the overhead plane (ceiling) and side surfaces. Thanks to the various acoustic shadow areas created consciously, the sound is prevented from reflecting excessively or being transmitted away from the desire to reflect again and return to the space.

5.3 Distance Between Source and Receiver

In the same volume, an individual who is closer to the source hears the sound higher, while an individual who is sitting farther away hears the sound lower. From the moment the sound comes out of the source, it is subjected to friction and its energy is reduced thanks to material surfaces and listeners, especially air. In addition, the energies of high-frequency sound waves are low, and as the distance between the source receiver increases, it becomes difficult to reach the receiver. Therefore, the individual who is close to the source hears the fine sounds more clearly than the one sitting far away. In terms of speech, vowels remain intelligible even over long distances, while consonants become inaudible as they move away from the source. Transmitting the sound from the source to the receiver with the least change increases the comfort of the space. In volume acoustics, various designs are made on the basis of material, surface and form in order not to reduce the sound quality despite moving away from the source.

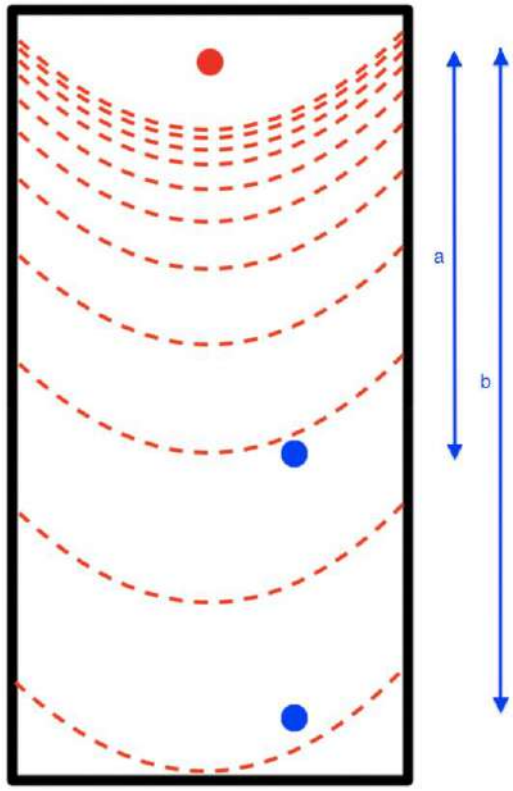

Figure 5: Distance Between Source and Receiver (b>a)

Especially in large volumes for listening purposes, even if listeners hear the same source, they are exposed to direct and indirect transmission in different amounts. While listeners closer to the sound source hear the direct sound coming from the source more dominantly, listeners farther away from the source hear the reflected sound (indirect sound) more dominantly(Tarcan 1978). This situation is one of the factors that determine the acoustic quality of the space, as well as causing differences in perception.

5.4 Volume (Thunder)

Narrow and dim spaces can be perceived larger and wider than they are with light and color, or they can be perceived in different sizes than they are with sound. The loudness of the sound directly affects the perception of the space. As the volume of the sound increases, we begin to feel the vibration in the space physiologically, so

we perceive spaces with loud music as smaller than they are. As the height decreases, we tend to perceive the space in its current size or larger than it is. The most important reason for this is that the number of functions that can be performed in places with high volume decreases, and the decrease in function shrinks the psychological dimensions of the space. Since the decrease in the volume can increase the number of functions that can be performed in the space, it can expand the psychological dimensions. However, if the sound is completely away from the environment and an echo can occur in the space, we perceive the space as thinner, longer or higher than it is. This applies to two audio sources in the same space. If only one of the two audio sources in a space echoes and the other doesn't, we tend to perceive the echo source more strongly (large or significant). The dominant voice in the space is always perceived as the owner of the space and the real identity voice of the space.

5.5 Reflectance

Human hearing organs are at the head level on the right and left sides of the body. For this reason, it is healthier in terms of hearing that the sound coming from the source does not reach the receiver at a right angle, but laterally. Lateral sounds reach the receiver by reflecting after leaving the source. The surfaces reflected, the lateral reflectance angle, the distance between the receiver source, the number of times the sound will reflect and reach the receiver determine the quality of the sound heard.

The perceived source width is the expression of the wider perception of the orchestra-like sound source than it is. The perceived weld width is related to the reflection rate (LF) and increases in direct proportion. When the side reflection rate is high, it will be perceived wider than the source and will affect the perception of the space(Özkartal 2011). Side reflection rate is a variable depending on many parameters such as source type, materials used indoors and surface areas of materials, space dimensions, source and user location.

In order to avoid any difference between the side reflections, the volumes with listening function are shaped symmetrically according to the scene. Side surfaces are planned as the same as height, design, detail, material. In this way, when a different side reflection is desired in music, the desired effect can be given to the receiver with the change in the source. Unless it is done consciously, the difference between side reflections is a problematic situation for all kinds of auditory actions.

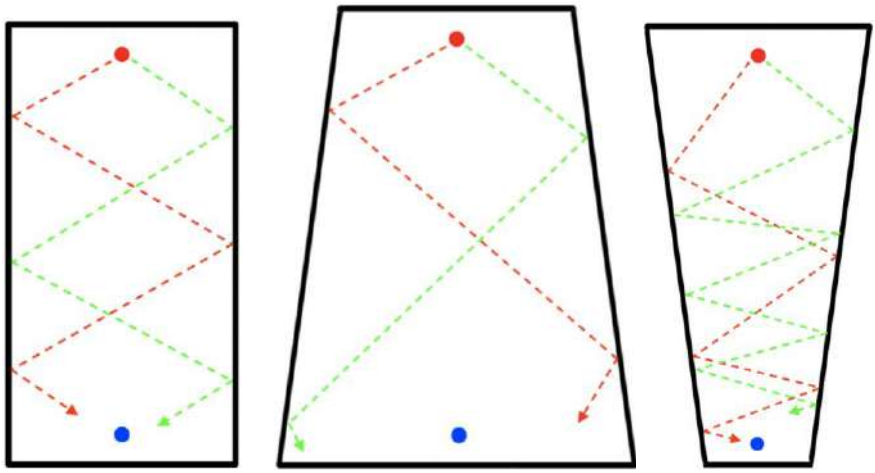

Figure 6: Lateral Reflection of Sound in Different Plan Shapes (Red Spots: Sound Source, Blue Spots: Listener)

Lateral reflections are most closely related to "surrounding the listener" and "embracing", which are the subjective quality criteria of sound. The fact that the listener is wrapped in all directions and provides equal sensation from all directions, not limiting his/her movement during listening is a feature that increases the quality of comfort.

6 EVALUATION AND CONCLUSION

Space is a physical phenomenon seen under the light and can be heard with your voice. It is a whole with its physical, sensory and perceptual dimensions. Acoustics is a comfort parameter that has a direct relationship with the physical and sensory dimensions of the space and an indirect relationship with its perceptual dimensions. Acoustic principles and designs can be examined psychoacoustically after the sound reaches and is interpreted to the individual. Space and sound are compatible and complementary elements. Therefore, architecture is an action of audible and sensible spatialization. The relationship between space and sound is bidirectional. Sound can affect and shape the space as well as the space can affect and shape the sound. Therefore, the reaction to the sound may be due to the shape of the space or surface materials.

All sounds, especially music, can be evaluated in perception with spatiality and temporality. The changes that the sound undergoes until it reaches the receiver occur due to the effect of spatial elements. The space can change the perception of sound directly or indirectly.

Studies show that acoustic measurements and calculations do not show a magnificent parallelism with auditory perception. Sound perception still has a large number of unknowns and is an area where experiments and studies are carried out. Therefore, auditory perception needs to be considered by the designer from both the musician and the listener's point of view.

In order to fully understand the auditory perception process, it is necessary to know the physical movement and behavior of the voice. If the designer focuses only on the effect of sound on humans, the design will be physically inadequate. The architect or designer should consider objective parameters such as acoustic calculation and measurement as well as subjective parameters such as the effects of psychoacoustics on space perception in order to create an illusion of perception or to make the most appropriate acoustic analysis for the space.

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A RESEARCH ON ECOSYSTEM SERVICES PROVIDED BY TREES USED IN URBAN LANDSCAPES

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Yeşim ÖZCAN[2]

INTRODUCTION

The global population's daily living environments are urban areas. Research shows that approximately 80% of the European population live in urban areas (Haase et al., 2014). Global research shows that people living in cities around the world are more than those living in rural areas. In 1950, the ratio of people living in the city to the general population was 30%, while it is estimated to be around 66% in 2050 (UN, 2014).

The primary reason for this increase in urbanization is the quality of life and services offered by cities to people. However, deficiencies in city planning and design have resulted in a slew of issues today. When building today's cities, green areas and natural ecosystems have been largely destroyed. This destruction of green areas reduces biological diversity and disrupts the urban ecosystem (Acar and Bekiryazıcı, 2012).

One of the negative effects of the increase in urbanization on humans is social and psychological problems. Urban residents who try to survive between the overcrowded population and the masses of buildings cannot meet their psychologically renewed rest needs in urban areas. This leads to an increase in the longing for people to be in nature, and most cities still meet their needs (Bekiryazıcı, 2015).

The deterioration of the green area system with rapid urbanization increases the urban heat island effect, and rainwater rapidly passes to the surface flow, artificial topography, particulate matter and artificial microclimate formations are observed. One of the most important ways to control changes in urban landscape areas is to ensure the continuity of green areas. The green areas accompanying the road

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networks in the urban environment naturally connect the green units that are effective along a line. In this way, both the green system is completed and the harmful effects of road networks are prevented and a living space is created for flora and fauna. City parks, which are part of open and green areas, serve many functions for human life and needs by limiting urban construction, regulating climate, improving air quality, providing recreation opportunities, and beautifying urban aesthetics (Aksu, 2021).

In this study, the ecosystem services provided by the tree species used in urban landscapes (mostly in public open green areas) were examined. As a study area, field studies have been carried out in some open green areas in the center of Rize (Turkey). Within the scope of the research, the tree species used in 19 public open green areas in Rize were identified, and the characteristics of these tree species, usage densities, and ecosystem services were determined.

Ecosystem Services and Benefits of Plants

Although the concept of ecosystem services dates back to the 1970s, its introduction and use in the literature gained momentum in the 1990s (Groot et al., 2002). The concept of "Ecosystem Services" was first described by Daily (1997) as "natural ecosystems and processes formed by natural ecosystems and processes for the sustainment of human life."

Within the context of the earlier definitions, ecosystem services can be defined as ecosystems' direct and indirect contributions to the benefits of ecosystem functions or the welfare of people (Groot et al., 2002). Ecosystem services are an ecosystem concept expressed as beneficial to humanity. These services provide our basic needs for life, such as the air we breathe and the water we drink. However, deterioration in large ecological cycles such as water, sulfur, nitrogen, and carbon; flood, drought, climate change, environmental pollution, and many environmental problems. Ecosystem services provide benefits to prevent problems in this cycle (Özer, 2010) (Table 1).

Table 1. Ecosystem Service Classification MEA (2005), TEEB (2012) Classification

RESOURCE-PROVIDING SERVICES (MEA)	RESOURCE-PROVIDING SERVICES (TEEB)
Food	Food
Biological raw materials	Raw Materials
Decorative sources	Ornamental resources
Genetic resources	Genetic resources
Fresh water	Water
Biochemicals and medical products	Medical resources
REGULATING SERVICES	REGULATORY SERVICES
Air quality regulation	Air purification
Climate regulation	Climate regulation
Water flow control	Regulation of water flow
Erosion control	Erosion prevention
Water treatment and waste control l	Waste treatment (Especially water treatment)
Epidemic disease control	Biological control
Pest control	Preventing or mitigating distortions
Pollination	Pollination
Natural risk reduction	Continuity of soil fertility
CULTURAL SERVICES	CULTURE AND COMFORT SERVICES
Recreation and ecotourism	Recreation and tourism
Spiritual and ethical values	Spiritual experience
Social relations	Information for cognitive processing
Information system	Aesthetic information
Educational value	Inspiration for culture, art and design

A sense of place and space	
Aesthetic values	
Inspiration	
Cultural heritage value	
Cultural diversity	
SUPPORTING SERVICES	HABITAT SERVICES
Nutrient cycling	Continuity of the life cycle
Water cycle	Gene pool protection
Photosynthesis	
Soil formation	
Primary production	

In the literature, the benefits of plants can be collected under many classifications. In terms of sustainable development, it is possible to group these benefits according to three basic elements; environmental (biological diversity, thermal arrangement, air quality, drainage of water, and soil protection), social (human health and welfare, social adaptation, and identity), and economic (optimization of the constructed environment, using herbal products, urban agriculture, and regional attractiveness) (Torbay 2013; Sarı et al., 2020). The benefits of urban trees can be listed as follows under three main headings:

Environmental Benefits

- Oxygen production
- Filtering dirty air
- Climate arrangement
- Taking the carbon in the atmosphere
- Prevention of erosion and ensuring water balance
- Water treatment
- Protecting biological diversity
- Control of noise

Social benefits

- Providing opportunities for education and cultural activities
- Contribution to social development
- Protecting public health
- Decrease in crime rate
- Economic benefits

Energy Saving

- Providing tourism and job opportunities
- Ensuring energy saving
- Increasing the property value of the area

Plants, which are the main elements of landscape designs, can have some negative effects on their environment as well as these benefits. The various disadvantages caused by plant materials used in public spaces, especially in public spaces, can be listed as follows (Yorulmaz, 2017):

- Pollute Effect
- Allergen effect
- Poisonous effects
- Being a bad source of smell
- Damages caused by roots
- Being a shelter for animals
- Undesirable shade
- Maintenance cost
- A taxon that is not in line with the ecological conditions of the environment it uses

Urban reforestation attempts are actively supported as a planning tool for urban areas to adapt to and alleviate climate change, increase urban sustainability, and improve human health and prosperity (Salmond et al. 2016). Therefore, woody plants used in urban areas play an important role in this context. However, many

plant species used in urban parks designed today are mostly composed of exotic ornamental plants. The studies on the adaptation of these taxa to local conditions, their sustainability, and the value of supporting the ecosystem services provided by green infrastructures are not sufficient (Sarı et al., 2020). In this study, it is aimed to reveal the benefits of urban trees and potential ecosystem services by examining 19 examples of public green areas in the city of Rize.

STUDY AREA AND METHOD

The study area is Rize's central district in Turkey's Eastern Black Sea region. The total area of Rize is 3,920 km^2. Its located in the Eastern Black Sea Region, between 40 ° 50′20 ″ and 41 ° 4 ′ 8 ″ North Parallels, and 40 ° 23 '55 "and 40 ° 39 ′12 east meridian, and the area of Rize Center is approximately 245 km² (Figure 1). The lands of the central district of Rize, which is located on the northern slope of the Eastern Black Sea coastal mountains, are generally rugged and mountainous.

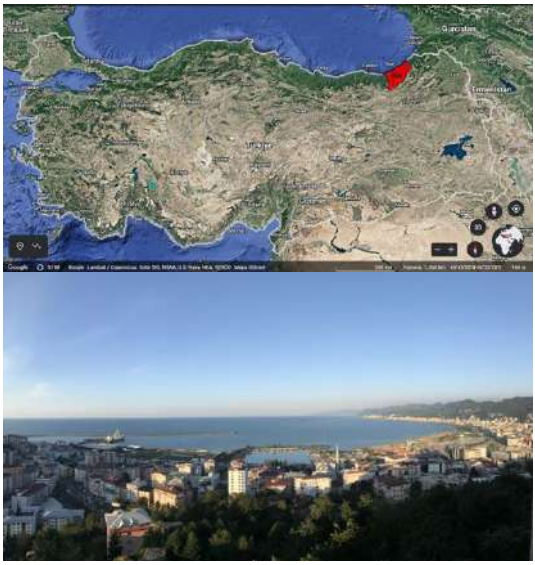

Figure 1. Location of Rize and city center view

The central district of Rize has a cool, mild, and rainy climate in both winter and summer. According to the results of 50 years of observations, the average annual temperature of the central district of Rize is 14.2 °C. The months with the lowest temperatures are January and February, and the highest months are July and August. The average temperature of February, the coldest month, is 6.3 ° C and the average temperature of August, the hottest month, is 23.2 ° C. Rize is the rainiest province in Turkey. The total annual rainfall is over 2200 mm (MGM, 2022).

Within the scope of the study, tree taxa in 19 open green areas (mostly consisting of parks) located in the central district of Rize province were examined. The names of the studied areas are listed below (Figure 2):

Municipal Park (1), Bosphorus Park (2), Bagdatli Çınar Park (3), Dalyan Mosque Park (4), East Park (5), Fener University Recreation Area (6), Fetih Park (7), Castle Junction Recreation area (8), Castle Park (9), Castle Road (10), Kültürpark (11), Likapa Park (12), Liman Park (13), Central Junction Recreation Area (14), Seaside Mosque Park (15), Seaside Park (16), Tanyel Park (17), Tuzcuoğlu Memişağa Park (18) and Agriculture Botanic Park (19).

Figure 2. Location of Sample Areas

As a result of literature research, it was seen that the ecosystem services provided by plants are also closely related to the benefits provided by the plants. In this respect, five evaluation criteria were determined for the benefits of plants, including social, aesthetic, climatic-physical, biological, and any possible damages (Roy et al. 2012; Laille et al. 2014; Torbay 2013; Çetinkaya and Uzun 2014; Sari et al., 2020).

19 open green areas determined in Rize city center were visited at different times in the spring and summer seasons in 2021, and observation, photography, plant diagnosis, and inventory studies were carried out. The general characteristics of the trees identified in the sample areas, such as breed, species, family, homeland, growth form, exotic-natural, aesthetic feature, useful feature, damages, were determined using various hard copy and electronic resources (Akkemik, 2014; CABI 2021; PFAF 2021; Pollenlibrary 2021; wfoplantlist.org; Turkish Plants Data Service; Çorbacı et al., 2019; Çorbacı and Ekren, 2021; Sari et al., 2020).

The ecosystem services provided by the most used tree taxa in 19 sample areas were analyzed in line with the evaluation criteria determined within the scope of the study.

RESULTS

A total of 94 trees from 28 families were identified in 19 open green areas examined within the scope of the study (Table 2). Families with the highest number of taxa are Cupressaceae (18 taxa), Pinaceae (16 taxa) and Rosaceae (13 taxa) (Figure 3). 71 % of the detected taxa are exotic, and 29 % are natural (Figure 4). 56 of the 94 taxa are broad-leaf trees, and 38 are coniferous trees. 52 of the taxa are evergreen and 42 are deciduous.

Table 2. Tree taxa detected in sample areas

No	Botanical Name	Family
1	*Abies concolor* (Gordon) Lindl. ex Hildebr.	Pinaceae
2	*Abies nordmanniana* (Steven) Spach	Pinaceae
3	*Acacia dealbata* Link	Leguminosae
4	*Acer negundo* L.	Aceraceae
5	*Acer palmatum* Thunb. 'Atropurpureum'	Aceraceae
6	*Acer palmatum* Thunb. 'Dissectum'	Aceraceae
7	*Acer palmatum* Thunb. 'Garnet'	Aceraceae
8	*Acer saccharum* Marshall	Aceraceae
9	*Aesculus hippocastanum* L.	Sapindaceae
10	*Ailanthus altissima* (Mill.) Swingle	Simoribaceae
11	*Araucaria angustifolia* (Bertol.) Kuntze	Araucariaceae
12	*Araucaria heterophylla* (Salisb.) Franco	Araucariaceae
13	*Betula pendula* Roth	Betulaceae
14	*Calocedrus decurrens*(Torr.) Florin	Cupressaceae
15	*Carpinus betulus* Mill.	Betulaceae
16	*Castanea sativa* Mill.	Fagaceae
17	*Cedrus atlantica* (Endl.) Manetti ex Carrière 'Glauca'	Pinaceae
18	*Cedrus deodara* G.Don 'Pendula'	Pinaceae
19	*Cedrus deodara* G.Don	Pinaceae
20	*Cedrus libani* A.Rich.	Pinaceae
21	*Cercis siliquastrum* L.	Leguminosae
22	*Chamaecyparis lawsoniana* (A.Murray bis) Parl.	Cupressaceae
23	*Chamaecyparis lawsoniana* (A.Murray bis) Parl.'Goldrider'	Cupressaceae

24	*Chamaecyparis pisifera* Endl.	Cupressaceae
25	*Chamaecyparis pisifera* 'Boulevard'	Cupressaceae
26	*Chamaerops excelsa* Thunb.	Arecaceae
27	*Cinnamomum camphora* (L.) Presl.	Lauraceae
28	*Citrus aurantium* L.	Rutaceae
29	*Cordyline australis* Endl. 'Red Star'	Asparagaceae
30	*Cordyline indivisa* Endl.	Philadelpheae
31	*Cryptomeria japonica* D.Don	Cupressaceae
32	*Cryptomeria japonica* D.Don 'Elegans'	Cupressaceae
33	*Cupressocyparis leylandii* Dallim.	Cupressaceae
34	*Cupressocyparis leylandii* Dallim. 'Goldrider'	Cupressaceae
35	*Cupressus arizonica* Greene	Cupressaceae
36	*Cupressus macrocarpa* Hartw.	Cupressaceae
37	*Cupressus macrocarpa* Hartw. 'Goldcrest'	Cupressaceae
38	*Cupressus sempervirens* L.	Cupressaceae
39	*Cycas revoluta* Thunb.	Cycadaceae
40	*Cydonia oblonga* Mill.	Rosaceae
41	*Diospyros kaki* L.f.	Ebenaceae
42	*Eriobotrya japonica* (Thunb.) Lindl.	Rosaceae
43	*Eucalyptus globulus* Labill.	Myrtaceae
44	*Fagus sylvatica* L. 'Atropurpurea'	Fagaceae
45	*Ficus carica* L.	Moraceae
46	*Fraxinus excelsior* L.	Oleaceae
47	*Fraxinus excelsior* L. 'Aurea'	Oleaceae
48	*Ginkgo biloba* L.	Ginkgoaceae
49	*Juglans regia* L.	Juglandaceae
50	*Juniperus virginiana* L.	Cupressaceae
51	*Laurus nobilis* L.	Lauraceae
52	*Liquidambar styraciflua* L.	Hamamelidaceae
53	*Magnolia grandiflora* L.	Magnoliaceae
54	*Malus domestica* Borkh.	Rosaceae
55	*Malus floribunda* Siebold ex Van Houtte	Rosaceae
56	*Morus alba* L.	Moraceae
57	*Morus nigra* L. 'Pendula'	Moraceae
58	*Olea europaea* L.	Oleaceae
59	*Paulownia tomentosa* Steud.	Paulowniaceae
60	*Picea abies* (L.) H.Karst.	Pinaceae
61	*Picea glauca* (Moench) Voss	Pinaceae

62	*Picea orientalis* (L.) Peterm.	Pinaceae
63	*Picea pungens* Engelm.	Pinaceae
64	*Picea pungens* Engelm. 'Glauca'	Pinaceae
65	*Pinus brutia* On.	Pinaceae
66	*Pinus nigra* J.F.Arnold	Pinaceae
67	*Pinus pinaster* Aiton	Pinaceae
68	*Pinus pinea* L.	Pinaceae
69	*Pinus sylvestris* L.	Pinaceae
70	*Platanus acerifolia* (Aiton) Willd.	Platanaceae
71	*Platanus orientalis* L.	Platanaceae
72	*Platycladus orientalis*(L.) Franco	Cupressaceae
73	*Populus alba* L.	Rosaceae
74	*Populus nigra* L.	Rosaceae
75	*Prunus avium* L.	Rosaceae
76	*Prunus cerasifera* Ehrh.	Rosaceae
77	*Prunus cerasifera* Ehrh. 'Atropurpurea'	Rosaceae
78	*Prunus cerasifera* Ehrh. 'Pissardii Nigra'	Rosaceae
79	*Prunus domestica* L.	Rosaceae
80	*Prunus laurocerasus* L.	Rosaceae
81	*Pyrus communis* L.	Rosaceae
82	*Robinia pseudoacacia* L.	Leguminosae
83	*Salix babylonica* L.	Salicaceae
84	*Salix matsudana* Koidz.	Salicaceae
85	*Salix nigra* Marshall	Salicaceae
86	*Sequoia sempervirens* (D. Don) Endl.	Cupressaceae
87	*Sequoiadendron giganteum*	Cupressaceae
88	*Styphnolobium japonicum* (L.) Schott	Leguminosae
89	*Taxodium distichum* (L.) Rich.	Cupressaceae
90	*Tilia rubra* DC.	Tiliaceae
91	*Tilia tomentosa* Moench	Tiliaceae
92	*Trachycarpus fortunei* (Hook.) H. Wendl.	Arecaceae
93	*Washingtonia filifera* (Linden ex André) H.Wendl. ex de Bary	Arecaceae
94	*Washingtonia robusta* H.Wendl.	Arecaceae

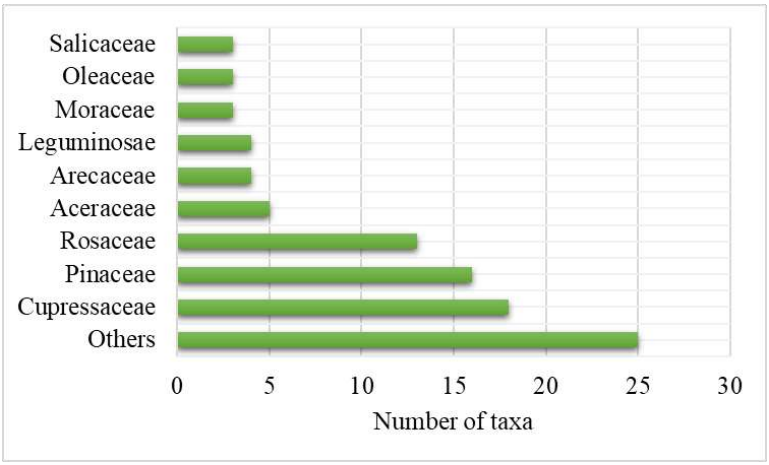

Figure 3. The Families of the Taxa

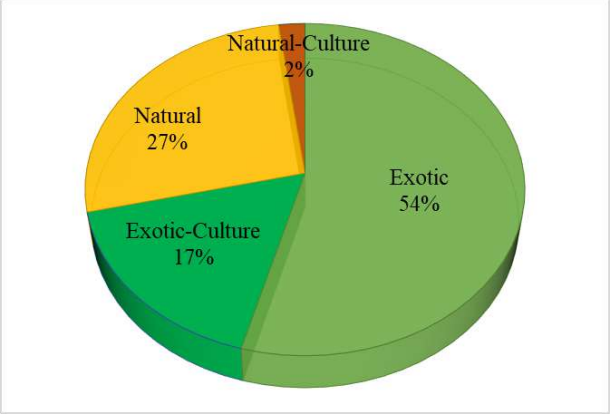

Figure 4. Natural and Exotic Status of Taxa

When examined in terms of the rate and number of tree taxa in the sample areas, it was found that the most plant taxa were in the Coastal Park and the Agricultural Botanical Park (Figure 5).

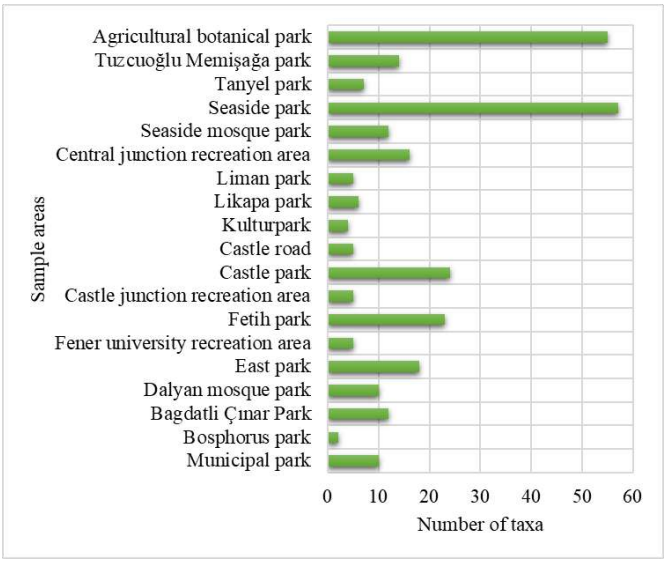

Figure 5. The rates of presence and usage of tree taxa detected in the sample areas

The top 10 taxa, which have the highest rate of presence in the sample areas, have been determined as Prunus lauracerasus, Fraxinus exelsior, Laurus nobilis, Magnolia grandiflora, Platycladus orientalis, Cupressus arizonica, Cupressus macrocarpa 'Goldcrest', Eriobotrya japonica, Platanus orientalis.

The first 10 taxa, which were found to have the highest number in the sample areas in terms of usage, are Platycladus orientalis, Washingtonia filifera, Prunus laurocerasus, Cryptomeria japonica, Cupressus macrocarpa 'Goldcrest', Prunus cerasifera 'Pissardii Nigra', Chamaecyparis lawoniana, Tilia tomentosa, Platanus orientalis, Acer negundo.

When examined in terms of the aesthetic characteristics of the taxa detected in the study area, they are determined as tissue aesthetics, form aesthetics, flower aesthetics, leaf aesthetics, autumn coloring, fruit aesthetics, fragrant, shoot and branch aesthetics, stem aesthetics. When some previous studies are examined, it has been mentioned that the aesthetic features of the plants used in many open green areas in cities such as parks, campuses, and roadsides are effective in preferences (Düzenli et al., 2018: Kahveci, 2021; Karaşah, 2021; Sarı and Karaşah, 2018; Surat, 2017; Surat and Yaman, 2017; Tarakci Eren et al., 2020).

When the benefits provided by 94 tree species determined, they offered many benefits as listed below have been identified: providing medical benefits, being edible, erosion control, visual curtain, attracts for bee-birds and other pollinators,

limitation, providing shade, sound curtain, windbreaks, commercial benefit, routing the traffic, air-cleaning, a source of food for birds, a nitrogen stabilizer, carbon cycle support, support wildlife.

Ecosystem services provided by the first 10 tree taxa, which have the highest number of uses in 19 public open green areas, were evaluated in the context of the 5 parameters determined (Table 3).

Table 3. Ecosystem services provided by the 10 most used tree taxa in sample areas

	Properties	***Acer negundo***	***Chamaecyparis lawoniana***	***Cryptomeria japonica***	***Cupressus macrocarpa 'Goldcrest'***	***Platanus orientalis***	***Platycladus orientalis***	***Prunus cerasifera 'Pissardii Nigra'***	***Prunus laurocerasus***	***Tilia tomentosa***	***Washingtonia filifera***
Social benefits	Providing opportunities for recreation and educational activities	■	■	■	■	■		■	■	■	
	Contributing to environmental quality	■	■	■	■	■	■	■	■	■	■
	Contribution to the physical and mental health of urban people	■	■	■	■	■	■	■	■	■	■
	The historical and symbolic significance					■			■	■	
	contributing to urban identity								■	■	

Table 3. Continue

Properties		*Acer negundo*	*Chamaecyparis lawsoniana*	*Cryptomeria japonica*	*Cupressus macrocarpa 'Goldcrest'*	*Platanus orientalis*	*Platycladus orientalis*	*Prunus cerasifera 'Pissardii Nigra'*	*Prunus laurocerasus*	*Tilia tomentosa*	*Washingtonia filifera*
Aesthetic benefits	Creating aesthetic value with vegetation of different colors, textures, forms, and frequency	■	■	■	■	■	■	■	■	■	■
	The potential for monitoring seasonal transitions	■				■		■		■	
	Creating a sense of space	■		■	■	■				■	
	Contribution to the improvement of visual quality	■	■	■	■	■	■	■	■	■	■
Climatic and physical benefits	Creating a microclimate	■	■	■		■	■		■	■	
	Dust removal, reduce air pollution	■	■	■	■	■	■	■	■	■	■
	Noise control		■	■		■	■		■	■	
	Erosion control			■	■	■	■				
	Wind control	■	■	■		■	■			■	
Biological benefits	Creating habitat for species in the urban environment	■	■	■	■	■	■	■	■	■	■
	Butterfly-bird-bee attracting	■				■		■	■	■	■
	improving the soil			■	■						
Harmful properties	Invasive	■									
	Toxic properties								■		
	Allergenic properties	■			■	■				■	
	Root damage (pavement and drainage systems)					■				■	

When the potential harmful properties of tree taxa are examined, in some taxa; toxic properties, allergen, invasive, toxic to some animals, can cause dermatological discomfort, host to invasive insects, root damage (shallow roots can damage

pavements and sewers), street pollution, fruit and pine litter, malodorous features can be found.

CONCLUSION

In this study, the ecosystem services of the tree species detected in 19 public open green areas selected in the center of the city of Rize were examined. It has been determined that the tree taxa considered within the scope of the study provide many benefits:

- environmental (oxygen production, protecting biodiversity, filtering polluted air, sequestering carbon in the atmosphere, water purification, reducing the temperature effect, preventing erosion, supporting wildlife, sustainability, reducing noise),
- social (providing opportunities for recreation and educational activities, contributing to environmental quality, protecting public health, contributing to urban identity, the historical and symbolic significance)
- and aesthetic (creating aesthetic value with vegetation of different colors, textures, forms, and frequency, improving visual quality, creating a sense of space, and the potential for monitoring seasonal transitions) benefits.

However, it has been discovered that it may cause some potential damage due to the individual characteristics of tree species. In most of the areas examined, exotic species were used rather than natural species. Exotic taxa, on the other hand, cause plant diseases and carry risks such as adaptation problems or becoming invasive species.

Invasive taxa used in urban open green areas should be used with caution, as they negatively affect the spread of natural species and disrupt the balance of the natural ecosystem. The use of allergenic taxa in public open green areas may pose a threat to public health.

Ecosystem services ensure the balanced use of resources, sustainability, protection of biodiversity and increasing the level of human well-being. In order to understand that trees play an active role in creating healthy, livable and sustainable cities, it is important to investigate the environmental benefits and ecosystem services provided by urban trees. In addition to concepts such as arid designs, vertical gardens and green roofs, it is important to develop planting design strategies to support ecosystem services in public open green spaces and to pay attention to these

issues in applications. Ecosystem services are seen as a tool in the sustainable use of natural resources. Information on ecosystem services informs different decision-making areas such as conservation studies, landscape and urban planning, environmental impact assessments and strategic environmental assessments. Service capacities and interactions with other ecosystems should be taken into account in ecosystem studies. There is a need to manage and understand the ecosystem economically by determining the ecosystem service capacity. For the sustainability of ecosystem services, the protection of the structure and functions of ecosystems should be one of the main goals of the ecosystem approach.

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SURFACE MATERIALS IN HARDSCAPES

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Can Burak ŞİŞMAN[2]

Introduction

The base plane, vertical plane and overhead plane are the three basic volume elements that create the space (Simonds, 1997). The space is formed by combining these three basic volume elements in different ways. In landscape design studies, the aim is to design aesthetic and functional spaces. Base, vertical and overhead elements constitute the space in the landscape. Floor elements that form the basis of the space are important elements that affect the design. Landscape design begin with base elements namely the surface elements which are considered to be the first and basic element of space (Şentürk & Altınçekiç, 2018).

The positive or negative effect in the design is revealed by the relationship between the figure and the ground design (Booth, 2012). Soil, grass surface, ground cover or water can be defined as the basic ground element. The base plane is the basis of the design as it forms the functional and spatial framework of the design and creates a living space for the plants (Simonds 1997). Every element in the landscape is directly or indirectly related to the base plane (Simonds 1997). In landscape design study, different spaces can be created with material changes on the ground (Booth, 2012).

Surface element design have the potential to combine two important features of design; aesthetics and function (Şeçkin, 1997). Floor coverings constitute the first step on the plane in the landscape design stages. The use of materials of different colors, textures and sizes in flooring affects the design both functionally and aesthetically (Uzun, 2004). Surface refers to the hard floor that occurs when the ground plane is covered with a natural or artificial covering material in line with the intended use and design goals (Booth, 1983).

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Definition Classification and Functions

Surface material is one of the structural architectural elements that have the feature of creating space as well as carrying and separating functions. (Toydemir, Gürdal & Tanaçan, 2011).

These materials can be classified in different ways in landscape design studies. Surface materials can be classified according to their physical characteristics as loose, unit and adhesive materials (Booth&Hiss, 2012), according to the form of construction methods, bounded or nonbonded (Zimmermann, 2015), according to state of being alive; living (lawn or plants) or nonliving materials (Uzun, 2004).

Hard surface materials have functional and aesthetic features.

- Creating a hard, non-slippery surface for pedestrians and vehicles,
- Ability to carry the load on it and transmit it to the ground
- Directing pedestrian and vehicle traffic,
- Separating spaces with different functions,
- Creating a visual impact, especially in squares
- Surface drainage

Material selection in landscape design should be based on criteria such as function, form, style/character, regional climate, sustainability, budget and availability (Seçkin, 1997; Başal, Memlük, & Yılmaz, 1997; Booth, 2012).

Hard Surface Materials Frequently Used in Landscape

Most kind of attractive and durable surfaces are available for walkways and driveways. Natural stone, wood rounds and timbers are all alternatives to poured concrete and asphalt paving. They provide a rustic and interesting look to landscapes and they make beautiful appearances with plants.

Gravel: Gravel, also known as aggregate, is a loose-textured material consisting of small stones (Booth&Hiss, 2012). Different colors and size of gravel can be used to make patterns. Gravel is ideal for surfacing tight spaces that are too awkward to pave, and for places where not much will grow, such as under trees (Brookes, 1996). Gravel can be used alongside well defined areas of planting to create a textured, geometric pattern (Figure 1). Gravel is ideal for sustainable landscaping as it creates a permeable surface. The potential disadvantage of gravel is that it easily moves into adjacent areas of the landscape and therefore requires extra care. There are some recycling materials that can be used in aggregate form, such as gravel. Recycled

materials such as shards of glass, pieces of broken brick or rubber can be used as surface material.

Figure 1. Different use of gravel (Photo: Sisman&Sisman)

Stone: Stone has maintained its importance as a building material in every age. The appearance of the stone removed from the quarry changes depending on the way the stone is processed and the formation of the stone. Quarried stone may be split and given a sawn or rubbed face for paving (Figure 2). Choice of stone will depend on durability, whether it becomes slippery underfoot when wet, and whether it fractures in frost. The most commonly used stones in the landscape are granite, andesite, marble, basalt, quartzite and travertine. Stones with different colors are usually more expensive.

Figure 2. Use of Flagstone in landscape (Photo: Sisman&Sisman)

Travertine granite and marble, which is a natural stone surface material, is widely used in outdoor applications (Figure 3). Travertines can be of different sizes. However, their thickness should not be less than 3 cm. Granite is a hard and solid

material, usually gray in color and with different patterns (Figure 4). Granite is normally processed into slip resistant texture. It has three forms for coating purposes: plaque, block and parquet (Seçkin, 1997).

Figure 3. Travertines (Sisman&Sisman)

Figure 4. Granite (Sisman&Sisman)

Brick

Brick is manufactured by pouring liquid clay into a mold and then firing it at extremely high temperatures to harden. A brick's color, from dark orange-red to earthy tan to deep purple, varies depending on the mineral content of the clay (Figure 5).

Brick can be used to create a historic, intimate and a warm atmosphere in the landscape. In particular, they can be used to contrast with cooler materials such as concrete. Brick is withstanding pedestrian and vehicle traffic, sun and rain.

Figure 5. Bricks (Sisman&Sisman)

Wood

Wood differs from other materials by it is an organic material that weathers and decomposes over time ((Booth&Hiss, 2012). Various chemicals are applied to extend the preserve its longevity of wood. Wood is a good surface material to create a soft surface that has a very slight give underfoot (Figure 6).

Tree trunks that are suitable for this coating are cut into logs with an average height of 130-180 mm. Tree stumps are laid in sand, earth or mortar. After the stumps are placed in place, vegetable soil is placed between them and suitable plants are planted. Application should be preferred in shaded areas, as it may dry out and split in the sun.

Figure 6.Wood creates a natural look (Sisman&Sisman)

Synthetic wood can be used as an alternative to wood material. Synthetic wood is produced with recycling materials and it is environmentally friendly. The advantage of synthetic wood over true wood is that it does not require periodic maintenance.

Concrete

Concrete surface are rigid, high strength surface. In creating them, many diverse possibilities for surface structure, shapes and color are available to the planner (Zimmerman, 2015). Concrete is the most widely used surface material on landscape (Figure 7). It is less costly than natural stone material. They create useful surfaces for pedestrian and driveway.

Figure 7. Most popular used hard surface material (Sisman&Sisman)

Concrete floors can have many different sizes and colors. The most common shapes are rectangular, square, octagonal, or a set of coordinated shapes ((Booth&Hiss, 2012).

Figure 8. Different form of concrete pavers (Sisman&Sisman)

Another use of concrete material is the application of stamped concrete (Figure 9). Stamped concrete is a type of concrete used to give distinctive textures and patterns. The cost in terms of labor is lower than other materials that need to be laid individual. More space can be laid in a short time. Slip resistant when treated with a non-skid additive. Is durable and long-lasting.

Figure 9. Stamped concrete (Sisman&Sisman)

Concrete modules are used in the combination of living and nonliving surface materials (Figure 10). Concrete modules with 5-8 cm holes for planting pressure-resistant grass mixtures are suitable for private parking lots where usage is not intense.

Figure 10. Combination of concreate modules and lawns (Sisman &Sisman)

Asphalt

Asphalt is a residual product obtained from the processing of crude oil. As asphalt is cheap, requires less labor and can be easily supplied, it is frequently used as a surface material, especially in parking lots, driveways and sidewalks (Figure11). It can be easily repaired, but due to its impermeable texture, problems that may occur in drainage and collapses and fluctuations may occur as a result of insufficient

compaction of the ground (Uzun, 2004). It is a bulk material such as asphalt concrete and is suitable for curvilinear forms. However, its difference from concrete is that it does not reflect light due to its black color. This is an undesirable situation in heavily used landscape areas.

Figure 11. Use of Asplat driveway and sidewalks (Sisman&Sisman)

Glass

Glass has a transparent property. Glass also has good chemical resistance and low coefficient of thermal expansion. Safety glass types have a higher stability than normal glass types, and break without splintering. Since in most outdoor use of glass it is desirable or even essential to minimize the risk of injury through broken glass, safety glass should be used preferentially. In landscape architecture, it is used for surface materials (Figure 12). They are especially used to show interesting looks on the surface. Glass production is energy-intensive and costly for the environment. Glass is a material that can be melted and reused. In addition, broken glass can be used as aggregate in asphalt and concrete (Zimmerman, 2015).

Figure 12. Transparency effect of glass surface material (Sisman&Sisman)

Rubber: One of the flooring materials that has been widely used in recent years is rubber. Rubber material is used in layers or as poured-in-place (PIP) rubber. This material has been used in playgrounds and sports area in recent years, especially because it is durable, safe, soft and customizable. (Figure 13). This material is constructed from using recycled materials with binders (Janes et al, 2018).

Figure 13. Use of rubber in play areas (Sisman&Sisman)

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TRUST FOR IMPROVING INTERNAL & EXTERNAL CUSTOMER SATISFACTION IN A DESIGN ORGANIZATION

Gamze OZKAPTAN ALPTEKIN[1]

1. INTRODUCTION

Many resources indicate that, satisfaction of individuals will bring job satisfaction and improve performance. This study approaches the subject not only as job-oriented but also people-oriented. The human-centered sensitivity of Industry 5.0 is expected to bring more employee-orientedness to the agenda than ever before (Nahavandi, 2019) (Adel, 2022). Despite all the development and widespread use of information technology, the architectural design process still requires an intense workload. Aim of many of the theoretical and practical studies related to construction is to increase quality and efficiency, reduce errors and losses by producing solutions from different angles (Jraisat, 2016). In literature, it is argued by many researchers that design failures are being the major reasons of waste. There are plenty of work to improve quality of design documents, process in design stage, integration of the stages in building production process and integration of stakeholders, at project level. There is also a lot of research on construction as a business or corporate level topics. In literature, trust building among the parties contacting in design seemed to receive relatively less attention.

This explanatory study has a human-centric perspective and is focused on architectural offices mainly. All the employees of an architectural organization, including the managers are appraised as internal customers, and owners of the projects are appraised as external customers in the scope of this study. After explaining the competitive environment of the architectural offices, relations between the internal and external customers will be classified with a holistic approach, from an organizational point of view. Types of trust that are valid for satisfaction of people who work in architectural offices and in other interacting organizations in the design phase will be examined depending to the defined organizational models. This study was conducted on the basis that increasing the

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individual happiness, health and well-being of colleagues ultimately benefits professional environment.

2. COMPETITIVE ENVIRONMENT IN ARCHITECTURE

Developing countries offer new projects to the market because of quantitative and qualitative needs to both structural and infrastructural projects. Construction projects are being promoted by the governments of developing countries due to the stimulating effect of the economy as it triggers production in different areas and to be considered as a spongy sector as employing many people even the least skilled ones and reducing unemployment rates (Azeem, 2020) (Kale, 2002). Ofori (2007) summarizes the findings of some researchers according to globalization and business strategies in construction in developing countries, and he points out the need of local enterprises to compete with global firms and to equip firms in developing countries with the ability to adapt a strategic response to the presence of foreign firms in their home markets (Ofori, 2007).

Clients demand to get (deliver) design projects in short terms, with lower prices. These requirements push the design market into an aggressive competitiveness sometimes with very low profit margins. In the competitive environment of architectural design organizations, uncertainty according to undertaking future projects is the most critical factor for the actors. Architectural design organizations should take their positions against competitiveness and uncertainty.

Undertaking new projects is the first and the main issue for all the actors in construction. Architectural offices generally may have problems of undertaking new projects. As being in the leading role in the initiation stage of a new project, architects are under risk in the scope of client-architect relationship. Especially working with a new client poses a potential risk as not continuing the initiation stage with an agreement.

Moreover, architectural offices start working for design proposals upon oral agreement, with a wishful hope, without making a written contract nor getting any payment. There are examples in practice that clients abuse goodwill, architects suffer monetary loss. These situations sometimes may lead architectural organizations even to go bankrupt. Looking from this point of view, client-architect relationship, and mutual trust between them is seen critical for surviving of design organizations. Especially while working with new clients, trust-building between client and architect is anticipated as one of the most effective issues.

Upon a close inspection on architectural office environment, architectural offices are known to be labor intensive and stressful with long working hours despite the

developments in IT. Employee architects may have relatively low-income levels and generally they do not have the opportunity to participate in design decisions especially before their senior years or before being at least a team manager. These circumstances may affect the employee architects negatively against their peers and managers within the office, so this may reflect to their job satisfaction and performance as well as their individual happiness. Concisely, employee architects need to be supported and motivated both psychologically to feel that they are in a trustworthy environment and, also tangible conditions need to be improved. Feeling of trustworthiness by the employee architects is seen inevitable for improving their performance and job satisfaction in this scope (Uusitalo, 2021) (Wong W. C., 2008).

In the other hand, manager architects are under stress for enabling the organization to survive. They must provide profit to the company, communicate with new customers, undertake new projects, motivate, and lead employees. What about their personal happiness and well-being? They need to avoid from conflict, make good relations with internal and external customers and work in a less stressed environment with trust. While they have to deal with uncertainties, at least they should have less problems about certain conditions, such as managing the human resources. Trust is chosen as keyword for enabling satisfied "customers" in competitive environment of architectural design stage and its actors.

3. DEFINITION OF TRUST

Trust is a research area of many disciplines beginning from philosophy, psychology, sociology, political science, economy, etc. (Rotenberg, 2018) and on which many studies have been conducted by theoreticians (Erikson, 1963) (Dunkel, 2017). This study addresses the need for trust among customers from social, relational, and behavioral aspects. Trust is defined as; 'to believe that someone is good and honest and will not harm you' or 'that something is safe and reliable or to hope and expect that something is true' as a verb, and 'the belief that you can trust someone or something' or a 'legal arrangement in which a person or organization controls property and/or money for another person or organization' as a noun (Cambridge Dictionary, 2022).

Rotenberg, a psychologist who published many academic writings according to trust, explains trust with a framework within three bases as ″reliability, emotional, honesty″, three domains as ″cognitive/affect, behavior-dependent, behavior-enacting″ and two target dimensions as ″familiarity, specificity″ (Rotenberg, 2010).

In social psychology, in the scope of relational trust, Cook (2005) claims that, trust comes to forth in ongoing relationships, when there is a risk. Under high risky and uncertain conditions, trust gains importance or some legal enforcements are needed for reliability. Trust is generally examined between relatively equals. Considering the relationship between power and trust, which means to realize under unequal bodies like employers and employees, here external customer and the manager architect or manager architect and employee architects, ″transparency, fairness, and procedural justice″ may be counted as effective factors for trustworthiness (Cook, 2005).

In literature, there are studies about trust and trust-building, to improve relationship between both individuals and organizations, to improve their expectation, belief, behavior, to decrease risks and uncertainty. These studies cover fields of business and management, economics, education as well as design and construction. In construction, trust-building among contracting parties, trust in construction partnering, trust in and between design and construction organizations are studied particularly (Wong W. C., 2008) (Uusitalo, 2021) (Ceric, 2014).

In construction, distrust, and confrontation between the participants, is seen as a common problematic attitude, in all phases of a construction project. In literature, lack of trust between construction participants is argued to lead to unsuccessful completion of construction projects, quality problems and causes project participants to suffer (Emmitt, 2007) (Soares, 2012) (Wong W. C., 2008). According to solutions for the defined problem, some of the studies concentrate on building trust between organizations, in the scope of partnering, co-operative contracting or other organizational context (Emmitt, 2007) (Wong P. C., 2004) (Cheung, 2003) (McDermott, 2005), while some others are concentrating on trust in construction projects, examining effects of construction clients' behavior to reduce risks and uncertainty (Levander, 2001) (Arabiat, 2007) (Ceric, 2014).

4. SCALES OF TRUST - SCOPE AND LIMITS OF THE STUDY

'There are numerous studies in literature about trust scales in different nations or measuring trust in organizations (Yamagishi, 1994) (Islamoglu, 2012) (Paine, 2003). It can be deduced that, personal-trust and organizational trust should be examined considering the conditions and social characteristics in which they are located.

In this study, trust relations classified from the organizational point of view as; trust between individuals (interpersonal trust), trust between an individual and an organization, trust within an organization (intra-organizational trust) and trust

between organizations (inter-organizational trust) (See Fig.1) depending on the classification done by Ceric (2014). These classifications will be addressed not only to design organizations at corporate level, but also their clients, and other organizations they are contacted at project level depending on the topic.

In a design project, all the design organizations and the client are interrelated at project level, while in the architectural design organization, all the members, including the manager are interrelated at corporate level.

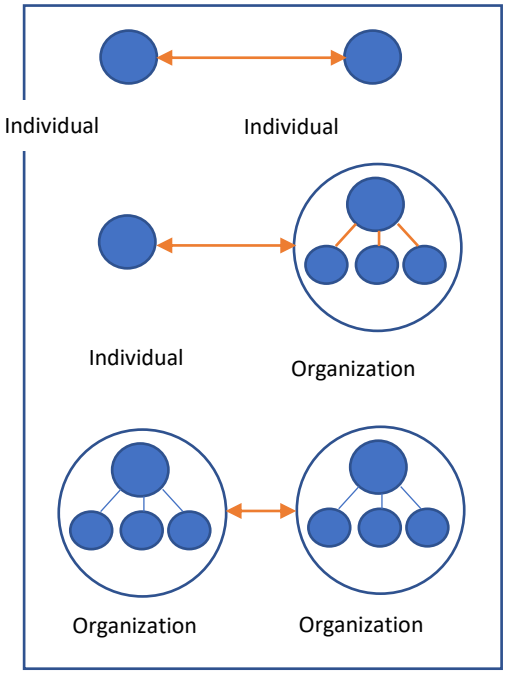


Figure 1. Classification of organizational scales

In literature, trust between individuals is considered as interpersonal trust, and studied under both general trust and relational trust context. Because general trust is mostly subject of private life, the subject will be handled particularly under relational trust.

In this study, all the parties that the design organization is in contact within the projects are named as external customers, including owners of the projects. All the members of the design organization, including the design manager (can be at the same time owner of the office) are named as the internal customers of the design organization. Consequently, interpersonal trust will be limited with two dimensions,

first examining trust building between the external customer and the manager architect at project level and second, examining trust building between the peers working in the architectural design organization, in corporate level. Intra-organizational trust, trust building between the manager architect and internal customers (between the peer architects) of the architectural office in corporate level. Scope of trust between an individual and an organization will be limited with trust building between external customer and the architectural office organization in project level. Scope of trust between organizations which is called inter-organizational trust points out trust building of the architectural office organization with the other design organizations and contractors at project level.

According to the framework for trust in construction contracting by Wong et al. (2008), trust is categorized as system-based, cognition-based, and affect-based (Wong W. C., 2008). Cognition-based trust is depending on knowledge and understanding (communication/interaction), system-based trust is defined to be founded on performance and faith in the system (organizational policy, communication system, contracts/arrangements), and finally affect-based trust is defined to be more personal by addressing the feelings and emotion (being thoughtful, emotional investments).

Organizational classifications for trust interactions in design organizations will be distributed starting from the project level and the corporate level. Then the organizational classifications will be corresponded with the three major types of trust, identified by Wong et al. (2007), which is widely accepted for construction in literature (Bon-Barnard, 2018) (Buvik, 2015), and found also appropriate and adaptable for architectural organizations as well.

4.1 Project Level Interactions

Trust has become a topical issue in construction, which is known with its adversarial culture and general inability to trust others. As working in a collaborative environment, transparency and trust should be two of the most critical issues. Architectural design organizations interact with different clients, different design organizations and stakeholders in each of the projects they undertake. Under these circumstances, it is not easy to achieve trust in a short time (Emmitt, 2007). Contrary, it is known that development of trust should be earned in a long time but can be lost in an instant (Khalfan, 2007). Project level interactions, types and components of trust will be explained depending on these circumstances.

4.1.1 Interpersonal Trust; Between External Customer and The Manager Architect

Being the representative of an architectural design organization, manager architect is generally the first and sometimes the only person to interact with the external customer - client of the project (See Fig.2). Generally, the first encounter is not accidental, meaning that cognition-based trust is constructed depending on knowledge according to competence and reputation of the manager architect and reputation of the architectural organization (Khalfan, 2007), and previous design products. Also, the communication and interaction between the manager and external customer helps to structure cognition-based trust. Besides these, the emotional interaction and being thoughtful may be two components of affect-based trust which may be structured interpersonally between the two parties (Wong W. C., 2008).

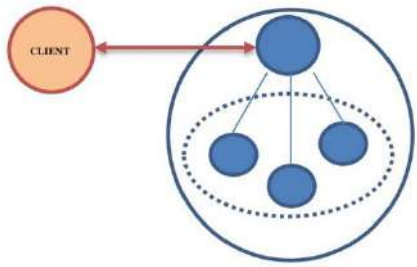


Figure 2. Inter-Personal Trust

According to a study in the literature, in the later stages of a project, external customer and the manager designer may have contrary trust perceptions resulting from uncertain contractual conditions or design changes (Uusitalo, 2021). Written contracts are one of the vital tools for enabling trust in long term. Both dialogues between the external customer and design manager, and the formal design meetings provide an efficient environment for communication and trust building (Otter, 2008).

The timely delivery of the required documents to the design office and the timely payments are effective factors in establishing in the trust of the executive designer to the external customer.

4.1.2 External Customer and The Architectural Office Organization

Design organizations are supposed to undertake more than one project concurrently. A design organization liaise with different external customers at the same time, within different project scopes (See ***Figure***). Developing trust and establishing a strong image should be handled as a managerial issue for design

organizations. Studio culture of the design organization and value added to the project by the design organization are two important issues attracting the external customer and for building cognitive trust.

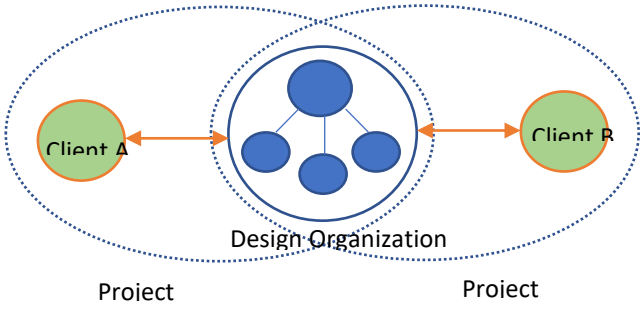


Figure 3. Trust Building at Project Level; Between Design Organization and the External Customer - Client

Completion of the design project on time, in accordance with the required budget and in accordance with the expected quality level creates trust between the external customer and the architectural organization and ensures external customer satisfaction. External customer satisfaction and not to be subject to litigation, are indicators for architectural design office performance and ensures recognition in the design market.

Degree of trust changes according to the personality, expertise, and experience of the people and their requirements (Arabiat, 2007). All these features are valid for both manager architect and architectural design organization for mutual trust. Experience and expertise of external customer is affective for ease of communication. Trust is related with the parties' confidence to trust other's commitment, commitment to project goals and values. In fact, external customers do not trust an organization only, they trust the individuals working in the organization that they are in contact with. Personal contact is required for development, learning, testing and reaffirmation of trust. Development of trust is a miscellaneous issue with people only interacting temporarily and holding different organizational values and objectives, because people have little opportunity to get to know each other well enough to develop trust (Emmitt, 2007). Because of this, organizational policy, procedures, communication system, written contacts despite oral agreements, constitute the components of system-based trust (Wong W. C., 2008). Continuous

effort for value creation until the handover stage is essential for satisfaction of the external customer (Savolainen, 2018).

4.1.3 Intra-Organizational Trust; Between Architectural Office Organization and the Other Organizations at Project Level

Architectural design offices must interact with engineering design organizations, contractors and constructors and many other consultant organizations, within each of the project they undertake (See Fig.4). There is a huge data flow among these organizations and design office must build relations with them to ensure validity, correctness, and updated information sharing preferably defined by formal procedures. All the mutual relations and responsibilities are defined by written contracts between the stakeholders. This formal interaction structures system-based trust between the organizations.

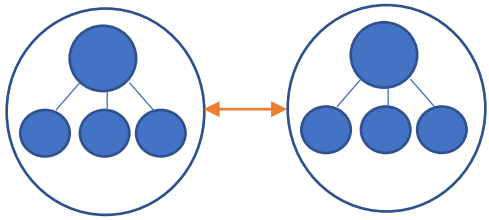


Figure 4. Inter-Organizational Trust

Teams from independent organizations which are having mutual relationship within a project must build a special type of trust in a short time, namely 'swift-trust' between them, to carry out the tasks (Adler, 2007). For enabling inter-organizational swift-trust; managing fragility, uncertainty, risks, and expectations are needed. (Meyerson, 1996).

Inter-organizational trust is seen fundamental for architectural and engineering design organizations because none of the organizations may have the sole responsibility on the project. According to a study about the relation between positive trust-performance and negative task conflict-performance, it is found out that, collaboration is so important for design organizations, to ensure trust and manage task conflict. Collaboration enables mutual and accurate information flow, feedback, and coordination between the design organizations (Chiocchio, 2011), with an appropriate communication system support.

Uusitalo et al. (2021) made research about the relation between trust, information flow among participants of the project and Design Quality Performance. They found

out that trust has positive effect on design quality and inter-organizational trust is influenced by the psychological safety of the participators. (Uusitalo, 2021).

Reputation is effective for organizations to trust each other. Organizations build their reputations as a result of their reliability, accuracy, non-conflict and honesty in the work they had completed (Khalfan, 2007). Sensations about the performance of completed works are heard through communication tools and interaction in the industry. Spreading this reputation builds cognitive trust.

4.2 Corporate Level Interactions

4.2.1 Intra-Organizational Trust – Between Manager and the Internal Customers

Architectural offices may have different organizational models depending on their scale and number of the employees. Whatever organizational model is used in the office they are generally directed by an experienced design manager (may be at the same time owner) (see Fig.5). Building trust between the design manager and the employee architects depends on organizational policy of the organization. Existence and obeying to the formal contracts or informal agreements, availability of social rights, awards and promotions, timely payments etc. structures system-based trust and organizational commitment (Çelik Tantekin, 2021).

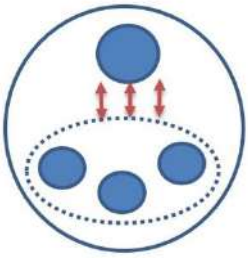


Figure 5. Trust building at Corporate Level: Between Manager and Internal Customers - Employee Architects

Sharing information among colleagues, participating in discussions, creates a feeling that their ideas are valued, and employees' feeling like they are a part of the organization increases their performance. Ensuring communication, interaction and partition builds cognition-based trust between the organization represented by manager architect and the employee architects.

Apart from the ordinary circumstances, employees need to feel that they are considered in unexpected situations or exceptional situations related to their private lives. Manager's responses to these expectations feeds emotional investments and builds affect-based trust in organizations.

4.2.2 Interpersonal Trust – Between Internal Customers

Interpersonal trust, between internal customers of a design organization (See Fig.6) can be built by experience of the team members' working together (McDermott, 2005). According to research about interpersonal trust and willingness of knowledge sharing in design organizations, it is found out that team member's attitude towards work, ability, personality, and social interaction are the important factors influencing interpersonal trust (Ding, 2007). Interpersonal trust strengthens internal customers' organizational commitment, their interrelations (Tamer, 2014) and build up team resilience (Wei M. H., 2022). These features of the employee architects create affect-based trust between them.

According to a study about the relation between trust and conflict, it is found out that, trust has a partly positive effect on task conflict, but has completely positive effect on relationship conflict on performance. Additionally, when there is a high cognitive relationship and high task focusing between the internal customers, trust is not affected negatively from conflict (Rispens, 2007).

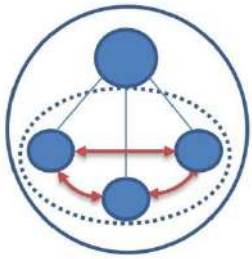


Figure 6. Trust building at Corporate Level: Interpersonal; In-between Internal Customers - the Designers/Employees

Affect-based trust is valid for interpersonal trust depending on the peers' thoughtfulness to each other and their emotional investments. (Wong W. C., 2008).

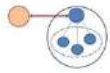
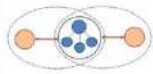
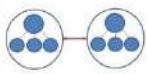
Design organizations have a more stable and permanent environment compared to other teams participating in construction. Members of design teams may have similar professional backgrounds, goals, and values. (Wei M. ,., 2022). Similar backgrounds of the employee architects enable ease of interaction and

communication between them and ensures building cognition-based trust between the internal customers of an architectural design organization.

5. CONCLUSION

Human resource in design organizations and interacted parties in design phase should be more taken account with the human centric approach of Industry 5.0 era. While most of the effort is given for satisfied external customers and project performance, it mustn't be forgotten that satisfied internal customers are needed for this purpose. In the study, it is aimed to present a holistic perspective focusing on the relational behaviors based on trust, while all the participants of the design phase are defined as mutual customers since they receive services from each other.

Organizational classifications of the parties, in the scope of an architectural design project are summarized in Fig. 7, corresponding to the required types of trust put forward by Wong et al. (2008).

Level of Management	Organizational Classification*	Scope	Model	Trust type**	Definition**
Project Level	Interpersonal Trust	Between External Customer and The Manager Architect		Cognition-Based Trust	Communication/ Interaction Knowledge
				Affect-Based Trust	Being thoughtful Emotional Investments
	Organizational Trust	External Customer and The Architectural Office Organization		System-Based Trust	Organizational Policy Communication System Contracts/Agreements
	Inter-Organizational Trust	Between Architectural Office Organization and the Other Organizations		System-Based Trust	Organizational Policy Communication System Contracts/Agreements
				Cognition-Based Trust	Communication/ Interaction Knowledge

* Derived from Ceric ((2014). Communication Risk and Trust in Construction Projects: A Framework For Interdisciplinary Research, *Procs 30th Annual ARCOM Conference* (pp. 835-844). Portsmouth, UK: In: Raiden, A B and Aboagye-Nimo, E (Eds).

** Derived from Wong, W. C. (2008). A Framework for Trust in Construction Contracting. International Journal of Project Management, 26, 821-829.

Figure 7. Trust building in design phase at Project Level

Despite the awareness that the design phase is vital for project performance and external customer satisfaction and therefore has an impact on the reputation of organizations; The feelings and thoughts of internal customers and their expectations in the working environment should be considered.

Level of Management	Organizational Classification*	Scope	Model	Trust type**	Definition **
Corporate Level	Intra-Organizational Trust	Between Manager and the Internal Customers		System-Based Trust	Organizational Policy Communication System Contracts/Agreements
				Cognition-Based Trust	Communication/ Interaction Knowledge
				Affect-Based Trust	Being thoughtful Emotional Investments
	Interpersonal Trust	Between Internal Customers		Affect-Based Trust	Being thoughtful Emotional Investments
				Cognition-Based Trust	Communication/ Interaction Knowledge

* Derived from Ceric ((2014). Communication Risk and Trust in Construction Projects: A Framework For Interdisciplinary Research, *Procs 30th Annual ARCOM Conference* (pp. 835-844). Portsmouth, UK: In: Raiden, A B and Aboagye-Nimo, E (Eds).

** Derived from Wong, W. C. (2008). A Framework for Trust in Construction Contracting. International Journal of Project Management, 26, 821-829.

Figure 8. Trust building in design phase at Corporate Level

Whilst it should not be ignored that internal customers' satisfaction is important for sustaining of the architectural organizations and organizational commitment (Çelik Tantekin, 2021). Personal and professional satisfaction of employee architects, which will occur as a combination of system-based trust, cognition-based trust and affect-based trust will reduce their intent to job change (Kasapoğlu, 2000).

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A VISUAL NARRATIVE OF THE NATION: ARCHITECTURAL REPRESENTATION IN *TURKEY IN PICTURES* (1937)

Gizem YAKUPOĞLU[1]

INTRODUCTION

Architecture and representation have a continuous relationship that involves diverse decisions and actors. Firstly, there are meanings related to the architectural work itself, which is tied with the decisions of the architect, who design in a specific time and place. Following the design and construction process, the meanings related to architecture is interpreted by people, since they experience their lives in and around architecture. Secondly, there are meanings constructed using various representations of architecture to explain diverse phenomena. An example of this can be seen in historical accounts that utilize architectural works to highlight specific ideas and themes. These narratives often include photographs and/or visualizations of architecture to emphasize meanings conveyed through a written medium. In other words, representations of architecture within diverse narratives operate as tools that contribute to the process where meanings on specific ideas are being constructed and conveyed.

Representation, which simply means "re-presentation", involves decisions on how a subject or an idea is to be represented (Morphy, 1986). In this process, signs of diverse kinds are utilized to create a relation between various objects and interpreting thoughts on them (Peirce, 1931). Architectural works have representational aspects themselves, as they have been used to convey different ideas, specifically in the representation of ideologies and power. However, when architectural works are represented within a narrative, they are visualized through a specific medium such as photography, as their physical reality cannot be incorporated into written accounts. Photography have been one of the most significant representational mediums since its invention in the early nineteenth century. Photographs do not offer a fixed image of reality as they focus on a specific object through an intentional framing, in a specific time and place. In other words, photographs are not necessarily objective, and they may construct or alter meanings

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in accordance with a wide variety of factors including the intention of the photographer; the construction of the composition; as well as the circulation and use of the photograph in different contexts.

The selection and incorporation of photographs in a narrative may affect the constructed meaning of the text, as well as its interpretation by the reader. In some cases, however, the photographs may constitute the main narrative, where texts accompany the visuals to provide context. A significant example of this can be seen in the photograph album titled *Turkey in Pictures* (1937), that was published by the General Direction of the Press, which aimed to "give an idea of the features of the new Turkey" following the proclamation of the republic in 1923 (The General Direction of the Press, 1937).[1] The objective of this chapter is to examine the constructed image of Turkey in *Turkey in Pictures* (1937) to understand how architectural photography operated as a representational tool to highlight certain themes and ideas by the state. Accordingly, a close reading and examination of *Turkey in Pictures* (1937) is conducted to be able to identify dominant ideas in relation to the context within which the book was produced.[2]

TURKEY IN PICTURES (1937)

The proclamation of the republic of Turkey and the establishment of Ankara as the new capital in 1923, following the War of Independence, are turning point events in the history of Turkey. The year 1923 marks the beginning of the transformation of Turkey into a secular state under the leadership of Mustafa Kemal Atatürk, which was accomplished by implementing a wide variety of reforms gradually that affected law; culture; education; and economy among other things (Turan, 1995). The abolition of the Caliphate and the adoption of the new Turkish constitution in 1924; the introduction of modern clothes in 1925; the enactment of the Turkish Civil Code in 1926; and the replacement of the Arabic alphabet with the Latin alphabet in 1928 were only some of the reforms that had an impact on the social lives of people (Ünsal, 1979). Architectural approaches of the time have also changed in line with the new

[1] "Matbuat Umum Müdürlüğü", which was a state institution, is translated as The General Direction of the Press. Some sources translate "Matbuat Umum Müdürlüğü" as the "General Directorate of the Press". However, in this chapter, "The General Direction of the Press" is used in accordance with the translation used in *Turkey in Pictures* (1937).

[2] The publication year of *Turkey in Pictures* is not included in the album itself. Türkiye Büyük Millet Meclisi – Kütüphane ve Arşiv Hizmetleri Başkanlığı (Library and Archive Services Department of the Turkish Grand National Assembly) catalogs *Turkey in Pictures* to the year 1937. Additionally, the archival document obtained from the Directorate of State Archives of Turkey, which can be seen in Figure 1, also dates to 1937. Accordingly, publication year of *Turkey in Pictures* is accepted and used as 1937 in this chapter.

ideals of the secular state, since “modern architecture” became the dominant architectural language between the 1930s and 1940s and continued to be a part of the architectural culture afterwards (Holod & Evin, 1984). In other words, the process that began following the proclamation of the republic, had already significantly changed the lives of people in the 1930s, in terms of cultural; social; architectural; political; and financial conditions. In his speech delivered on the tenth anniversary of the republic, Atatürk famously expressed this transformation by stating that “we have accomplished many and great tasks in a short time” (Atatürk In Cumhuriyet Halk Partisi On Beşinci Yıl Kitabı, 1938, V).

Turkey in Pictures (1937), a 178-page album was published by the General Direction of the Press, as a way to introduce “new” Turkey to the world, next to other publications such as the journal *La Turquie Kemaliste*, which began publishing articles in French, English and German to address an international audience in 1934 (Batuman, 2008). Similarly, *Turkey in Pictures* (1937) was published in four languages that are Turkish, English, French and German, with the intention to introduce Turkey to abroad (Figure 1). *Turkey in Pictures* (1937) was printed in Munich, Germany, which can be seen in the explanation section of the album (The General Direction of the Press, 1937) and in the archival document in Figure 1. Following its dispersal abroad, remaining copies of the album alongside 5000 publications ordered for Turkey were to be distributed free of charge within the country (Figure 1). *Turkey in Pictures* (1937) has a short four-page introduction (in all four languages), whose author is unclear, and an explanation page, which is then followed by one-page photographs.

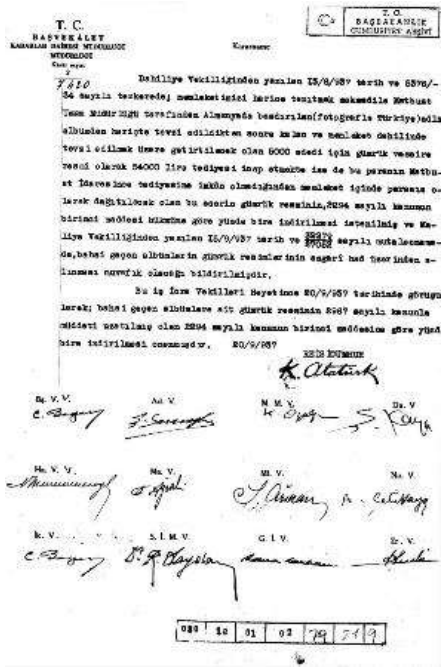

Figure 1 – Tariff document for Fotoğrafla Türkiye (Turkey in Pictures) signed by Mustafa Kemal Atatürk, expressing the intention of the album was to "introduce our country to abroad"; showing that the album was printed in Germany. Document obtained from: Directorate of State Archives of Turkey.

The photographs used in the album was taken by Othmar Pferschy, an Austrian that lived in Turkey between the years of 1926 and 1966 (Sezer, 2021). After Pferschy visited Istanbul with touristic purposes in 1926, he became impressed with the city and started working as a photographer, which was followed by him winning a photography competition organized by the Direction of the Press (Matbuat Umum Müdürlüğü) (Sezer, 2021). In line with these developments, Pherschy worked as a specialist photographer in the institution between the years of 1935 and 1940, and during that time he traveled the country and took photographs that were used in various government publications (Sezer, 2021; Batuman, 2008). *Turkey in Pictures* (1937), as a photograph album, utilized Pherschy's photographs to construct a visual narrative to represent the country to an international audience. Here, it is considered significant to first examine the four-page introduction of the book, as it provides a contextual basis for the visual narrative.

"From the Ottoman Empire to the Turkish Republic": An Overview of the Introduction of *Turkey in Pictures* (1937)

The four-page introduction of *Turkey in Pictures* (1937) compares the "new" and "vigorous" Turkey with the Ottoman Empire on four main categories that are, "Culture"; "Social Life"; "Economy"; and "Politics". In the few sentences that lead to this comparison, it is clearly stated that even though "Kemalist Turkey" descends from the Ottoman Empire, "the descent is of a purely historic nature", since the civilization, the social and political structure, and the economic system are different from one another (The General Direction of the Press, 1937, 9). In other words, in the first section of the introduction, the "new", "Kemalist" Turkey, a term that emphasizes the official ideology, is defined through a difference by contrasting it to its "Other", the Ottoman Empire. According to Hall (1997, 234), "… 'difference' matters because it is essential to meaning; without it, meaning could not exist…". Furthermore, he expresses that "… we need 'difference' because we can only construct meaning through a dialogue with the 'Other'" (Hall, 1997, 235). In other words, Hall (1997) explains that "difference", whether positive or negative, is necessary in the production of meaning, which is why, definitions of the "self" may be constructed through "difference" with its "Other".

The introduction of *Turkey in Pictures* (1937) follows a repetitive organizational structure, as in each category – "Culture"; "Social Life"; "Economy"; and "Politics" – we see the same narration. First, it acknowledges the accomplishments of the Ottoman Empire in its period of expansion. It provides positive aspects related to each category until the end of the 18th and/or the beginning of the 19th century. This brief overview of positives in each category is followed by the negative conditions that existed in the Ottoman Empire in its period of decline. These negatives aim to show the reader some of the reasons behind the fall of the empire. Additionally, it provides a ground of comparison between the conditions in the final years of the empire and the "new" Turkey. The last section of each category narrates the changes in the country, in terms of what was accomplished following the proclamation of the republic. The introduction ends with a few sentences on the objectives of publishing *Turkey in Pictures* (1937).

Examining the narration of the Ottoman Empire in its expansion period, we can see that the achievements of the empire in various fields are recognized. This image of the Ottoman Empire is expressed to be "modern" and "tolerant" (The General Direction of the Press, 1937, 9). It describes a time when people, including different minorities, were living together in peace, in an empire that considers social; cultural and economic needs of its people, even though it was a "theocratic Muslim state" (The General Direction of the Press, 1937, 12). The arts (painting, sculpture,

ceramics, and literature are mentioned among others) and architecture is described to be in its culminating point. Additionally, it is explained that the empire was equipped with armed power and organized finances (The General Direction of the Press, 1937). In other words, the introduction constructs an image of the Ottoman Empire that is accomplished and prosperous in terms of its "culture"; "social life"; "economy"; and "politics".

This prosperous image of the Ottoman Empire, however, shifts abruptly in the narration of each category, and we see a completely different portrayal of the empire in its period of decline. The reasons behind this shift are not outlined in the text. Rather, the living conditions in the Empire during the 19th century are shown. In the narration of the Ottoman Empire in the decline period, we see the former harmonious life of people changes as it is described that "the Ottoman society was transformed into a bizarre mixture…" (The General Direction of the Press, 1937, 10). The negative conditions of life are explained by pointing to the breaches made into the Ottoman Empire from all sides, which is expressed to disturb both political and financial fields (The General Direction of the Press, 1937). In this part of the introduction, we see the image of an empire at the brink of collapse, as it is stated that "we find the empire in a condition of complete cultural, economic, social, and political dissolution… the extensive dismemberment announced itself…The autocratic structure was about to fall to pieces" (The General Direction of the Press, 1937, 11). This image of the empire is then contrasted with the last section, the image of the "new" Turkey in each category, by pointing to accomplishments in the brief time following its foundation.

In the narration of the "new" Turkey, we can see few different ideas emerge from the text. First of all, we can see that the heritage of the Ottoman Empire in its expansion period, specifically in terms of its arts and architecture, is acknowledged and valued. In other words, the narration does not solely depend on a comparison between the "old" and the "new", instead, an image of Turkey that maintains the positive, and "transform" the negative is constructed. In the sections that highlight a difference between the "new" Turkey, and the Ottoman Empire in its decline period, we see an emphasis on the ideology of the state, as we see that the aforementioned differences are expressed to be made possible through the changes in ideology. An image of the "new" Turkey that contrasts with the final years of the empire is constructed through the utilization of "Kemalism" in the text, which is defined as "the ideologic religion of the Turkish Republic" (The General Direction of the Press, 1937, 10). In that, we see an emphasis on the fact that the new "Turkey" is a "laic" and "democratic" People's State that values "national unity", where one class or the other is not prioritized as the "Turkish state…belongs to the entire nation" (The

General Direction of the Press, 1937, 12). The values of the Turkish nation are summarized in the text by pointing to the principles of the Republican People's Party by outlining that "…the Turkish nation is republican, nationalist, laic, democratic, state-socialistic, and revolutionary" (The General Direction of the Press, 1937, 12).

In addition to the mentioned comparisons between Ottoman Empire in its periods of expansion of decline and the "new" Turkey, we see another theme that is included in the four categories of the introduction. The theme that operates as a point of reference is the "West"[1], or the "Occident" as identified in the text. We see the "Occident" is being used to emphasize two main points. Firstly, it is being used from a historical point of view, in relation to the Ottoman Empire in its period of decline. In this use, the "Occident" is the one that infiltrates the country, as they are the ones that "breach" causing disturbance in political and financial fields, which leads to the fall of the empire (The General Direction of the Press, 1937). This breach of the "Occident" is explained through two factions of people within the country: the ones who are showing a theocratic reaction, and the ones who showed "boundless admiration for European civilization, and abandoned their mind like an open market to the invasion, to Occidental colonization" (The General Direction of the Press, 1937, 9). Continuing, it is also expressed that Ottoman Empire in its period of decline was relying on import of industrial goods, which formed "an open market for the European capitalism" (The General Direction of the Press, 1937, 11).

In this utilization, the "Occident" is being used to highlight unfavorable conditions of the empire in its decline, since it lacks "national funds" and "national commerce"; which creates a vulnerable position (The General Direction of the Press, 1937, 11). Additionally, there are descriptions of people who are either described as "apish copying of what was considered to be manifestations of European civilization" or showing "theocratic reactions", which are both stated to be "expressions of degeneration" (The General Direction of the Press, 1937, 9). In other words, in its first use, the "Occident" in relation to the Ottoman Empire, operate as a tool to emphasize the "dismemberment" of the country in its final years.

In the second use of the "Occident" theme, we see a completely different approach, since it operates as a reference point for the "new" Turkey.[2] While the

[1] It is considered important to mention that the term "West" is not included in *Turkey in Pictures* (1937), rather the terms "Occident" and "Europe" were embedded in the introduction. Here, it is being used to refer to the constructed idea of the "West", as it has been being used in cultural studies in the last few decades.

[2] It should be noted that the "Occident" also operates as a point of reference for the Ottoman Empire in its period of expansion, since the text mentions "medresses" as an advanced educational institution that "produced men" who are "considered worthy of fame by Europe" (The General Direction of the Press, 1937, 9).

first use of the theme highlights the negative conditions of the empire in its period of decline, the second use utilizes the "Occident" as a way to construct an image of the "new" Turkey, while also contrasting it with the past.

The utilization of the "Occident" as a point of reference is also visible in the narration of reforms that had changed Turkey following the proclamation of the republic, as it is expressed that "…a series of reforms which are still unrealized ideas for many European states, have attained definite realization" (The General Direction of the Press, 1937, 10). These are exemplified by pointing to the awarding of political rights to woman, nationalization of wholesale manufacture, controlling of the industrial cost of production, and so on. In other words, in its second use, the "Occident" operates as a tool to emphasize the accomplishments of Turkey, while also globally positioning the country. Accordingly, it can be stated that the definition of the "self" in *Turkey in Pictures* (1937) is being constructed in relation to Ottoman Empire in its periods of expansion and decline, while also utilizing the "Occident" as a reference point.

The introduction section leads to the remaining 158 pages of the album, where photographs are categorized under six headings,

Ankara; Istanbul; Towns and Landscape; Archeology and Art; Economy and Constructive Work; and Man and Civilization. The last few sentences of the introduction that lead to the photographs of Othmar Pferschy explains readers that the album aims to "be able to give an idea of the features of the new Turkey", and that it shows "beside old historic monuments the stages of its march on the road of progress and development, the expressions of its will to build up, and of its dynamism" (The General Direction of the Press, 1937, 12).

Constructing an image of the Nation through Photography and Architecture in *Turkey in Pictures* (1937)

The introduction to the photograph album *Turkey in Pictures* (1937), outlines the accomplishments of Turkey following the proclamation of the republic. As previously explained, the constructed image of Turkey in that narration uses difference with the Ottoman Empire in its two different periods, while also positioning itself in the global arena by utilizing the "Occident". This narration shows that through the new state ideology, "Kemalism", Turkey is in a continuing process of advancements in cultural, social, political, and financial fields. While the arts and architecture of the Ottoman Empire in its expansion period is expressed to be valued, in the remainder of the text, we do not see a specific emphasis on these areas. Even though it is stated that "The arts are enjoying the greatest assistance, and are advanced without difference", the introduction does not reflect these fields in the

text (The General Direction of the Press, 1937, 9). On the other hand, the visual narrative constructed in *Turkey in Pictures* (1937), heavily rely on arts, architecture, and the city, since accomplishments of Turkey are spatialized and visualized through them.

The first heading in *Turkey in Pictures* (1937) is Ankara, which is the "new" capital of the "new" Turkey. Capital cities, as seats of governments, has representational attributes since symbolic values can be attached to those places. The declaration of Ankara as the "new" capital, as opposed to the "old" capital of the Ottoman Empire, Istanbul, also carried symbolic meanings by representing a break with its past. Öz (2014, 13) explains this by stating that, "Ankara became the representative of a new Turkish State that aimed to attain a place in the global picture as being a modern and secular nation state." While Ankara was a modest town in the early 1920s, following its declaration as the capital, Ankara's built environment had started to change significantly with the rapid construction of architectural works (Altan Ergut, 2006). In line with the aim to become a "modern" state, the architectural language of "modernism" was utilized as a representational tool itself, and the architectural works employing this dominant approach began to shape the face of the capital.

A direct reflection of this phenomenon can be seen in the first heading, Ankara, within which the built environment of Ankara represents the "new" and "modern" capital of the country. The are a total of 28 photographs in the Ankara section. The main objects in 22 of these photographs are architectural works. The objects of the remaining 6 photographs are sculptural works and images that show the cityscape. The first photograph of the heading Ankara is among the latter, as the photograph album opens with an image of the Monument of National Sovereignty (Hakimiyeti Milliye Abidesi), also known as the Victory Monument located in Ulus Square, Ankara (Figure 2). The monument was the outcome of a competition, whose main theme was the War of Independence alongside its main actor Mustafa Kemal Atatürk (Doğramacı, 2010). The winning sculpture belonged to the Austrian sculptor Heinrich Krippel and the monument was inaugurated in 1927. In other words, the visual narrative begins with a symbolization of the War of Independence, which operate as a starting point for the "new" Turkey.

Figure 2 - Monument of National Soveignity (Hakimiyeti Milliye Abidesi), The first photograph included in Turkey in Pictures (1937), Photograph taken by Othmar Pferschy. (The General Direction of the Press, 1937)

The following three photographs, continue the narration on the foundations of the republic, since we see the Villa of Atatürk, also known as the Residence of the President; a photograph that shows the Ministerial Quarters (Devlet Mahallesi) where many of the state and institutional buildings began to be constructed; and another photograph that shows the building of the Grand National Assembly building (Büyük Millet Meclisi) (Figure 3).[1]

As it can be seen, the first four photographs included in the album, visually express a narrative within which the War of Independence occurs, whose main actor is also the first president of the country, Mustafa Kemal Atatürk, that are followed by the images of the "new" capital being built starting with one of its most symbolically and ideologically significant buildings, the Grand National Assembly (today known as the Second National Assembly). In the remaining photographs, we

[1] It should be noted that the building included in Turkey in Pictures (1937) as the Grand National Assembly building that was built by Vedat Tek in 1926 was first used as the Headquarters of the People's Republican Party. There was another Grand National Assembly building being used prior to the building, and therefore the architectural work included as the Grand National Assembly in Turkey in Pictures (1937) is known as the Second National Assembly (Holod & Evin, 1984).

see the "new" buildings of the capital that are mainly government buildings and various institutions of the state. Most of these buildings utilize the characteristics of modern architecture, in line with the construction program of the state.

Figure 3 – Photographs taken by Othmar Pferschy that are included as the second, third and fourth images in Turkey in Pictures, showing the Villa of Atatürk; Ministerial Quarters and the Second National Assembly from left to right. (The General Direction of the Press, 1937)

If we examine the photographs of these "new" buildings closely, we can state that Pferschy highlights the modern attributes of the architectural works, as his photographs were framed to emphasize physical characteristics of architecture, in static and sterile environments (Figure 4). Looking at the relationship between photography and architecture, Colomina (1996, 14) explains that "It is actually the emerging systems of communication that came to define twentieth-century-culture- the mass media- that are the true site within which modern architecture is produced and with which it directly engages". Indeed, we can see Pferschy emphasizes the "modern" characteristics of the included works by making them main objects, while diminishing any other objects or people (Figure 4).

Before continuing with the next heading, it is considered important to state that the selection and inclusion of the photographs is also a significant factor in terms of diverse meanings being constructed within the visual narrative. Here, it is possible to observe that many of the included buildings are newly built architectural works that exhibit physical characteristics of modern architecture. On the other hand, many other architectural works that were built in line with the architectural characteristics of the "First National Architectural Movement" were not included in *Turkey in Pictures* (1937), even though they are today considered as significant works in the

architectural history of Turkey.[1] This representational decision to exclude these works, however, is consistent with the idea of creating difference between the Ottoman Empire and the "new" Turkey, since the architectural language of the "First National Architectural Movement" utilized forms of Ottoman Architecture. There are few exceptions to this strategy in the heading of Ankara, since images of Grand National Assembly (Second National Assembly); Bank of Agriculture; and the People's House and Ethnographic Museum were chosen to be incorporated in the album.

The next heading, Istanbul, has 23 photographs, through which a much more diverse image of Turkey is being represented to the readers. This contrast between Ankara and Istanbul strikes the reader in the first image of the heading that shows the Galata Bridge, in a busy cityscape (Figure 5). Unlike many static photographs in the former heading Ankara, the bridge is filled with people and vehicles; there are numerous boats on either side of the Galata Bridge; and the background shows a wide variety of buildings with different architectural languages (Figure 5). While the remaining photographs in the Istanbul heading carry resemblance to the ones in the prior heading in terms of being static and sterile, the first photograph (Figure 5) highlights a difference between the "new" and the "old" capital of the country.

[1] We can exemplify some of these significant buildings that were not included in the heading in Ankara in *Turkey in Pictures* (1937) as Ottoman Bank Headquarters (1926); İş Bankası Headquarters (1928); State Monopolies General Directorate (1928); Ankara Palas Hotel (1927); and so on.

Figure 4 – Four photographs taken by Othmar Pferschy that takes the built environment as their main object in a sterile and static way. Upper Left: Institutes for Higher Studies in Agriculture (Yüksek Ziraat Enstitüsü); Upper Right: Ismet Pasha Young Women's Institute (İsmetpaşa Kız Enstitüsü); Lower Left: Tribunes of the Stadium (Stadyum Tribünleri); Lower Right: Hygienic Institute (Sıhhat Enstitüsü). (The General Direction of the Press, 1937)

In relation to the introduction, it was expressed that the arts and architecture of the Ottoman Empire in its period of expansion was acknowledged and valued. In the photographs of Istanbul, we see that another emphasis is being made in terms of heritage, as in the next image we see a view of the Hagia Sophia, an important architectural work that was built in the Byzantine period. Moreover, the next two photographs of Pferschy are also images of the Hagia Sophia (Figure 6). Furthermore, another byzantine structure, the Cistern of Philoxenos, is also included in the album. In the following images, we see exteriors and/or interiors of various mosques built during the Ottoman Empire. Indeed 9 out of the 23 photographs include mosques. Considering that there are also photographs showing the Leander tower; Ottoman gravestones; the old fortress of Rumeli Hisar and what appears to be an Ottoman fountain, it can be stated that the value being given to the Ottoman heritage is visible in the Istanbul section. In addition to the photographs that have architectural works as their object, we also have scenic images in this heading, highlighting natural merits of the city.

Figure 5 - A lively scene from Istanbul showing the Galata Bridge and Istanbul skyline in the background. Photograph taken by Othmar Pferschy. (The General Direction of the Press, 1937)

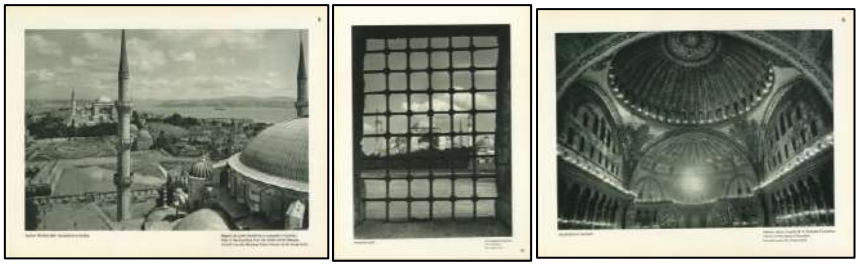

Figure 6 – Static photographs of Hagia Sophia, a significant Byzantine structure located in Istanbul. Photographs taken by Othmar Pferschy. (The General Direction of the Press, 1937)

Reconsidering the dominant architectural language of the period, which utilized characteristics of modern architecture that was emphasized in the Ankara heading, we can see that Istanbul is being represented through its past. In a photograph that shows the Moda Bay, however, we see a building contrasting the architectural works in the remaining of the Istanbul section (Figure 7). While the architectural work, whose function is not specified in the album,[1] stands out in comparison to other images, it shows that "modern architecture" was not the main object of the photographs in Istanbul.

[1] The building in the photograph is located next to today's Moda Deniz Kulübü (Moda Sea Club). Moda Deniz Kulubü was founded in 1935. In their official website, they refer to the building in the photograph, however, it is unclear if the building was constructed and used by them.

Figure 7 - The photograph titled Moda Bay with an architectural work that show characteristics of modern architecture in the front. Photograph taken by Othmar Pferschy. (The General Direction of the Press, 1937)

The next heading, Towns and Landscape consists of 22 images, which are mainly scenic photographs taken by Othmar Pferschy. The first photograph of this section is an image that shows a green landscape in the morning fog in Bursa, one of the rather larger cities of Turkey. The next five photographs, however, highlights the built environment once more. The first architectural work we see is the Hotel of the new Iron Thermal Baths (Çelikpalas) at Bursa, which is the object of three consecutive photographs. The next two architectural works are from Yalova, a small city in the country. In the two photographs taken in Yalova, we first see the Sulphur Thermal Baths, and then a hotel built in the vicinity of it. Images reflect a continuum with the earlier static photographs, as they are also uninhabited. We see that the thermal baths and the greenery surrounding the mentioned architectural works were put forward in these images. In addition to that, in the photographs of the Hotel of the new Iron Thermal Baths at Bursa, which was built in 1935 by Giulio Mongeri, we see an emphasis on the art deco characteristics of the building, in addition to its modern features (Figure 8). The remaining photographs under this heading, highlight nature in different cities of Turkey by showing landscapes in diverse geographies.

The fourth heading, Archeology and Art, consists of 22 photographs and first it takes us to the Archeological Museum in Istanbul. Diversity of culture being represented in the visual narration of the second heading, Istanbul, can also be seen under this heading, since we view archeological ruins; artefacts; and artworks from different periods that date back to early Anatolian civilizations such as the Hittites. We view static images of Pferschy once more and their objects vary but include sculptures; a sarcophagus, archeological ruins in different ancient cities; ceramic tile decorations on the facades and interiors of buildings.

Figure 8- The thermal pool area that exhibit art deco characteristics in the Hotel of the new Iron Thermal Baths (Çelikpalas) at Bursa. Photograph taken by Othmar Pferschy. (The General Direction of the Press, 1937)

The fifth heading, Economy and Constructive Work, consists of 44 photographs. Looking at the objects of the photographs, we see that this heading aims to show the progress made in different fields, such as agriculture; production of goods; collection and treatment of raw materials; the transportation of products; and so on. Accordingly, we see some people in the process of gathering and crafting; in addition to many scenic photographs that show fields, trees, fruits and animals; a bridge, dam and railroads; as well as images that show factories and warehouses. One of the highlights of the "new" Turkey in the introduction is the self-sufficient policies of the government and the photographs under this heading portrays the processes and constructions as steps that were taken to achieve this goal.

The last heading, Man and Civilization, which can be better translated as "Culture and People" from Turkish "Kültür ve İnsan", consists of 14 photographs. Unlike the previous five headings, the object of these photographs are people, more specifically young people, who are all participating in different activities. The photographs are not static, as their objects are in motion, making music; doing sports; marching; parading; learning different crafts and gaining new abilities. We see women as prominent figures in these photographs, who were given equal political rights as part of the series of reforms.

CONCLUSION

The examination of *Turkey in Pictures* (1937) can be seen to highlight several points related to architectural representation and its use to convey various ideas. First of all, it can be seen that the choice of architectural language, as well as its incorporation to the album was used to emphasize a difference between the "new" Turkey and its past. This is particularly visible in the first two chapters, Ankara and Istanbul, former being the new seat of the government of Turkey and the latter being the capital of the Ottoman Empire. It was seen that the image of Ankara was constructed through the incorporation of architectural works that utilize a modern architectural language, despite the few mentioned examples of "First National Architectural Movement". The emphasis on "modern architecture" can also be viewed in line with the reference made to the "Occident" in the introduction, as the roots of "modern architecture" is associated with the "West" by being its point of origin. On the other hand, the architecture of Istanbul portrayed a much more diverse and complex image within which the Ottoman and Byzantine heritage were acknowledged and represented to the reader. Considering the organizational structure of the visual narrative, alongside the narration of the introduction, it can be stated that the visual narrative contributed to the definition of the "self", Turkey, by comparing it to its "Other", the Ottoman Empire, while respecting the cultural and historical inheritance; and by highlighting an association with the "Occident". In the visual narrative, both formal characteristics of architecture, as well as their selection; inclusion; and exclusion from the narrative was utilized to represent the "new" and "modern" Turkey to an international audience.

The acknowledgment of the cultural heritage was also emphasized in the fourth heading, Archeology and Art, which showed works from past civilizations. However, this section did not make any comparisons and incorporated works from different cities, through which the diversity of culture was highlighted. Another section that utilized the built environment to represent "new" Turkey, was the chapter on Towns and Landscape, which included architectural works and pointed to its modern and art deco characteristics. This can be seen to construct an image of the country, which spreads the values that were first implemented in the capital, Ankara. Considering other photographs that were taken by Othmar Pferschy, we see that the remainder of the themes were in line with the narrative of the introduction, since they highlighted the process of development of Turkey by incorporating its nature; industry; economy; heritage; culture; and people.

If we revisit Pferschy's photographs in *Turkey in Pictures* (1937), we can see that the main body of his works portrayed architecture in a static and sterile manner. They were images that focused on the architectural works, as opposed to including people or vehicles. Accordingly, when we look at these images from today's point of view, they show the built environment in an uninhabited way, as if the time had stood still. Remembering Colomina's words, we can say that Pferschy produced these architectural works in his photographs, through his point of view, which is line with the objectives and representational intentions laid out *Turkey in Pictures* (1937). Lastly, we can see that while the introduction of *Turkey in Pictures* (1937) provided the reader with a contextual basis, the main narrative of the album was achieved through photographs – specifically images of the built environment – and their organization, through which a nation in a continuing process of progression was represented to people.

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THE ROLE OF POLICIES FOR ENERGY EFFICIENT BUILDINGS: DEVELOPING A PERSPECTIVE FOR SUSTAINABLE ARCHITECTURE IN TURKEY

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Hatice KALFAOĞLU HATİPOĞLU[2]

INTRODUCTION

One of the main sources of energy consumption worldwide is buildings (Annunziata et al., 2013a). Fundamental steps to decrease the European Union's reliance on fossil fuels, energy imports, and greenhouse gas emissions are reducing energy consumption and boosting the use of energy from renewable sources in the construction sector. According to research conducted by the Intergovernmental Panel on Climate Change (IPCC), the risk of the earth's temperature rising by between 1.4 and 5.8 C as a result of global warming brought on by greenhouse gas emissions is present if appropriate measures are not taken (Barone-Adesi et al., 2011).

Buildings are responsible for around 40% of total final energy use and 36% of the European Union's total carbon dioxide emissions (Petersdorff et al., 2006). Consequently, European legislation has set out a cross-sectional framework of ambitious targets for achieving high energy performances in buildings to encourage sustainable development. "The key part of this European regulatory framework is The Energy Performance of Buildings Directive (EPBD) for reducing energy use for heating, cooling, ventilation, hot water, and lighting in buildings" (Economidou et al., 2020).

The directive mandates the use of a systematic framework for estimating a building's energy performance. It has provided the opportunity for Member States to establish minimum energy performance standards (MEP) for both new and existing buildings and to demand that these standards be met when substantial retrofits are made to existing structures. (Economidou et al., 2020). As part of this directive,

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Member States have also put in place certification that inform prospective buyers or tenants of the building's energy class and suggest improvements for cost-effectively improving overall energy efficiency. The updated Directive, which completed in 2010, established a standardised calculation technique to tighten the minimum energy performance standards and drive them toward a cost-optimal level.

Turkey is extremely sensitive to climate change since it is located in the southern region of Mediterranean Europe, where temperatures have been documented to be rising and precipitation levels to be falling. “The issue of energy production and consumption is one of the strategic themes considered in national independence policies of Turkey and should be carefully examined. In addition, the construction sector accounts for a significant share of this consumption.” (Hatipoglu et al., 2022). Similar to many other nations, Turkey has lately experienced significant changes in the environment. In the summer of 2021, while experiencing floods and the greatest wildfires in its history, the nation made a significant step in battling climate change. Notwithstanding Turkey has joined the Paris Agreement in 2016 (*Türkiye | UNFCCC*, n.d.), it held back from ratifying it for five years.

Turkey's economic growth from 2010 to 2018 reached 6.41%, which contributed to an extreme increase in carbon emissions during the past ten years. The Turkish economy is still very reliant on imported petroleum and other fossil resources. According to the International Energy Agency, coal, natural gas, and oil account for the majority of Turkey's overall energy supply, with dependency on renewable sources becoming relatively low. (Onofrei et al., 2022).

In 2020, Turkey's emissions of carbon dioxide (MtCO2) totaled 369.5 million metric tons. After reaching a peak of 397.1 MtCO2 in 2017 (*Republic of Turkey Climate Change Action Plan 2011-2023*, 2011).

Summary of Turkey’s action plan is:

- By 2023, implement thermal insulation and energy-efficient technologies that satisfy specifications in commercial and public structures with useable areas greater than 10,000 square meters.

- Effective implementation of the Regulation on Energy Performance in Buildings (EPB) and other energy efficiency regulations until 2017

- Create the mechanisms necessary to offer the funding assistance for energy efficiency, renewable energy, and EPB through the end of 2013.

- Issuing “Energy Performance Certificates” to all buildings until 2017

- Reduce yearly energy use in public buildings and facilities by 10% until 2015 and 20% until 2023.

- As of 2017, at least 20% of the annual energy demand of new structures will be fulfilled by renewable energy sources.

- by 2023, decrease greenhouse gas emissions in new settlements by a minimum of 10% each compared to existing settlements. (*Republic of Turkey Climate Change Action Plan 2011-2023*, 2011)

Accordingly, Turkey has been behind schedule compared to other EU countries and needs to improve its targets and plan to mitigate risks of climate change in order to take action towards sustainable development. Moreover Turkey needs to make progress for more sustainable development which can be provided with some policies in terms of norms, measures and enforcements.

The main aim of this study is to investigate European countries' policies and implementations comparatively in order to prevent the decrease of extreme CO2 emissions regarding energy efficiency in the buildings. This was achieved by applying regulations, measurements and experiences of the EU countries. Moreover the aim of the study is to lead a path for Turkey in terms of energy efficiency in buildings from these experiences.

In order to achieve these aims, the research focuses on the new EU regulations for new buildings, exploring the degree of commitment of different countries in the EU, and the role of these regulations in the comprehensive energy policy of the EU to achieve their goal of climate neutrality by 2050. This study compares the effects of EU policy requirements regarding energy efficiency on the building sector in order to show how effective they have been at decreasing climate change risks and energy consumption in both new and existing buildings. To exhibit their performance and show how they help to lower buildings' energy usage.

REGULATIONS AND INSTRUMENTS FOR EU COUNTRIES

In order to meet the EU's 2030 and 2050 decarbonization goals, it is critical to effectively reduce emissions from both new and existing buildings, as indicated by the EU Climate Target Plan of EU and Fit for 55' package. To achieve this decrease, laws must be in force buildings to consume the least amount of energy possible. The EU Climate Target Plan emphasizes the requirement to phase out the use of fossil fuels for heating by 2040 in order

to achieve decarbonization of the construction industry. (*2030 Climate Target Plan*, n.d.; *EU Economy and Society to Meet Climate Ambitions*, n.d.-a).

For the benefit of building owners, financial investors, and public authorities, the EPBD involves steps to make Energy Performance Certificates (EPCs) considerably clearer, more trustworthy, and visible, with easy-to-understand information on energy performance and other important qualities. The EPBD predicts that as of 2027, fossil-fuel-powered boilers will no longer be eligible for public support since the average life expectancy of heating systems is nearly 20 years. (Gutiérrez-Sánchez et al., 2022). Furthermore, 100% of on-site energy consumption in all new buildings is covered by renewable energy as of 2030, with public buildings having an earlier implementation date of 2027.

In figure 1, a comparison for the distribution of energy performance certificates of the new residential buildings in the EU region has been shown between years 2010 – 2013 by author according to (*Zebra Monitoring*, n.d.).

Figure 7 - Distribution of EPCs in new dwellings by author according to (Zebra Monitoring, n.d.)

Although Denmark has made remarkable progress toward label A dwellings, other countries (Netherland, UK, Slovakia) are still moving toward dwellings with lower labels like (B&C). However Spain still struggling with new residential dwellings with labels (D&E) (figure 1).

The EPBD uses many instruments to maintain its overarching' objectives, for example, Every year, the EU Emissions Trading System (ETS) reduces the ceiling on emissions from several economic sectors and assigns a price to carbon. In the last 16 years, it has been effective in reducing emissions from the power industry and energy-intensive businesses by 42.8%. (Ovaere & Proost, 2022). Nevertheless, each Member State is given more challenging emissions reduction goals under the Effort Sharing Regulation for buildings, domestic road and sea transport, agriculture, waste, and small businesses. These goals are based on the GDP per capita of each Member State, taking into consideration the various starting places and competencies of each Member State.

The Regulation on Land Use, Forestry and Agriculture establishes an overall EU objective for carbon removals via natural sinks, equivalent to 310 million tons of CO2 emissions by 2030, since Member States also share responsibilities for removing carbon from the atmosphere. (*EU Economy and Society to Meet Climate Ambitions*, n.d.-b). Finally, in order to prevent aggressive climate action in Europe from resulting in "carbon leakage," a new Carbon Border Adjustment Mechanism would impose a carbon price on imports of a specific selection of items.

POLICY AND PRACTICES OF DIFFERENT EU COUNTRIES IN TERMS OF ENERGY EFFICIENCY

The analysis's results indicate that diverse approaches were used by the European Member States to create their individual national regulatory frameworks. Nearly all of the European Union's member states have used at least one of the tools for policy development and regulation..

Some countries such as Denmark, Finland, and Sweden in North Europe, and Germany, Austria and the Netherlands for West Europe are ahead in the adoption of regulatory and policy to achieve energy saving targets. They have developed policies in terms of certification schemes, requirements for thermal insulation/performance, and low-interest loans.

Although, The amount of buildings in Austria has almost increased since the 1960s, and the building industry is responsible for over 40% of total energy use. Austria has acted as a model state in Europe, maintaining a sustainable building strategy for more than 20 years by adhering to EU Standards. (Hatipoğlu, 2016)

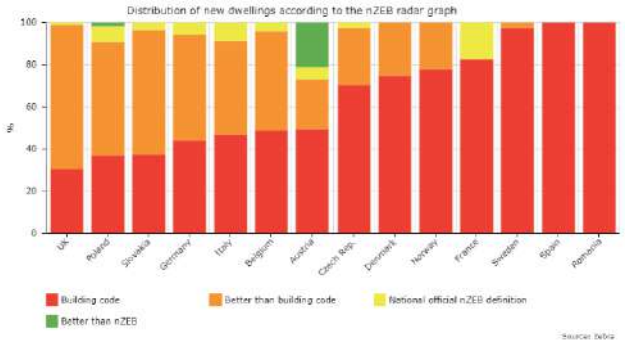
An energy certification program has been established in Denmark for the sale of single-family homes and owner-occupied apartments. Since 1976, Finland has established minimum standards for thermal insulation. (Annunziata et al., 2013b). Germany has had thermal performance standards since 1977 (Geller et al., 2006), and since 2002, the country has implemented precise energy performance standards for new and renovated buildings as well as a need for new construction and significant renovations to get an energy certification. (Schettler-Köhler, n.d.).

To enhance the energy efficiency of Swedish homes, Sweden provided low-interest loans and subsidies for improvements in residential buildings.

Sustainability is a contemporary concern in Turkey's construction industry, however it is driven by economic factors, and attempts are of a short-term nature. Government policy has emphasized earthquake preparedness measures and urban renewal for underdeveloped areas. Ministries have a strategy in place to promote sustainable development, but it is still in the planning stages and has not been put into action. Since diverse stakeholders are not collaborating yet, a sustainable national policy has not yet been formed. (Hatipoglu et al., 2022).

Figure 2 below shows the distribution of new dwellings percentage for many countries according to the nZEB radar by country, Red colour refers to the dwellings that had settled for the national building code and Green colour refers to the new dwellings that did better than nZEB standard by author according to (*Zebra Monitoring*, n.d.).

2010



2014

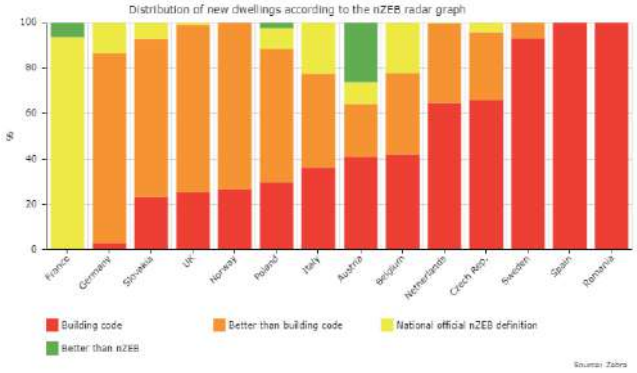


Figure 8 - Distribution of new dwellings according to the nZEB radar graph by author according to (Zebra Monitoring, n.d.)

Austria is one of the countries that lead the race, and The figure shows that new dwellings in France had totally followed its own national official nZEB definition, however many other countries have proven a progress better than the existing code standard but they need more efforts to reach nZEB standards. Lastly Sweden, Spain, and Romania have settled on the national building code. (Figure 2)

Many countries had the presence of incentives for the sale of energy-efficient buildings like Belgium, Netherlands, Estonia, Finland, Sweden, Italy, Slovenia, Austria, Germany, and Luxembourg. also, many countries had the presence of incentives for rent of energy-efficient buildings, for example, Lithuania, Belgium, Finland, Sweden, Austria, Germany, and the Netherlands

National laws in several nations apply administrative fines and/or monetary penalties for failing to comply with energy performance requirements, for example, The Czech Republic, Sweden, Spain, France, and Luxembourg.

The EU's greenhouse gas emissions have already decreased by 24% since 1990 as a result of its current energy and climate regulations. While the EU economy has grown by around 60% in the same period, decoupling growth from emissions. This group of laws is built around a tested legislative structure.

The present policy agenda aims to reach the primary objectives by the year 2030: a decrease in greenhouse gas emissions of at least 40% below 1990 levels; a rise in the share of renewable energy sources in energy consumption to 32%; as well as an increase in energy efficiency of 32.5%. (*EU Economy and Society to Meet Climate Ambitions*, n.d.-c).

Figure 3 shows carbon dioxide (CO2) emissions by country (1998-2018)

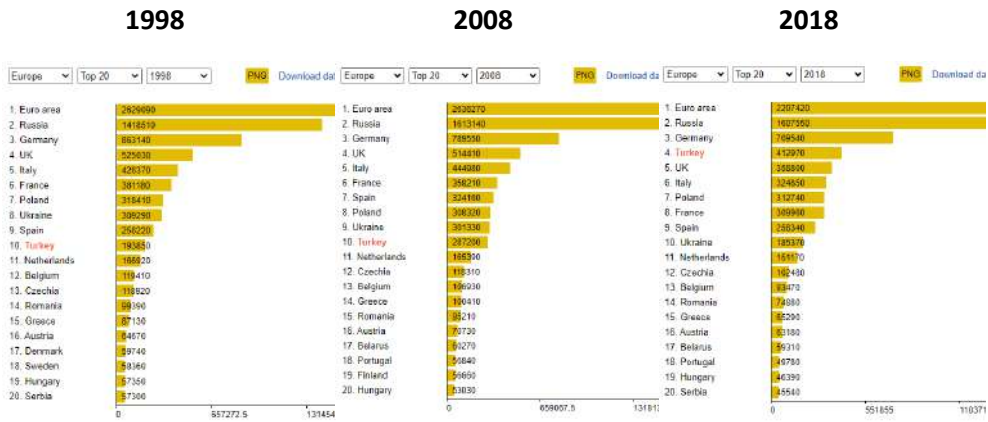


Figure 9 - Carbon dioxide (CO2) emissions by country by author according to (Zebra Monitoring, n.d.)

While the Euro area decreased its carbon emissions by 20% between 2008 - 2018, Turkey's carbon emission has increased by 212% between 1998-2018, and moved to the top three countries (Figure 3).

Figure 4 shows percentage share of clean energy from total energy use by country (1998-2018)

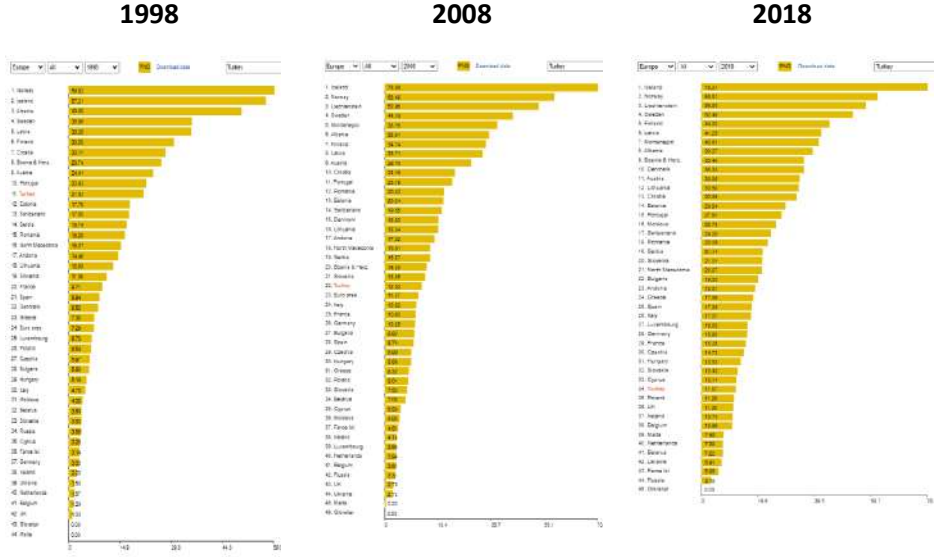


Figure 10 - Percentage share of clean energy from total energy use by country by author according to (Zebra Monitoring, n.d.)

While the Euro area increased its share of clean energy by more than 50% between 1998- 2008, Turkey's share of clean energy has decreased to half between 1998-2018. And Turkey's ranking fell from 11th to 34th in the EU region. (Figure 4)

CONCLUSION

This study emphasises the importance of the policies and measures for energy efficiency in terms of encouraging sustainability. Political actions and infrastructural developments which are based on norms, regulations and measures can promote sustainable development. Sustainability policies and practices in European countries have provided significant progress toward energy efficiency in buildings which can guide other countries. All EU Member States have put efforts in order to achieve energy-saving targets by considering energy saving potentials in the building sector. Since concerns and implementations in Turkey have not reached the same level as that in Europe, these can propose a contribution for energy efficiency policies and practices in Turkey.

After the analysis of the study it can be indicated that Turkey needs active and successful strategies and policies in order to promote energy efficiency in the building sector. These can be described as follows:

● To create a vision for the country in the buildings sectors, which should be set a clear objective for the new building (and later for existing building also) to be net-zero energy and carbon over the whole lifecycle, It needs to maintain a very high energy performance, full decarbonization at operational phase

● A must to report on embodied carbon emissions should also be added to ensure low embodied carbon emissions in building and construction materials and processes as well as update current standards and tools to accomplish climate neutrality for all buildings.

● To develop the framework for energy performance certificates (EPCs), which shows key indicators including real energy performance, GHG measurements, and indoor air and environmental quality as well as calculations procedures.

● To promote positive energy in order to fully use demand response and energy storage technologies throughout the operating phase.

● To Encourage building renovation by introducing minimum performance standards for all building types with help of public financing.

The research concludes that many EU countries have experience implementing sustainable development in the building sector and have relevant guidelines for sustainability of new and existing buildings. Moreover, the analyses show that the contribution of these measures have provided a significant success in terms of reducing carbon emissions. Turkey needs to improve its targets and plan to mitigate risks of climate change with norms, measures, enforcements and initiatives to make progress for more sustainable development. This development can be implemented with the contribution of several actors of the building sector. Open dialog and discussions between different stakeholders can raise awareness of environmental problems because a sense of collaboration and commitment between the government and construction industry is required to build an efficient sustainability perspective for Turkey.

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HENRI PROST'S ISTANBUL MASTER PLANS AND THE EARLY 20TH CENTURY HOUSING IDEOLOGIES HIS HOUSING PLANNING IDEAS AND METHODS AS AN ARCHITECT-URBANIST

Hülya Coskun[1],

1. Introduction

The scope of the Henri Prost Istanbul plannings has been discussed in each period following provision of studies, but the "housing" issue and the ideological background of plannings has remained unknown.

This research examined Henri Prost's Istanbul plannings with the context of the "housing" emphasizing his main identity as an "architect-urbanist", his ideological "*l'école*" (school's) thinking resource *Le Musée-Sociale* (Social Museum) and its influencer Frédérick Le Play. 19th century ideologies that shaped today's modern French civil society emerged to solve "housing "problematic in French society" this idea would be later adapted and used by H. Prost to modernize the cities also aimed to develop new housing models and typologies revealed later in Istanbul plans.

The ideas and approaches of Henri Prost's plannings were identified from Social Museum's regulations on the housing planning ideologies and models derived from F. Le Play's ideology and his research to improve living conditions of French families and workers "housing problem" with his book *La Réforme Sociale* (Social Reform) times and time the CIAM's modernism and the block arrangements.

This study's main subject was Istanbul city plannings and the "housing" problematic as a one of the significant examples of the modernization project of Türkiye's Republican period in the first half of the 20th century. Istanbul city planned by French "architect-urbanist" H. Prost, these plans implemented in his absence after the H. Prost left Istanbul with the 15 years workings between 1950-60s in the beginning of the multi-party period, and then in the Democrat Party in 1950s.

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In these study Prost Master Plans were analyzed with a different research method including the ideas on “housing” plannings. Whereas, Prost Master Plans prepared by “urban-scale”, necessary to re-examine in “architectural-scale” revealing “housing” and “buildings” instead of “urban-scale” plannings like “roads”, and “plots” specified H. Prost’s main identity as an “architect” also “urbanist”.

H. Prost's Istanbul Master plans planned a period of the city where 1 million people population in the Historical Peninsula and Pera regions without a projection of until the 1960s and 1970s. Although Istanbul has changed and transformed as different urban forms in years, the decisions and implementations of the H. Prost’s continued to influence Historical Peninsula and Pera Region and left long lasting traces.

2. The Research Method: H. Prost and French Urbanism’s “*l’École*” School He Affiliated New Research Axis Via Collecting Empirical Database

Indeed, H. Prost and his “*l’école*” (school) was known the idea that dealt with cities with a design doctrine described as “regulatory” and “beautifying” urbanism and used these tools (Prost, 2007). The general orientation of the previous research on H. Prost’s was addressed this “regulatory” and “beautifying” urbanism method and their designs were product of this doctrinal line.

This urban planning method primarily aimed to planned Istanbul by opening new roads and squares described “modernism”. The Master Plans identified the urban operations that needed to be realized to priority. But this research method as an urban planning system might not be adequate to focus on “buildings” and “houses” to reveal his approach to “housing” problem with existing research axis.

Originated an “architectural-scale” method used in this research as well as the "urban-scale" plannings. Among the intensive accumulations a new research axis that existing research axis were not examined and problematized subject considerably.

Due to previous research focused H. Prost’s “urbanist” identity and his “urban scale” plans so, necessary to establish new research axis to re-examine “buildings” in Prost Master plans -evidently lost in the details his “urban scale” plans and drawings-designed by him the “roads” and “squares” emphasized his “architect” identity.

3. The 20th Century Planning Ideologies and Planning Method of Henri Prost as a French "Architect-Urbanist"

At the beginning of the 20th century in France, H. Prost and his colleagues were known as the founders of a new discipline exclaimed "*l'urbanisme*" (urbanism). As "architects-urbanists" continued the modernization plans after predecessor E. Hénard and developed new urban planning techniques connected the Paris city to the nearby suburbs (Royer, 1965). H. Prost and his colleagues, L. Jaussely, A. Agache planned the cities like; Berlin, Barcelona, Paris, and later they had been in Türkiye, H. Prost, planned the Istanbul and L. Jaussely participated competition the capital city Ankara.

H. Prost's ideological background and "urbanism" method was originated from the *Le Musée-Sociale* (Social-Museum) a prominent institution in Paris plannings as a "liberal" organization and an effective civil society platform continued until the late 19th and mid 20th centuries (Dogrusöz, 2016).

An inspiration of *Le Musée-Sociale* (Social-Museum) as a 19th century's think tank institution where founded the ideas of F. Le Play and his book *La Réforme Sociale* (Social Reforms) involved the housing problematic (Horne, 2002). This institution developed earlier models of social "housing" models for workers and poor families who lived in the Paris city suburbs lack of hygienic conditions (Horne, 2002). A commission of this institution determined the regulations on housing production, models, and typology on behalf of the Paris people. H. Prost's method of urbanism considered within the context of the Social-Museum's ideology and planning method.

Throughly the main characteristics of the discipline of "urbanism" developed between the two world wars a "realistic" "regulatory" and "beautifying" urbanism *l'école* (school) based on the Social-Museum's ideology. Until the mid of the 20th century H. Prost's and his friend's technique known "realistic planning" approached to cities as problem-solving method also Social-Museum ideology (Doğrusöz, 1981). Plan Prost and its implementations became to symbolic understanding of urban design technique, and housing. For this purpose, an "*l'école*" (school) examined put forward by French theorist F. Choay's "model" as a general theoretical framework in ideological book "*L'Urbanisme Utopies Et Réalities*" (Choay, 1979), (Merlin, 1991).

H. Prost was invited to Türkiye by Atatürk for planning Istanbul after the foundation of new Turkish Republic (De Hauteccoeur, 1968). Thus, H. Prost realized the modernization project (Tekeli, 2002) started in the early period of Republican Turkey. As an "architect-urbanist" H. Prost was a prominent figure who designed

the city in the years between 1950-60 until beginning of the multi-party period, the change the democrat party in the 1950s, but these were realized in his absence.

4. Istanbul, The Newly Founded Turkish Republic, Housing Policies and H. Prost's Approach to Housing Planning of The City

In the early 20th century, the newly established Turkish Republic's economic problems emerged from the latest world war and the state sought to improve institutional structure. When H. Prost first arrived in the Istanbul, there was not considerable "housing planning policy" and research on the "building stock" in the city as well as the country. First reports prepared on housing problem by reporter of the that time Martin Wagner later in the 1950s (Wagner, 1940).

The country's general approach was towards the implementation of social policies; however the economic situation did not make it possible to reflected on housing issue. This approach was similar like traditional French social housing policy and plannings where H. Prost came from as familiar.

In the 1950s, the liberal policies became significant on "housing" planning, and later construction works handed out to the private sector by change of the government. Thus, H. Prost also had to adopt a new liberal political view and planning approach accordance to new government policies (Doğrusöz, 2016). The socio-economic condition was another factor of housing problem in the early 20th century Türkiye and the lack of the institutions for constructing sector, however countries such as France had developed housing system since 19th century, such as HBM, Municipalities, Banks, and Social Security Institutions, etc. (Guerrand, 2010). With the compelling problems, on "housing" planning in Istanbul became significant with the H. Prost's decisions. Another problem was on transferring "housing-models" and "construction systems" from developed countries such as France due to deficiency of construction institutions in the 1940s (Coskun, 2017).

Even though some inferences- he only made new suggestions with his own initiative and opened new housing areas and planned new houses revealed in the Prost "Master plans". Whereas, H. Prost, had to concentrate regulation and modernization of the Istanbul city, instead of planning "houses" necessary economical resources.

4.1 Analysis on H. Prost's Master Plans, His Housing Models and Typologies

In the context of H. Prost's plannings to present with a new research axis of this paradigmatic view and it was significant to emphasize the "housing problem" as main assumption that brought to this research more central position. H. Prost's empirical databases used on Istanbul plans; (Prost Master plans, maps, written texts,

directives, draft of some regulatory laws of Prost, sketches, reports, articles, etc.) examined through the proposals made housing production in Istanbul. The main assumptions of the perspectives of H. Prost's research required to include the research axis "opening new housing areas future" and "housing" "models" and "typologies" within the scope of discipline of "architecture"and "architectural-scale".

5. Conclusion and Findings: Prost Urbanism and His Proposals for Solutions of The Housing Problematic in Istanbul

According to research's main assumption supported the "housing" subject previously mentioned the H. Prost's plannings empirical data, created taxonomies and typologies of housing production and forms. The study based to "housing" problem in Istanbul city, as well as the opening new housing areas, location choices, specifying house forms and production emerged as effective data of Prost plans.

Indeed, the city plan and "housing" models in Istanbul was stemmed from political structure of this kind of "urbanism" the main idea of "subject" based on economical housing models (especially, the districts choose effective in housing production). Although H. Prost's approach to "housing" planning was the public-centered, assumed that he had to fully supported liberalism in "housing production".

A taxonomy of all these proposals was prepared to reveal the housing typologies which were designed for different regions of Istanbul. In this context, the zoning approach of residential areas was not clear, not clearly defended in reports and typologies that describes as "implicit" policy in this research gain importance.

On conclusion, due to originality of research method with a distinctive approach of H. Prost's study and significant "housings" models and typologies revealed (Table 1) not considered in previously. Also, it was revealed that H. Prost Istanbul Master plans considered only planned with "housing" and "buildings" as a main subject of his design technique also "blocks", "roads" and "squares" planned detailed his plans.

The determination of the "housing-models" specified to the "districts" in the city. (Figuures 2-18) The research's main and the auxiliary propositions imposed strongly regardless of the "district" ideological power of regulatory elements (Axis, parks, buildings, etc.). Another assumption according to new research axis's "technical tools" not "explicit", "visible" and "direct" but "implicit" and "indirect" in Prost plans. H. Prost's approach to housing generated by inferences of "empirical data".

Hence, H. Prost and his "*l'école*'s" (school's) main urban planning "tool" and "technique" not only based to "road network and axes" but also "plots", and "blocks"

regions, forms, land production and sales conditions, property changes and it is based on the assumptions of the realistic applicability of all of these. According to results of these analytical studies, H. Prost's work on Master plan scale was not included the design of "roads" and "squares". The "housing" neighborhoods, and urban dwellings where the city design

On conclusion, in this study H. Prost's planning of Istanbul, "houses" were the main subject in his design, as well as the shape and dimensions of the "plots" and the determination of the width of the "roads". It was found that "plots", "blocks" and "building-blocks" was significant in H. Prost's plannings. The following "housing models" and "typologies" and "sub-typologies" were reached below.

Table 1. Henri Prost's "Housing-Models" and "Typologies" According to Regions

Housing Typologies- Housing Models Implemented In H. Prost Period

1. "Point-Blocks", Separated, Multy Storeys (Taksim, Harbiye, etc.)

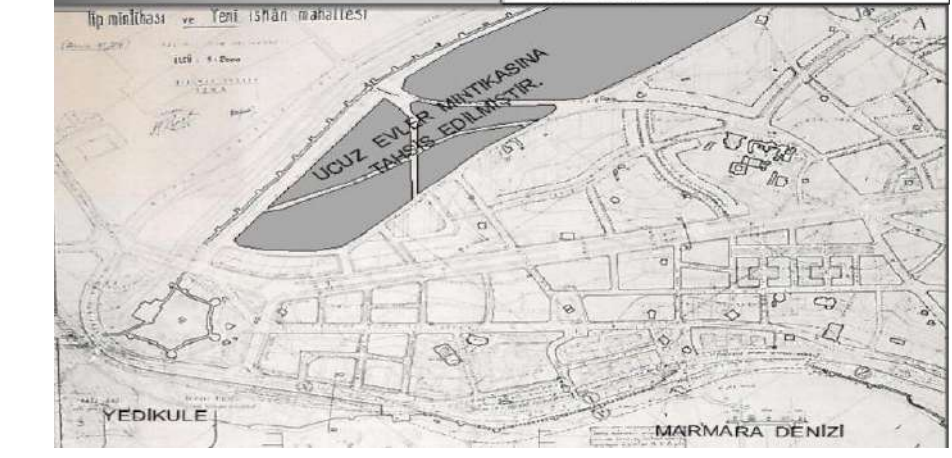
Housing Models Implemented Post Prost Period

1. "Point-Blocks":Implemented commonly Post Prost Period at Anatolian Side.
   1. a. Separated, Multy Story "Point-Blocks" with garden (Kadıköy, Yeldeğirmeni, Üsküdar, Doğancılar, etc.).
   1.b. Separated Low Story "Point-Blocks". (Üsküdar, Kadıköy, etc.)
2. "Row Hauses". (Historical Peninsula, 1/2000 Scale Fatih, Kocamustafapaşa, Fındıkzade Regions, etc.) A few Block-Buildings were implemented first by Emlak Bank in Findikzade, Haseki, and later by Private sector constractors According To Prost Master Plans (They used Prost Block-Buildings but Apartment Typologies designed by different constructors).
3. "Houses with Garden" and "Row Houses". (Implemented as Bank-Houses in the Post Prost Period at Regions in Kadıköy, Koşuyolu, etc.).
4. The Mixed CIAM Model, (Including "Point-Blocks", Levent Project.) Project planned by H. Prost and A.Angel and implemeted by K.A.Aru and R. Gorbon appointed by Government later in the Post Prost Period).
5. "Satellite Cities", (Ataköy, this project planned by H. Prost (In The10 Years Plan For Istanbul) and İmplemented by L. Piccinato and E. Menteşe in the Post-Prost Period).

H. Prost's Master Plans "Housing-Model" for "Social/ Worker-Houses" And "Garden-Cities"

In the H. Prost's 1/2000 scale, Fatih Master Plan (Including Surdibi-Yedikule) a specific area in the west of the Antique city walls reserved for "ucuz-evler" (low-costs houses) in a plan note. The area in the south of the city walls was described as "workers-quarter" (Bilsel, 2010) in the previous Istanbul City Planning Reports. According to H. Prost's Istanbul Planning Reports this area mentioned as quarter for "Houses with garden for workers" in the West of Yedikule Region (Elgötz, 2007). Thus, H. Prost's "garden-houses" considered to planned for "workers" in Prost Master Plans. Even thought, he taught "garden-city" models in School, ÉSA, Paris (*École Spéciale d'Architecture*) transferred English models from Unwin and E. Howard but, these models were different. H. Prost's housing models inspired from "workers-houses" like; Le Creusot, Mullhouse, etc. planned near factories. These were also like the French "*cités-jardins*" (garden-cities) (known as social-houses) planned by H. Sellier as a "property-model" or "houses with garden" accordance to "Social-Museum's" ideology of property model (Doğrusöz, 2017). Also, H. Prost's "garden-city" model like Tony Garnier's "*Cité-industrielle*" (industrial-city) or "*Quartier des Etats unix*" (Quarter of United-States) or E. Beaudouin, M. Lods, Sellier's "*cités-jardins*" planned for low-income people out the Paris city walls.

Figure 1. 1935, H. Prost's own objective Antique city walls to the Golden Horn. VF-05-01-07-27, IFA,Archives,Paris.
Figure 2. H.Prost and his colleguesprojects, (Housing planning for workers). LJ-DES-021-05-01. IFA Archives, Paris.
Figure 3. 1/2000, Scale Prost Yedikule Master Plan. In the plan Notes the west Reserved "Houses for Low Income people". Figure Drawing by H. Coskun, Doctoral Thesis from, 343 AA 201/6 (doc.HP.DES. 50.1-1), *İmp. Başkentinden Cumhuriyet'in Modern* Kentine *H. Prost*, İAE, 2010, s.124.



H. Prost's Master Plans
The "Housing-Models" for "Mid-High-Income People"

In the H. Prost's Yedikule-Yenikapı Master Plans some modern CIAM style "C, L, I" blocks inspired from Cerda's Barcelona plan planned as "building-blocks" housing model. Though intended to develop a spesific "model" for Istanbul city H. Prost is believed to transfer some plans directly from the Europe. H. Prost transferred housing model examples from the European "garden-cities" for his "social-housing" models and CIAM models for "high-income people". Thus, some housing areas in the H. Prost's Master Plans reserved for the "high-income people" in his Master Plan notes. H. Prost aimed to design a Marmara Coastal Road between Yedikule-Aksaray district to evoluate the area with modern sea-view houses for "high income people" similar to the "*Prominades des Anges*" plannings in Nice, South of France, (Prost, 2007).
It is also thought that this sea view houses were also would be houses near Sen River in Paris (Bercy, Charenton, Defense etc.), (Coskun, 2017). Türkiye as a country which was founded in the 1923's still had some economic problems, so, "upper-class" people might not formed yet in its hierarchical structure. In the 1930s, "upper-class" people lived in "individual apartments" or "block-buildings". Thus, H. Prost's houses for "upper income" group should be seen first in Istanbul.

Figure 4-5. Barcelona, Cerda Blocks-C, L, I Block Types. URL-1.

Figure 6. 1/2000 Scale, Prost, Yedikule-Yenikapı Master Plan. H. Prost's Modern "Building Blocks" Drawing, H. Coskun, Doctoral Thesis from 1/2000 Prost Yedikule-Yenikapı Master Plan 343 AA 201/6 (doc.HP DES.50.1- 1) Cité de l'Architecture et Patrimoine Archives d'Arch. Du XXe siècle,Paris.

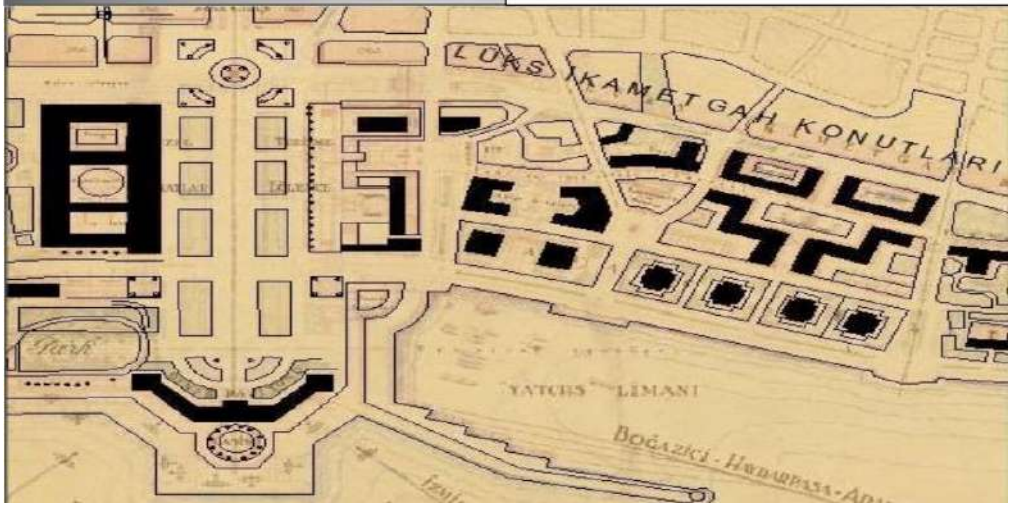
H. Prost's Master Plans "Housing-Models" For "Mid-High-Income People"

When H. Prost's Yedikule-Yenikapı Master Plans were examined some "housing" models like modern block types similar to French E. Beadouine and Marcel Lods in France or also similar to Le Corbusier's "*Lotissement Fermeé*" (closed block types) used in the H. Prost's Master Plans. especially the modern "blocks" models planned the Marmara Coastal.

In the drawings and notes of the of the H. Prost's Master Plans, the blocks were drawn with detailed and sophisticated architectural technique. Also, although the avenues and roads, drawn by very well detailed and also some explanation of roads, even pavements, and construction techniques specified in detailed however, almost no information was mentioned about "housing ".

After the 20-30 years of H. Prost abandonment of the "social" policies by the Government with the enriching liberal became dominant. Almost all the houses in Istanbul would be planned for the "middle-class" and upper income" groups. H. Prost, housing plans and proposals for the "upper-income group" identified some housing examples; Yedikule-Yenikapı Sahilyolu, the western part of Yenikapı and Florya, Park-City.

Figure 7. H.Prost, Yedikule-Yenikapı "Comb-Blocks", E.Beadouine,Paris Drancy, Cité de la Muette.
Figure 8. Le Corbusier's, "Lotissement Fermeé". Fondation Le Corbusier.
Figure 9.1/2000 Scale, Prost, Yedikule-Yenikapı Master Plan. Marmara Coast "Comb-Blocks", Reminescent of E. Beadouine, Paris, Drancy, Cité de la Muette. Drawing H. Coskun, Doctoral Thesis from 343 AA201/6doc.HP. DES.50.1-1), IFA, Archives, Paris.



H. Prost's Master Plans "Housing-Models" For "Mid-High-Income People"

H. Prost's, 1/2000 scale, Yenikapı Master Plan examined by focusing "housing" he planned some "point-blocks" considered as "Z Blocks" and "C Blocks", etc. H. Prost's proposals of "plural-housing models" for Istanbul city thought to the as "property-housing" model for the "middle-class" like in France in the period between the two world wars (Doğrusöz, 2016).

This housing typology was known as H. Prost's "Bank-Houses" model planned for "mid-income" people developed by Bank finance systems, such as IS Bank, Emlak Bank, etc. Thus, "middle-class" housing models identified by "Bank-Houses". The best example of this model was the Levent Project. In the 1940s, H. Prost planned a "middle-class" housing model as first Bank-Houses. In the 1950s, after H. Prost, this model was developed as "Bank-Houses" by Emlak Bank and Istanbul Municipality. After Prost left the city, similar projects became widespread in the Anatolian side. Later 1950s, with the American policies, Truman Doctrine, Marshall Plans and Democratic Party effected the social classes with the policies of power so, class change occurred.

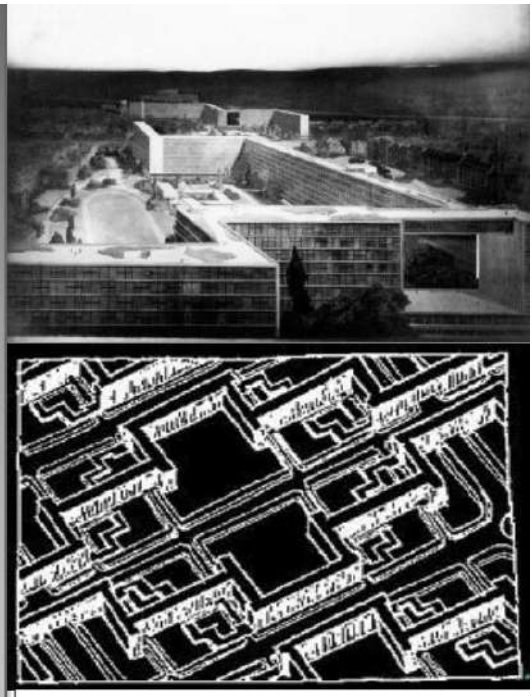
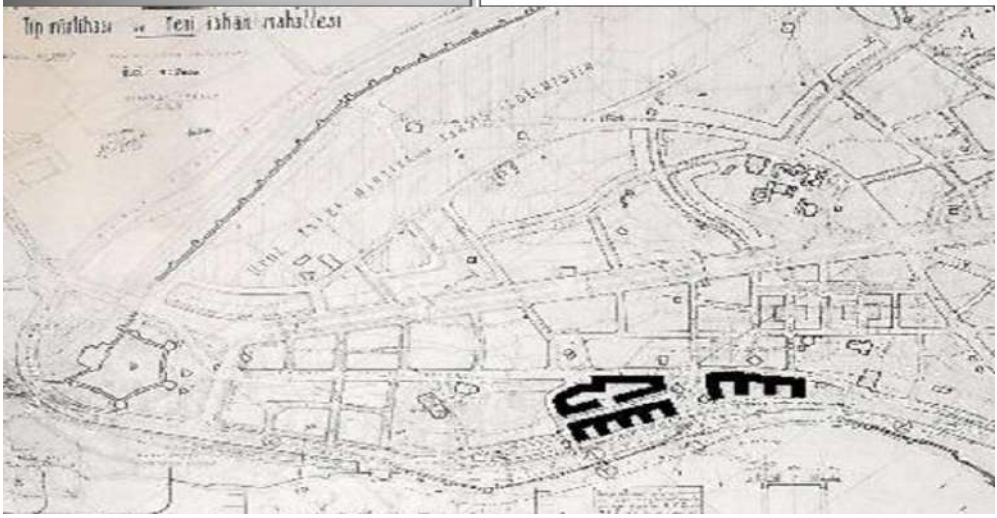


Figure 10-11 Le Corbusier's Project, "Ville radieuse" Inspired by H. Prost Zig zag Blocks. Foundation Le Corbusier.

Figure 12. 1/2000 Scale, H. Prost Yenikapı Master Plan. Prost Blocks. (Dark coloured). "Point-Blocks","Z Block"and "C Blocks". Drawing H. Coskun from, Prost Yenikapı Master Plan, HP-DES-049-01-01. IFA Archives, Paris.



Prost Master Plans Transformation of Existing Urban Fabric

The Historical Peninsula

H. Prost's 1/2000 scale Master plans included of Historical Peninsula was not solely consisted of roads, and avenues reflecting the H. Prost's "urbanist" as well as his "architect" identity the "plots" and "building-blocks" planned surrounded the roads drawn by H. Prost. He considered to develop new "housing-model" according to changing economy and social-class based on an "individual parcel-property-blocks".

H. Prost's apartment archetype blocks were "property-blocks" planned for newly formed Turkish "middle-class" with liberal approach and (Social-Museum thinking system) (Doğrusöz, 2017). In the 1950s, after the Henri Prost, Vatan and Millet Avenues opened, and the first Bank-Houses were built by Emlak Bank used to the Prost Master Plans. After that, construction practice led to the private sector and Prost Master Plans executed by private sector uncontrolled. So, Prost blocks built by the private

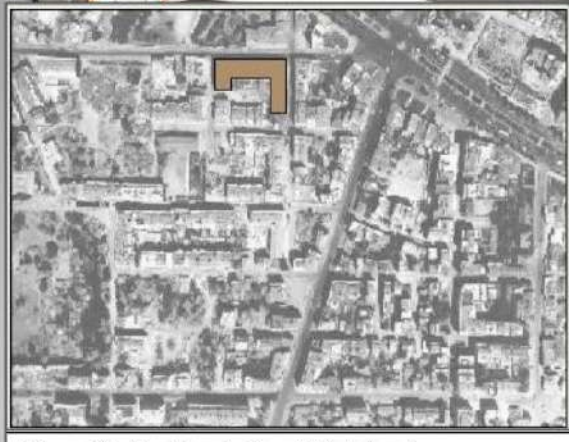
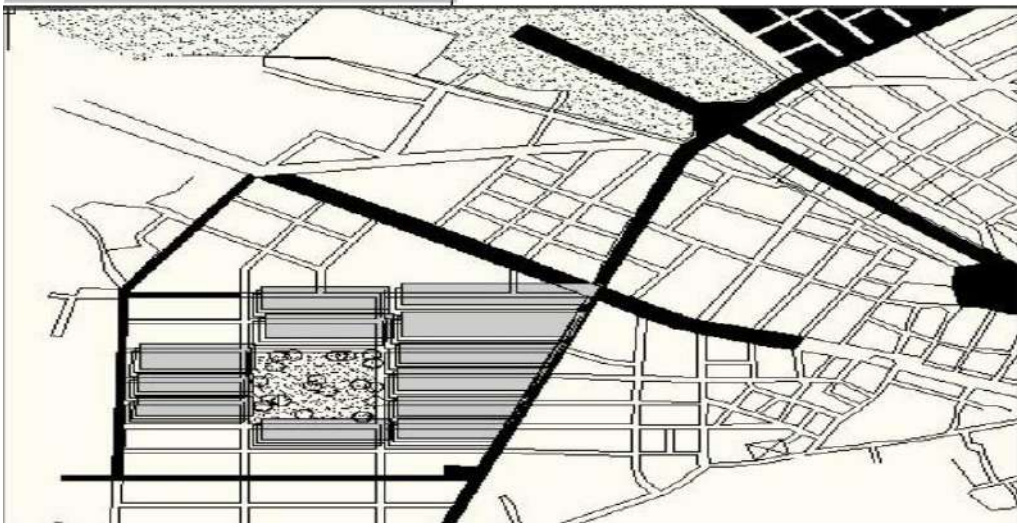


Figure 12 Fındıkzade, Prost "Plots" and Emlak Bank's Housing. Photo., H. Coskun.

Figure 13-14 Fındıkzade, Prost "plots" drawing H. Coskun, Doctoral Thesis from 1/2000, Scale Fatih Master Plan 343 AA 201/6 (doc.HP DES.50.1-1), IFA Archives.



H. Prost's Master Plans "Point-Blocks" Taksim and Elmadağ

First project of H. Prost was Taksim project aimed to plan instead of old, Taksim Barracks. Another project was in the Elmadağ. H. Prost planned "Point-Block's" consisted of 6 single buildings connected with an arcade in the ground floor level arranged equally along the Cumhuriyet Street towards Harbiye Radio House. H. Prost's "point-blocks" in Elmadağ were planned back-to-back two "C" blocks likewise his previous project typology planned in Northern Africa, Casablanca multiple times. Also thought that it was, transferred from French, Social-Museum plannings as a reminiscent with housing plan and stairs, etc. (Coskun, 2017). After H. Prost, similar Blocks were implemented commonly in the Anatolian side of Istanbul city. Such as discrete order, Multi-story "Point-Blocks" with Garden "(Kadıköy, Yeldeğirmeni, Üsküdar, Doğancılar, etc.) Discrete Order, Low-Rise Point-Blocks" (Üsküdar, Kadıköy, etc.), (Doğrusöz, 2017)

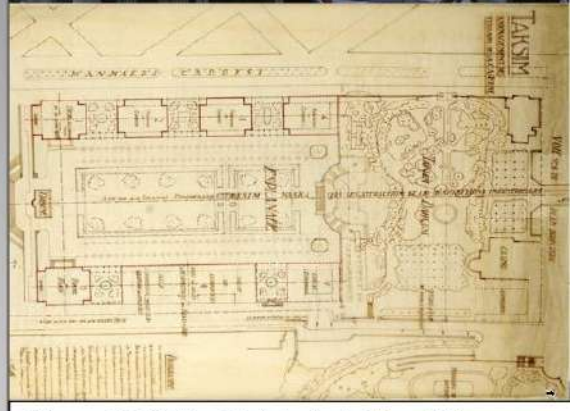


Figure 16 H. Prost's İstanbul, Elmadağ "Point Blocks" . Photo, H. Coskun

Figure 17 H. Prost, Taksim "Point-Blocks" planned place for old Taksim Barracks.

Figure 18 H. Prost's, Istanbul, Elmadağ. "Point-Blocks" . HP-DES-070-02 -01, IFA, Archives, Paris.

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AN INNOVATIVE CONSTRUCTION TECHNOLOGY IN ARCHITECTURE: 3D PRINTING

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1. Introduction

The construction sector has reached an important place all over the world with the development of industry and the increase in population density, thus urbanization has accelerated. With the increasing importance of the construction sector in the economy, the amount of energy consumed, the variety of materials used during construction and the amount of waste generated increased day by day, and natural resources and living habitats were damaged. Sustainability, which emerges with climate change, can be defined as the transfer of existing resources to the future in a balance and takes place in many disciplines, has an indispensable importance for architecture that directly intervenes in the natural environment that meets the needs of humanity.

Concerns such as the effect of the construction sector on the natural environment, efficient use of resources due to limited natural resources and creating less waste have revealed the concept of Green Building. One of the latest technological developments, 3D printing (3D) has been included as an innovative production technology in the search for an environmentally friendly production system. It can be said that the structures produced with 3D printing are compatible with the concept of sustainability, as they provide savings in terms of natural resources, time, costs, employees and equipment. For this reason, the use of 3D printing in architecture and the variety of printable materials are increasing day by day.

In this study, it is aimed to reveal how fast 3D printing technology has become widespread and continues to develop in the architectural field. The literature search is limited to the keywords "3D printed construction, 3D printed building, Additive manufacturing, 3D printable materials". From the samples reached as a result of the scanning, studies that show the characteristics of a completed building or building element are emphasized. Among the many examples, 3D printing; design, material,

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ability to respond to spatial functions, adaptability to change, recycling, etc. Selected samples, which were determined by taking into account the possibilities, were examined. Attention was drawn to the activation of the green building concept by showing with examples that material and design decisions that will reduce the environmental impact of building production with 3D printing, which is an innovative construction system, are possible. The place where 3D printing technology has come in the world in architecture has been evaluated according to the features given in Table 1.

2. 3D Printing Technology in Architecture

The principle of 3D printing is based on printing product components from a digital model and building structures in layers (Hager et al., 2016). This technology, in accordance with the concept of green building, reduces the use of natural resources, provides the opportunity to form the shell of the building by using a single material, thus reducing waste generation. In this technology, sustainable choices can be made, provided that the selected printing material is printable and of appropriate strength.

3D printing or additive manufacturing is the creation of a three-dimensional object from a CAD model or a digital 3D model. The 3D printer, which is used for rapid prototyping of functional and aesthetic products, was first invented in 1984 (3D Printing, 2021). Since the 21st century, it has developed rapidly and started to exist in daily life and widely used in various fields (such as bio-engineering, aviation, electronics, textiles) (Küçük et al., 2022).

With the global COVID-19 process and the post-pandemic order called the "new normal", in the last few years, 3D printing has become more accessible to enthusiasts as a hobby than the use of science fiction, research laboratories and technology companies. This is because 3D printing devices have become cheaper and easier to use. During the pandemic process, remote working and working with robots have become widespread in the architectural field as well as in all areas of life. Especially in the construction sector;

- The need for detached villas, houses with gardens and balconies will increase,
- Landscape area, walking track and wide area projects will be in demand.
- Digital transformation in construction sites will be put on the agenda and e-construction sites will be established.
- Robotic applications that will reduce the workforce will increase,

• New era predictions have emerged as the construction system with 3D printing will gain speed in construction (Küçük, 2022).

In this context, the construction industry has also shown an increasing interest in 3D printing, contributing to various scientific researches, technological renovations and material studies, allowing the development of 3D printing as a construction technology (Figure 1). Some of the advantages that encourage the use of this technology in construction activities are; efficiency, high quality and durability, cost effectiveness, freedom of design, saving mold, material, manpower and time compared to traditional construction techniques (Chua and Leong, 2014).

Figure 1. 3D cementitious material printing (PERI, 2020).

In the construction industry, large elements or a whole building can be produced with 3D printing. Various types of 3D printing devices differ in terms of the technology and printing materials used. The printing method in Contour Carfting (Figure 2), Kamer Maker and WinSun type devices is the creation of a smooth horizontal layer from granular material (sand). Afterwards, liquid is sprayed on this layer to become a binder, and at this stage, the solidification process takes place (Felek, 2019). Contour Crafting was originally designed to build molds for industrial parts. The walls of the building are formed layer by layer through the nozzles of the device. A mixture containing concrete is used as the material (Khoshnevis, 2004). With the development of this printing technology, prints are also applied with materials of different content such as soil and steel.

Figure 2. Contour Crafting 3D printing (Anonymous, 2022a).

In the D-Shape (Figure 3) printer, the printing method is the system that allows the printing material to be poured directly from one or more nozzles (Felek, 2019).

Figure 3. D-Shape 3D printing method (ESA, 2022).

3. The Place of 3D Printing in Architecture Through Examples

3D printing technology has been used primarily in model making, which is the most realistic expression of concept design ideas in the field of architecture. In cases where digital models are insufficient due to the lack of depth perception in the 2D drawings of the projects, 3D printed models help customers better visualize the final projects. With the development of technology, the scales of materials that can be printed are also developed, and special designs for fish in the fields of artificial reefs, sculptures, interior decoration, furniture, urban furniture can be produced with 3D printing.

With the use of 3D printing technology in architecture, it has also started to be applied in building types whose scale is growing. 3D printing technology, which is not yet easy to apply in high-rise buildings, can respond to many structural functions thanks to its free design options in the architectural field and the completion of the building in a short time as a result of fast printing. Alvarado et al. (2021) in their studies in which they examined the structures produced by 3D printing; Mostly

vertical building elements are applied with 3D printing, roofs or sheets are created in pieces in the factory, floors and foundations produced with 3D printing do not have great advantages over those built with traditional processes, the walls are created on-site by creating especially small printers that also produce superficial patterns, as in Batiprint3D house (Figure 4).In a previous study an insulating material is pressed as a mold and then filled with concrete and different techniques are used (García-Alvarado et al., 2021). In this technique, the foam is not removed and acts as insulation for the structure. This is a 3-layer sandwich panel with two layers of foam acting as a formwork (Nadarajah, 2018).

Figure 4. Batiprint3D House where polyurethane foam is used as a mold in 3D printing (Nadarajah, 2018)

With 3D printing, the entire structure can be produced at the construction site, as well as modular construction elements can be produced in the factory and assembled on site. The fact that it allows prefabrication shows that this system can reach larger scales and is a method that can be used for printing high-rise buildings. The production method of the project is decided according to the land conditions and the scale of the building during the design phase.

When we look at today's usage areas of 3D printing in architecture; As it is applied in urban areas, residential buildings, public buildings, interior and surface designs, there is also the applicability of space base structures that will contribute to scientific research.

3.1.3D Printing Examples in Urban Area

Sound barriers (Figure 5), green walls, plugs, installation products, pavilions, public toilets, waste collection stands, bus stops, recreation areas, pedestrian bridges (Figure 6) in urban life can be produced with 3D printing.

Figure 5. 3D printed sound barrier (WINSUN3D, 2022a).

Figure 6. 3D-printed stainless steel footbridge/Amsterdam (MX3D, 2021).

3.2.3D Printing Examples in Residential Buildings

One of the first uses of 3D printing in architecture is to produce houses quickly. In this way, it is possible to meet the urgent housing needs in a short time. 3D housing prototype production in architecture can be included in contingency plans in case of sudden multiple structure losses such as disaster and war. In the process that started with this point of view, the freedom in design and ease of production led to the widespread use of 3D printing in the residential building type. Social housing, luxury housing, temporary housing, isolation houses were produced.

Urban Cabin/Amsterdam: The break cabin, published by DUS Architects in 2016, has an area of 8 m² and a volume of 25 m³, consists of a small porch and an indoor recreation area (Figure 7). Recyclable, black bioplastic is used as printing material. It is designed as a short-term rental retreat (DUS, 2021a).

Figure 7. Urban Cabin/Amsterdam (DUS, 2021a)

House Zero/Austin: It is a project jointly produced by Lake Flato Architects and ICON 3D production company, where organic form and sustainability decisions are applied together (Figure 8). In the application of the ventilated and recyclable wooden roof, deep eaves that cut off the thermal effect were used and the roof was designed in accordance with the placement of solar panels. 3D printed walls provide three-layer thermal insulation. It is characterized as a residential farmhouse with a usage area of 186 m^2 and is produced by 3D printing of a special concrete-containing material called lavacrete (ICON, 2022a). There are also social housing projects prepared by the same company partnership for the low-income.

Figure 8. House Zero/ Austin (ICON, 2022a).

Tecla Living Space/Massa Lombarda: The project, created by Mario Cucinella Architects in Italy with the technical support of WASP firm, which designed and 3D printed it, is inspired by the pottery wasp and consists of a circular form with double domes (Figure 9). Local raw soil was used as printing material, thus an ecological and economic structure was obtained. The entire shell of the residential building, which has a usable area of 50 m^2, was produced on-site with 3D printing (WASP, 2021a).

Figure 9. Tecla living space (WASP, 2021a)

Manure Printed House/Amsterdam: 53 million tons of cow manure is produced annually in the Netherlands. Maxim Meijer, Doris Hondtong, Miruna Vlad, students at the Amsterdam University of Applied Sciences, calculated that around 1.5 million houses could be built annually with Dutch cattle manure alone. The project, which is a Biodesign Challenge 2021 finalist (Figure 10), was also presented at the Dutch Design Week and various benefits of dung houses were also mentioned (Biodesign Challenge, 2021).

Figure 10. Housing design proposal with dung printed (Biodesign Challenge, 2021).

Ashen Cabin/New York: Designed by HANNAH architecture office for those who want to get away from the city, the cabin with a footprint of 3x3 meters is raised from the ground on 3D-printed legs that adapt to the sloping terrain. In the building elements other than the foundation and the fireplace, the dying ash tree, which was infested by an insect damaging the trees, was used. While ensuring the sustainability of this wood, which is mostly used as fuel, 3D concrete printing is used at a minimum (Anonymous, 2022b) (Figure 11).

Cores/Texas: Cores, the first large-scale and two-story 3D-printed building, was designed by HANNAH architecture office to meet the demand for luxury housing with iron reinforcement reinforced printable concrete material (Figure 12).

Figure 11. Ashen cabin (HANNAH, 2022a); Figure 12. 3D printed CORES villa (HANNAH, 2022b).

Tova Kabin/Barcelona: The structure, which is designed to have a zero carbon footprint like Tecla, using the raw soil in the surrounding area, is intended to allow the production of mass housing and disaster housing (Figure 13) (IAAC, 2022).

Figure 13. TOVA 3D printed cabin (IAAC, 2022).

3.3.3D Printing Examples in Public Buildings

Municipal Administration Building/Dubai: US-based company Apis Cor has built a two-storey administration building for Dubai Municipality with 3D printing technology using concrete material (Figure 14). With a size of 640 m² and a height of 9.5 meters, the building is the largest structure ever produced with this technology (APIS COR, 2021).

Figure 14. Municipal Administration Building/Dubai (APIS COR, 2021).

Office of the Future/Dubai: The Office of the Future structure in Dubai was manufactured in parts in China and assembled in Dubai by the Chinese company WINSUN (Figure 15). As a result of this innovative construction technique, labor cost has been reduced by more than 50% compared to conventional buildings of similar size and wastage on site has been minimized. The layered structure of the modules allows the structure to be flexible, self-isolating and better responsive to seismic activity (WINSUN, 2021b). After the construction of the office building, its outer shell is covered with EPS insulation material.

Concept Store/Dubai: The store's pattern is embroidered on the exterior of the concept stores, which were produced by the Italian WASP company using the 3D printing technique of local raw soil (Figure 16). The project is reinforced with steel struts (WASP, 2021b).

Figure 15. Office of the Future (WINSUN, 2021b);

Figure 16. Concept Store (WASP, 2021b).

3D Office/Istanbul: An office used by the Parks and Gardens Directorate in Çamlıca, affiliated to IMM (Istanbul Metropolitan Municipality), was printed with a fiber reinforced concrete material developed after a house printed for trial purposes

in Turkey by the İSTON company, which produces concrete materials and products (Figure 17). The office has a usage area of 300 m^2.

Figure 17. 3D Office/Istanbul (Şantiye, 2022).

3.4.3D Printing Examples in Interior and Surface Designs

Thanks to its design possibilities, 3D printing is also used in interior design, surface, wall and furniture designs. The counter in Figure 18 is a juice bar designed by DUS Architects for the Loft store in Tokyo (DUS, 2021b). Printed from bioplastic material. The 3D printed recessed staircase integrated wall design in Figure 19 was created by printing the raw earth material of the WASP company (WASP, 2021c).

Figure 18. 3D printed juice bar (DUS, 2021b).

Figure 19. 3D printed wall with Recessed Ladder (WASP, 2021c).

3.5.3D Printing Examples in Space Structures

3D printing technology makes it possible to manufacture with a robotic arm by reducing the manpower required for construction. In this way, many designs and spaces that seemed impossible have become possible. In Figure 20, the Olympus Project has been created as an observation base, supported by NASA (US National Aeronautics and Space Administration) to conduct sustainable surface surveys on the Moon (ICON, 2021b).

Figure 20. Olympus Project (ICON, 2021b)

The United Arab Emirates decided to establish the Mars Science City (Figure 21) for a viable realistic model of Mars and to 3D print the walls of the structure using sand from the Emirati desert using one of the techniques considered for Mars habitat construction (ICON, 2021c).

Figure 21. Mars Science City (ICON, 2021c).

4. Conclusion and Discussion

Despite the fact that 3D printing has been developed for the purpose of obtaining rapid product prototypes, it is possible to encounter designs that are far from uniformity and that open up horizons in architectural design. It is seen that 3D printing technology has developed very rapidly in recent years and the production of structures in different typologies has increased after 2016 in the architectural field.

Thanks to 3D printing technology and the realization of digital design with a robotic arm, the margin of error is very low. In this system, which removes the limits

of the imagination of the architect, the building envelope alone is technically sufficient. Due to its hollow structure, 3D printing walls provide thermal and acoustic comfort, allow facility-to-sell transitions, and can be strengthened with various reinforcements. The thickness of the wall, the wall pattern design is formed according to the climate and environmental conditions, and a design compatible with the environment can be made. With its advantages, it not only provides cost, labor, work safety and material efficiency, but also enables the printing of a wide variety of materials. For this reason, in recent years, large companies in the world construction industry have started to participate in or purchase building production with 3D printing (Alvarado, 2021). Dubai and Singapore have national plans and ongoing projects related to 3D building production, declare state funding or government support to entrepreneurs. As the 3D-printed construction system has evolved, so has a productive relationship between academia, government and industries. (UAE, 2021; NTU, 2021).

Table 1. Architectural building types and areas of use produced by 3D printing

Project Name	Year/Location	Implementing Firm	Function/ Area	Geometry	Material	3D Printing Place	3D Application Format	Wall Mesh Model
Office of the Future	2016/ Dubai/ United Arab Emirates	WINSUN	Office/250m^2	Rectangle	Improved 3D concrete	Prefabricated Manufacturing	Iron reinforcement reinforced masonry	
Urban Cabin	2016 Amsterdam/ Netherland	DUS	Rest Cabin /8m^2	Cubic	Bioplastic	Prefabricated Manufacturing	Concrete reinforced masonry	
Municipal Administration Building	2019/ Dubai/ United Arab Emirates	APIS COR	Municipality Building/640m^2	Circular	Improved 3D concrete	On-Site Manufacturing	Iron reinforcement reinforced masonry	
TECLA Living Space	2021/ Massa Lombarda/Italy	WASP	Disaster Housing /50m^2	Circular	Raw Soil	On-Site Manufacturing	Masonry building	
MX3D Bridge	2021/ Amsterdam/ Netherland	Joris Laarman Lab	Pedestrian Bridge/12 m (Length)	Linear	Stainless steel	Prefabricated Manufacturing	Modular Printing, Combination with On-Site Welding	
ASHEN Cabin	2021/ New York/USA	HANNAH-Office	Ev Kabini/9m^2	Cubic	3D Printable Concrete + Native Ash Tree	Prefabricated Manufacturing	Modular, 3D Printed Reinforced In-Site Joint	

House Zero	2022/ Austin/Texas/USA	ICON	Luxury Residence/186m^2	Circular	Lavacrete	On-Site Manufacturing	Masonry building	
3D Office	2022/ Istanbul/Turkey	İSTON	Office/300 m^2	Rectangle	Improved 3D concrete	On-Site Manufacturing	Iron reinforcement reinforced masonry	
CORES	2022/ Houston/Texas/ USA	HANNAH -Office	Luxury Residence /371m^2	Rectangle	Improved 3D concrete	On-Site Manufacturing	Wood Framed 3D Concrete	
TOVA Cabin	2022/ Barcelona/Spain	IAAC	Rest Cabin/ 9m^2	Cubic	Raw Soil	On-Site Manufacturing	Masonry building	

In addition, it can be manufactured in parts (prefabricated system) in the factory, as in the Future Office project and the MX3D pedestrian bridge, or it can be manufactured at the construction site by ensuring that the robotic arm is installed on the land, as in the Çamlıca 3B Office. In line with all these data, the following can be said for 3D printed architecture;

• It has a wide variety of production options.

• Although the responsibilities of the architect to manage and control the project implementation details are greatly reduced with this system, design, project management and application decisions gain importance and making the right decisions can reduce energy and material losses.

• 3D printing is still a developing system. In the future, it is expected that the number of efforts to make the printable material environmentally friendly will increase. With the development of the robotic arm, which is the construction technology, it is possible to print multi-storey structures.

• Earthquake, hurricane, etc. Printable materials and printing forms can be developed in accordance with disasters.

• The 3D printing process of the building is formed by entering data into the digital environment starting from the design. This facilitates integrated work with digital software such as BIM (Building Information Modeling), and allows the future development of the construction system and material contents. As a result of data storage and sharing supported by digital software, future projects will be able to benefit from it as a resource.

• In the production and development of buildings with 3D printing, the state mechanism is important in terms of ensuring the zoning conditions of the building and obtaining the building permits.

With this study, it has been revealed that the place of architecture in digital 3D technology and its undeniable application area is developing. By accepting the fact that the limit is only imagination in the architecture produced with the 3D construction system, it has become possible to construct a building in a near-impossible space. Moreover, this system can provide a zero waste condition by using materials that can be mixed with the natural cycle, such as lunar sand or Mars soil, as raw materials. In addition to the variety of uses of 3D printing in architecture, drones (robots) that can construct while flying in the air, repair damaged structures, and which are expected to be useful in the construction of high-rise buildings and especially in dangerous areas where it is difficult for people to access and work, have begun to be developed (Zhang, 2003). K et.al, 2022).

In future studies, it is thought that researches on the compatibility of 3D printing and digital software and the evaluation of 3D printed structures in terms of project and resource management processes are required.

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DETERMINING THE LAND SURFACE TEMPERATURE FROM LANDSAT 8 SATELLITE IMAGES AND DATA EVALUATION IN ACCORDANCE TO LAND USE: ANTALYA/SERİK CASE

Nihat KARAKUŞ[1]

Buket EYİLETEN[2]

1. Introduction

Space-borne sensors have been around for over half a century (Luo et al., 2019). Being the first earth observation satellite in 1972, Landsat-1 started a revolution in remote sensing technology with the valuable data it provided (Leslie et al., 2017). Remote sensing has become a rapidly advancing technology with the developments in imaging sensors and the ever-increasing performance of the information infrastructure (Wulder et al., 2012). These rapid technological developments in recent years have expanded the application area of remote sensing and increased its performance. In remote sensing technologies, which generally have a wide range of spatial and temporal resolution (Khanal et al., 2017), the aim is to observe some physical parameters of the area to be mapped in a particular time or time period (Hu et al., 2013; Cheng et al., 2020). Satellite images have been one of the materials used to determine ecology-related features at regional and global scales (Hu et al., 2013; Olgun and Yılmaz, 2019). GIS software is used as an effective tool in the process of interpreting, analyzing, and using the data obtained consequence of the satellite images' analysis in planning studies (Liping et al., 2018; Ardahanlıoğlu et al., 2020; Olgun, 2020; Çınar et al., 2021). Monitoring the changes such as deforestation (Cabral et al., 2018), freshwater pollution (Wang and Yang, 2019), land use change (MohanRajan et al., 2020), soil degradation (El Jazouli et al., 2017), greenhouse effect (Silva et al., 2021), climate change (Wu et. al., 2017) and urban heat island effect (Algretawee et al., 2019) are important contributions of remote sensing technology to global ecological change studies.

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Today, with the acceleration of urbanization, the global population in cities is projected to exceed 60% in 2030 (Mushore et al., 2022). While urbanization changes land cover use, it can also lead to the modification of microclimate by changing the land surface temperature and increasing the effects of global warming. For this reason, the observation of these changes is quite essential. Spectral indices (SI) are the best quantitative representation of the urbanization-related land use/land cover (LULC) biophysical properties and continuous transformation (Zhou and Wang, 2011; Selim et al., 2022). SI are mostly in the spatial resolution of optical data and are variables obtained by deriving the reflections of two or more bands (Alexander, 2020). For example, while the Normalized Difference Vegetation Index (NDVI) quantifies the differences in the density of healthy vegetation (Bhatti and Tripathi, 2014; Benliay et al., 2020), the Normalized Difference Bareness Index (NDBal) quantitatively represents the changes in the bareness of land scope (Halder et al., 2021). In addition, Spectral Plant Indexes (SVI) use various plant-related parameters to analyze and detect changes in plant physiology (Mahlein et al., 2013). In cities, natural surface coverings are replaced by high heat absorption surfaces, causing these areas to give higher temperature values than their surroundings (Zhang et al., 2013). Land surface temperature (LST) affects and changes at the land-atmosphere interface in the lower layer of the urban atmosphere with biophysical-chemical processes (Chen et al., 2020). This increase in the region's thermal stress indicates that LST is affected by the categories of LULC (Guha et al., 2022). Remotely sensed thermal infrared (TIR) data is a widely used source of information to predict LST dynamically (Zhu et al., 2022). Various satellite sensors, such as MODIS, Landsat TM/ETM+, and ASTER with providing high, continuous, and simultaneous temporal and spatial resolution, have been developed to collect TIR data from the earth's surface (Weng, 2009; Mo et al., 2021). Remotely sensed LST data are frequently used in urban thermal environment studies, urban heat island characterization (Algretawee et al., 2019), development of evapotranspiration estimates (Zhang et al., 2018), drought monitoring and analysis (Khan et al., 2018).

The study was carried out in the Serik district of Antalya province, one of Turkey's most important tourism and agriculture destinations. It is aimed to determine the LST of the region and to evaluate the LST according to land use.

2. Study area

The Serik district of Antalya province, located between 36-37 degrees latitude and 31-32 degrees longitude, was chosen as the research area (Figure 1). The district is surrounded by the Manavgat district to the east, the Aksu district to the west, Burdur and Isparta provinces to the north, and the Mediterranean Sea to the south. The district, located in the east of Antalya province, is an important tourism center

of the region with its valuable cultural and natural resources and many alternatives it offers to its visitors. In addition, the Mediterranean climate, which is dry and hot in the summer and warm and rainy in winter, is dominant throughout the district. Furthermore, since the region is in the Mediterranean, Mediterranean plant species are seen on the coastline and its immediate surroundings. In particular, maquis and red pine (Pinus brutia) constitute the common vegetation type of the region. The district was partially established on plain land and is 1,220 km2 in area and according to TUIK 2021 data, the population of the city is 134,953. While husbandry and forestry are carried out in the rural areas of the district, it is seen that agriculture, especially early vegetable harvesting, is done in the lowland parts. By Looking at the district's natural resources, it is seen that the Western Taurus Mountains rise in the north of the district, and Köprüçay and Aksu Streams are the region's most important rivers. In addition, Akbaş, Acısu, Üründü, and Beşgöz streams flow into the Mediterranean from here. Historical ruins such as Aspendos and Sillyon stand out in the district with their tourist importance (Altınkaynak, 2021; Olgun and Selim, 2021; Olgun et al., 2022).

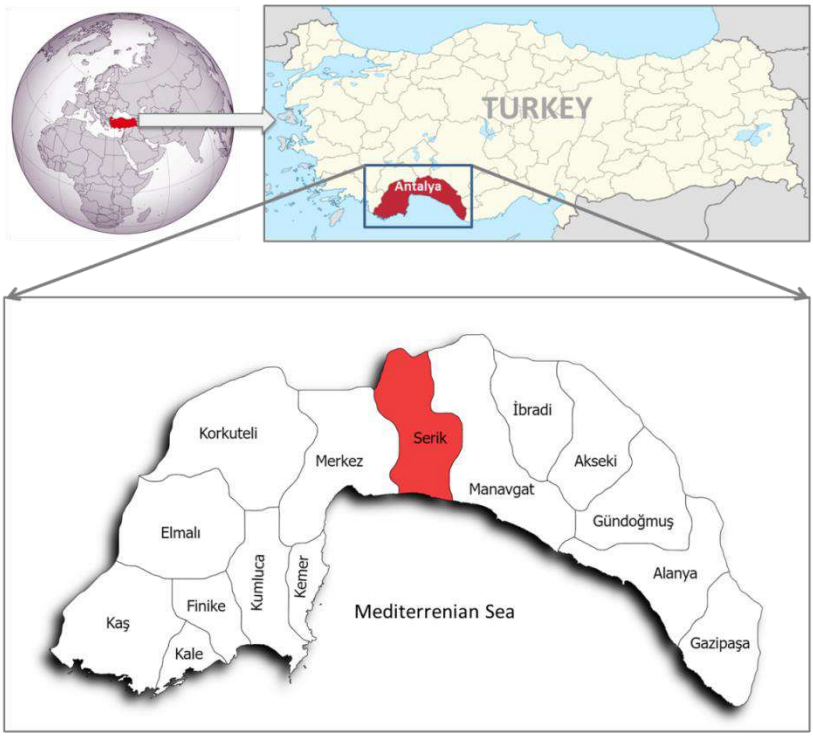

Figure 1: Study area

3. Datasets

The study used open-access Landsat 8 satellite data with ID LC08_L1TP_178034_20210722_20210729_01_T1, dated 22.07.2021, downloaded from the United States Geological Survey (USGS) 'Earth Explorer' website. The data's 4th, 5th, and 10th bands were cut according to the study area boundaries and used to obtain the land surface temperature (Table 1) (Figure 2). The Landsat 8 satellite used in the study provides medium-resolution data from 15 to 100 meters. The satellite orbits the Earth every 99 minutes in a sun-synchronous, near-polar orbit. It has an inclination of 98.2 degrees and is 705 km above the ground (Çoşlu et al., 2021; USGS, 2022).

Table 1. Landsat 8 spectral bands used in the study (USGS, 2022)

Spektral range	Wavelength	Resolution
Band 4 - Red	0.64 - 0.67µm	30 m
Band 5 - Near-Infrared	0.85 - 0.88 µm	30 m
Band 10 - TIRS 1	10.6 - 11.19 µm	100 m

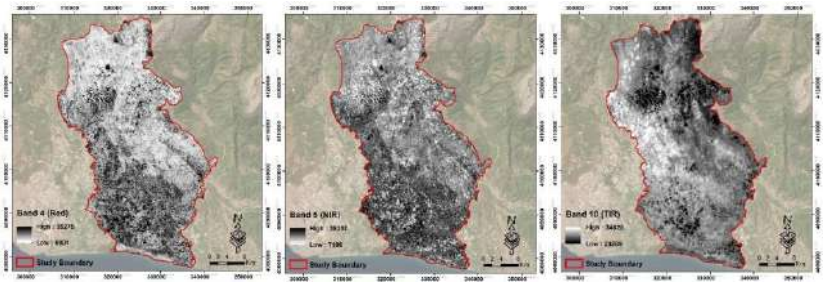

Figure 2: Landsat 8 bands (From left to right Band 4, Band 5, Band 10)

CORINE (Coordination of Information on the Environment) is the land cover/use data produced by computer-aided visual interpretation method made over satellite images, done according to the Land Cover/Use Classification determined by the European Environment Agency. CORINE consists of a land cover inventory of 44 classes. CORINE land cover inventory studies were conducted in 2000, 2006, 2012 and 2018, taking the year 1990 studies as a reference (Copernicus, 2022). Therefore, CORINE 2018 data, which is an available free service on the Copernicus website, was used in the study. First, the downloaded Corine 2018 data is cropped based on workspace boundaries. Then, since the Corine data will be used as the 1st level in

the study, the land uses of the lower levels were reduced to the 1st level by a merge process. As a result of this process, a Land cover data set with 4 classes, namely Artificial surfaces, Agricultural areas, Forest/semi-natural areas, and Water bodies, was obtained (Figure 3). According to CORINE 2018 data, the district of Serik consists of 50.5% forest/semi-natural areas, 45.5% agricultural areas, 3.2% artificial areas, and 0.8% waterbodies. Classified as one of the artificial areas, the Serik city center is located in the district's southeast on a slightly sloping area. Additionally, the artificial areas on the district's southern border are the facilities in the Belek Tourism Zone and the settlements around it. Furthermore, rural areas have a varying distribution of ground altitude levels.

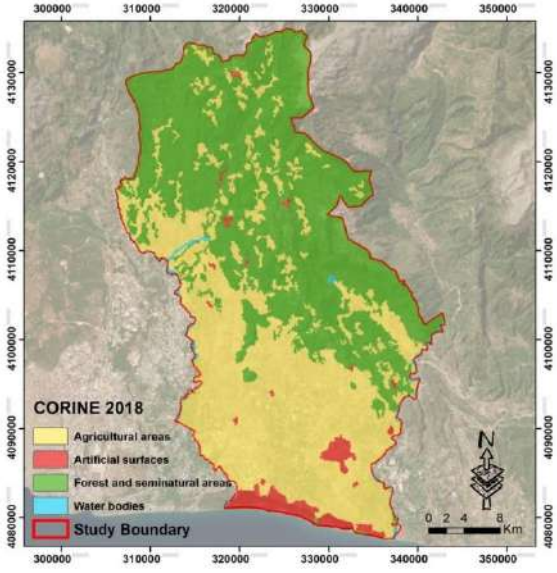

Figure 3: Corine Land Cover 2018 map

Farmlands are positioned on the boundaries of rural/urban settlements in the district's south, southwest, and southeast. These farmlands are cumulated within a large scope of land around the city center of Serik, north of the Belek Tourism Region, and the southeast, south, southwest, and west of the district, they spread fragmentarily in smaller areas on the peripheries of rural settlements. Moreover, forest/semi-natural areas are spread over the rugged terrain, located in the northeast, north, and northwest of the district. Coniferous trees, shrubs, and maquis are common in the region; in particular, maquis and red pine (*Pinus brutia*) constitute the common vegetation type of the region. Generally, the forested areas in the district do not have a fully closed internal formation but have a hollow structure.

4. Land surface temperature detection

The land surface temperature is usually determined as a result of a series of calculations using the satellite image's Red, NIR, and TIR bands in geographic information systems software. In this study, in order to obtain the LST map, firstly, the brightness value was converted to the radiance value by using the thermal band of the Landsat 8 satellite image. After converting the obtained radiance value to the temperature value, NDVI was calculated using the 4th and 5th Bands of the satellite image. Then, the proportion of vegetation and diffusion calculations were made using NDVI data. In the last stage, the land surface temperature map was determined using temperature and emissivity data. Accordingly, the LST map of the Serik district was obtained in six stages using Landsat 8 satellite image dated 22.07.2021.

4.1. Conversion from DNs to TOA Radiance

By using the thermal band (Band 10) of the Landsat 8 satellite image, the Digital Numbers (DNs) were converted to radiance (TOA spectral radiance) values utilizing equation (1). The M_L and A_L values required for the equation to be applied were obtained from the satellite metadata, and through this transformation, brightness and contrast corrections have been made in the image (Yuan and Bauer, 2007; Milder, 2008; Barsi et al., 2014; Akyürek, 2020; Çoşlu et al., 2021; USGS, 2022). The map obtained from the conversion of DNs to radiance values is given in Figure 4.

$$L_\lambda = M_L * Q_{cal} + A_L \qquad (1)$$

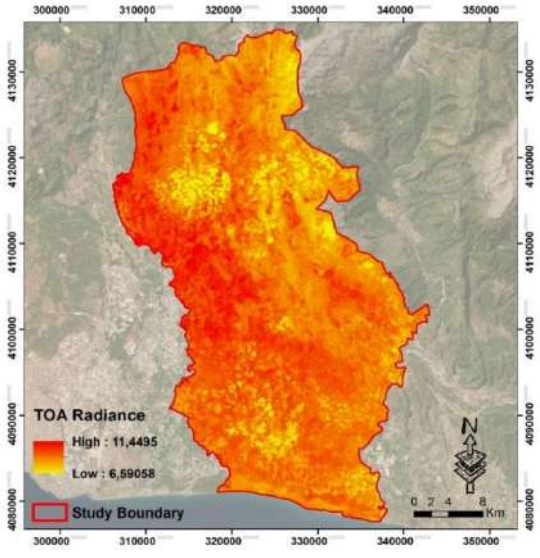

Figure 4: Conversion from DNs to TOA Radiance

4.2. Conversion from TOA Radiance to Top of Atmosphere Brightness Temperature (B_T)

Radiance values were converted to Top of atmosphere brightness temperature values utilizing equation (2). For the Landsat 8 satellite, the K_1 and K_2 calibration constants in equation (2) are 774.89 and 1321,079, respectively. Since the temperature obtained from the equation results was calculated in Kelvin, to convert it to degrees Celsius, 273.15 was subtracted from the result (Chander et al., 2009; Mercan, 2020; Çoşlu et al., 2021; USGS, 2022). The map obtained from the conversion of TOA radiance values to BT values is given in Figure 5.

$$B_T = K_2 / \ln(K_1 / (L_\lambda + 1)) - 273.15 \qquad (2)$$

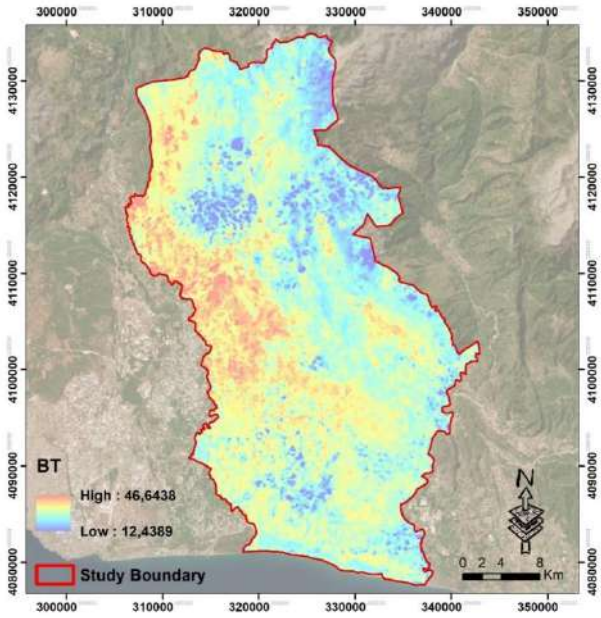

Figure 5: Top of Atmosphere Brightness Temperature (B_T)

4.3. Extraction of Normalized Difference Vegetation Index

By using Red (Band 4) and Near-Infrared (Band 5) bands, Normalized difference vegetation index (NDVI) image was produced with equation (3). The NDVI index calculated by using the reflectance values of the red and near-infrared bands takes values between -1 and +1. Therefore, in determining the LST, the NDVI value must be derived from the reflectance value, not the pixel value (Rouse et al., 1973;

Akyürek, 2020; Benliay et al, 2020; Mercan, 2020; Polat, 2020; Çoşlu at al., 2021). The map showing the NDVI is given in Figure 6.

$$NDVI = \rho NIR - \rho R / \rho NIR + \rho R \qquad (3)$$

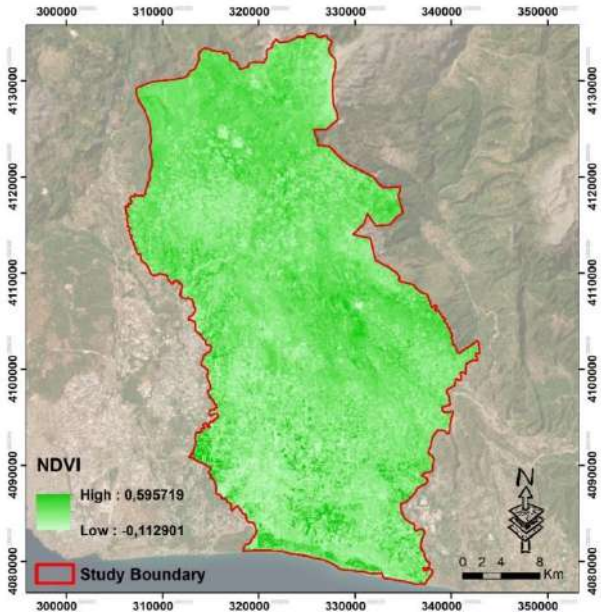

Figure 6: Normalized difference vegetation index (NDVI)

4.4. Determination of proportional vegetation (Pv)

The proportional vegetation (Pv), developed by Carlson and Ripley (1997), is a necessary parameter for land surface emissivity calculation. Pv is calculated using the NDVI, NDVI maximum and NDVI minimum values (Sobrino et al, 2004). Using NDVI, Pv was calculated with equation (4) (Giannini et al., 2015; Wang et al., 2015; Anandababu et al., 2018; Mercan, 2020; Türkyilmaz et al., 2020; Çoşlu et al., 2021). The map showing the obtained Pv using the $NDVI_{max}$, $NDVI_{min}$ and NDVI map values is given in Figure 7.

$$Pv = [\, NDVI - NDVI_{min} / NDVI_{max} - NDVI_{min} \,]^2 \qquad (4)$$

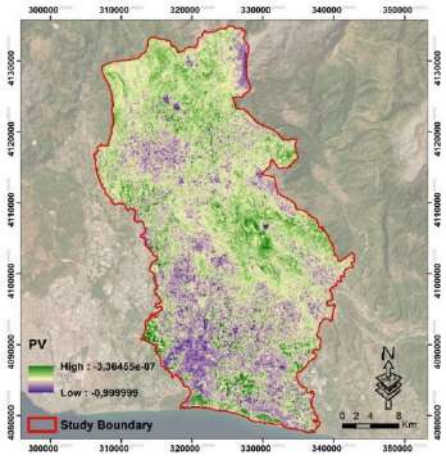

Figure 7: Proportional vegetation (Pv)

4.5. Determination of land surface emissivity (ε)

Land surface emissivity (ε) is a measure of a surface's ability to radiate or absorb a long-wave radiation spectrum (Sobrino et al., 2008). Whereas the higher the reflectivity of the object, the lower the emissivity of the object. In order to determine the LST, the value of the land surface emissivity (ε) must be known. The emissivity (ε) was calculated using the proportional vegetation with equation (5) (Sobrino et al., 2004; Anandababu et al., 2018; Çoşlu et al., 2021). The map showing the obtained land surface emissivity (ε) using the Pv values is given in Figure 8.

$$\varepsilon = 0.004 * PV + 0.986 \qquad (5)$$

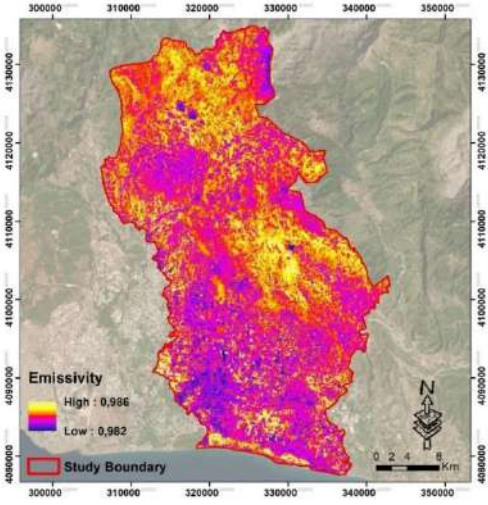

Figure 8: Land surface emissivity (ε)

4.6. Determination of land surface temperature (LST)

Following the process of evaluating the thermal radiance and land surface emissivity (ε), corrections such as dispersion and atmospheric distortions must be performed. For this reason, land surface emissivity correction was made to the brightness temperature value measured in the sensor. Thus, a land surface temperature (LST) map representing the actual surface temperature was produced using equation (6) (Artis and Carnahan 1982; Türkyilmaz et al., 2020; Çoşlu at al., 2021). The map showing the obtained LST of the Serik district, using the brightness temperature and emissivity values, is given in Figure 9.

$$Ts = B_T / \{1 + [\lambda * B_T / \rho]. Ln\varepsilon\} \qquad (6)$$

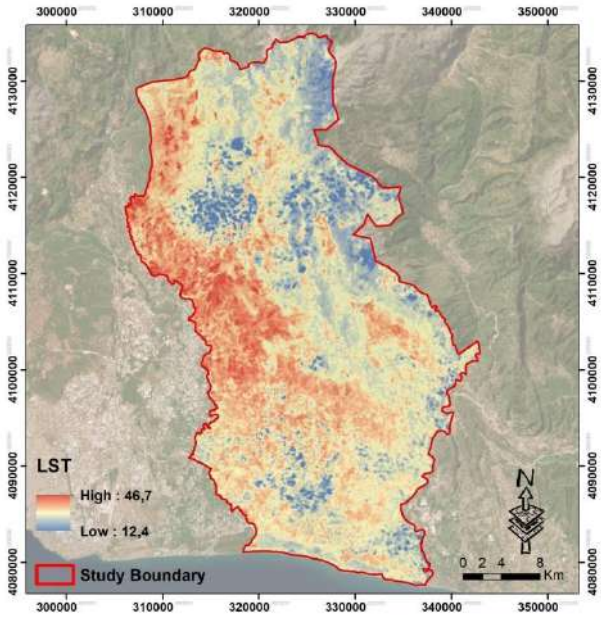

Figure 9: Land surface temperature (LST) map of Serik District

5. Evaluation of land surface temperature

In the study, three bands of the image of Landsat 8 satellite dated 22.07.2021 were used. By means of these bands, the Serik district LST map was obtained by performing 6-step processes (Figure 9). LST images showed that the minumum temperature in Serik district was 12.4 °C in the district's north forest area, while the highest temperature was 46.7 °C in the district's northeast rocky area. In addition to

these, the average surface temperature of the Serik district was determined as 35.9 °C.

Further investigation of the LST data showed that the thermal readings were mostly greater in the district's west agricultural areas and northwest sparse forest areas. In contrast, the temperature values are low in the district's north/northeast forests and south-cultivated agricultural areas. Since the southern part of the district is relatively close to ground level and can be considered mostly flat, the settlement's temperature is higher than the surrounding cultivated agricultural areas and water surfaces and lower than the surrounding bare soil and greenhouse areas. Due to the mountainous/rocky and forested region in general and the high altitude and slope north of the district, the land surface temperature is low. In comparison, the temperature is high in bare rock and rural settlements. It is thought that the high temperature in agricultural areas is because the area is not cultivated but bare soil or a greenhouse. In addition, the LST was observed to be higher in some agricultural areas than in other areas due to the harvesting of crops and the consequent conversion of land cover to bare soil.

6. Evaluation of the relationship between LST and CLC

In order to evaluate the relationship between land use and land surface temperature, a cross-section was taken in the south-north direction in the basin using the ArcGIS 3D Analyst Module and consequently, the graphic data in Figure 10 was obtained. The starting coordinate of the section plane in the south is 324384.8930, 4080644.4622, and the ending coordinate in the north is 324385.3335, 4134551.4870. The temperature and land use data of 1798 pixels in the section plane were transferred to Microsoft Excel software. Then this data was shown in the graph.

According to this graph, in residential portions of the study area showed greater LST values; 32.7 °C and 37.8 °C respectively for minimum and maximum, with the median being 34.8 °C. The reason for the temperature difference of 5.1 °C in the settlements is that the settlements have a heterogeneous land cover, namely hard urban landscape elements, recreational and non-green spaces. It was concluded that in residential areas, LST values are greater in parts of the city that mostly consists of hard landscape elements, whereas it is low in green areas. As stated in the literature, the denser the cities' green cover gets, the more the cities' average LST decreases (Gill et al., 2007; Çoşlu et al., 2021). It was found that the land surface temperatures in the examined agricultural areas had values between 18.6 °C and 42.1 °C and median LST has been 35.1 °C. The difference in temperature of 23.5 °C in agricultural areas is caused by the fact that the green texture of the products in agricultural areas varies over time. In agricultural areas, both seasonal agriculture

and perennial fruit crops are cultivated. Especially in seasonal agriculture, after the crops are harvested, the land cover remains as bare soil. Another reason for the high variability in the obtained temperature values is that in addition to garden and field agriculture, intensive greenhouse agricultural activities are carried out in the district. Additionaly, temperature differences occur in accordance to the type of cover that greenhouses have. Due to the fact that each plant species has a unique canopy size and the distances between these plants can vary, considerable temperature differences can be measured even within the same region (Leuzinger and Körner, 2007; Çoşlu et al., 2021). In areas with bare soil, differences in temperature tend to be caused by the existence of multiple distinct soil typologies near one another, and the diverse reflectance and absorption properties of each soil group resting on their respective bedrock (Duran, 2007; Çelik, 2017).

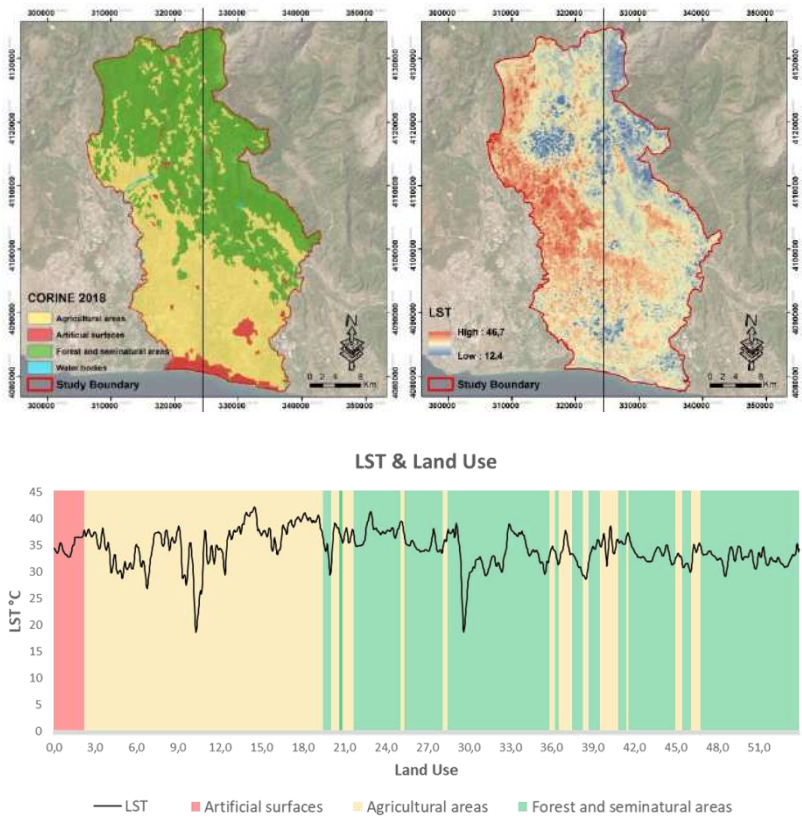

Figure 10: Land surface tempature according to land use

The land surface temperature in forest/semi-natural areas had values between 18.6 °C and 41.3 °C, and the average land surface temperature was 33.6 °C. This

temperature difference (22.8 °C) is caused by the variability of the plant density in the land cover. In areas where the land cover is mostly rocky and bare soil, the land surface temperature is high because the volume of the vegetation population is thin, and the LST is low in the areas where the plant density is high. As stated in the literature, rocks with different reflection and absorption properties have different surface temperatures when exposed to the same radiation. While darker colored rocks absorb most of the energy from the sun and heat up, light-colored rocks reflect the incoming energy to a large extent (Duran, 2007; Çelik, 2017; Çoşlu et al., 2021). The higher the frequency of trees in forests, the more effective they are in lowering the land surface temperature of their environment. Consequently, the land surface temperature will not decrease to the same extent in environments with sparse trees (Gill et al., 2007; Frumkin and McMichael, 2008; Çoşlu et al., 2021).

The temperature difference between the residential areas and forest/semi-natural areas in the district was determined as maximum 19.2 °C, minimum 3.6 °C, and 1.2 °C on average. The temperature difference between residential areas and agricultural areas was determined as 19.1 °C maximum, 4.4 °C minimum, and 0.3 °C on average. It has been determined that the temperature difference between agricultural areas and forest/semi-natural areas is at most 23.6 °C. In the minimum temperature difference measurements, it was observed that this gap could narrow until the difference was 0 °C. Finally, the average temperature difference between these two area types was determined as 1.5 °C.

7. Conclusion

In this study, the land surface temperature of Antalya Serik, one of the most important tourism and agriculture centers of Turkey, was determined. In addition, the land surface temperature was also evaluated according to the land use in Corine 2018 data. The smallest measured surface temperature difference in the aforementioned area was 12.4 °C and was recorded in the forested area in the northern part of the land. The maximum measured value was recorded as 46.7 °C and was measured in rocky terrain in the north-eastern part of the area. The average land surface temperature of the district was determined as 28.22 °C. When examined according to the land uses in the district, the average land surface temperature was 35.1 °C, with the highest observed in agricultural areas, while it was observed at least 33.6 °C in forest/semi-natural areas. The average land surface temperature in the residential areas was observed as 34.8 °C. Data shows, the greatest LST gap between different land uses in the district is 23.6 °C between agricultural areas and forest/semi-natural areas. It was seen that there were differences in average temperature between different land uses. These differences were determined as 1.5

°C between agricultural areas and forest/semi-natural areas, 1.2 °C between residential areas and forest/semi-natural areas, and 1.5 °C between residential areas and agricultural areas, respectively. What can be verified in the literature and clearly seen in the light of the findings of this research is that if LST and land use are monitored in tandem, low LST values are observed in forested and semi-natural areas and high LST values are observed in bare soil, concrete and greenhouses.

Based on the findings in this study, it has been clearly demonstrated that remote sensing technologies can be used as an effective data synthesis and analysis method in land temperature measurements that can be made at a regional scale. In spatial studies to be carried out on a regional or global scale, remote sensing technologies allow to obtain both visual and numerical data.

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EVALUATION OF LANDSCAPE CHARACTERISTICS OF FINIKE-KUMLUCA SUB-BASIN

Rifat OLGUN[1]

1. INTRODUCTION

Landscapes in the world have a dynamic structure. For this reason, intense human activities cause the alteration of landscapes (Gökyer, 2013). The increasing prevalence of urbanization activities as a result of global population increase has a negative influence on natural and cultural landscapes. This effect of urbanization on the landscape structure; It is seen as the disconnection between natural areas, the fragmentation or disappearance of habitat areas over time, the interruption and loss of continuity of ecologically sensitive corridors (Akyol Alay, 2016; Olgun and Yılmaz, 2019). Natural and cultural landscapes, which are gradually decreasing, especially in urban spaces, make life increasingly difficult, break human-nature relations, and this leads to the emergence of increasing ecological problems in cities. These problems show that in today's cities, urban growth (sprawl) is left to an uncontrolled development and change, and it lacks an ecological basis (Korkut et al., 2017).

Natural and cultural landscape areas provide numerous benefits to cities and individuals living in cities. Today, the need for these areas is becoming more apparent today. In this context, a number of legal arrangements are made for the protection of natural and cultural landscape areas. However, these legal arrangements may differ according to the countries (Olgun et al., 2022). One of the main reasons for this difference is the diversity of the landscape. According to the Europe Landscape Convention; "Landscape means an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors" (Council of Europe Landscape Convention, 2000). As can be understood from the definition, the landscape has a multi-layered and complex structure (Arı, 2005; Polat et al., 2022). For this reason, landscape planning studies include processes that enable social, environmental, and economic developments, as well as the efficient use of landscape values. The aim of landscape planning studies is to protect natural, cultural and historical landscape resources and to use them in a

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balanced way (Şahin et al., 2013; Uzun, 2015; Demir, 2017; Demir and Demirel, 2018).

Today, natural landscape areas are under pressure due to the misuse of lands. For this reason, the sustainability and protection of these areas, which are the basis of development, are required. Planning studies are carried out in order to limit the use of these areas, to minimize the pressure on them and to make them renewable (Zengin and Yılmaz, 2008; Ardahanlıoğlu and Karakuş, 2015). However, these plans and policies have not been fully implemented. For example, while infertile and sloping lands are used as agricultural lands today, there are residential areas and industrial establishments located on 1st class agricultural lands as a result of wrong development plans and irreparable land uses (Duran and Günek, 2004; Ardahanlıoğlu and Karakuş, 2015).

Due to the increase in population in the world, efficient use of land becomes more important. Otherwise, the loss of agricultural lands will be inevitable with the misuse of the lands. With the increase in urbanization activities in Turkey, most of the urban areas have been established on plains and medium-sloping plateaus suitable for agricultural production (Niray, 2002; Ünaldı et al., 2007; Ardahanlıoğlu et al., 2017). In urban planning studies, it is important to include agricultural lands in planning by preserving their existing structure and quality. Accordingly, the distribution and spread of agricultural lands is a determining factor in the creation of the urban form (Ardahanlıoğlu et al., 2017).

In the last 30 years, cities have been developing rapidly. In particular, tourism has brought with it rapid urbanization and the growth of small coastal towns (Çınar et al., 2016). Rapid urbanization causes the identity of cities to be ignored during the planning stages of cities. Thus, unplanned urbanisation without identity emerges. This unplanned urban structure negatively affects the identity of cities. (Karagüler and Korgavuş, 2014). In this case, there are significant changes in the natural, cultural and social structure of cities.

Remote sensing and geographic information systems are used in different researches by many professional disciplines such as city and regional planning, geology, agriculture and forestry. One of these usage areas is the studies for the planning and protection of the natural and cultural landscape structure of the cities. In this context, advances in remote sensing technologies facilitate mapping studies of land use and land cover, which are critical for landscape analysis (Shao and Wu, 2008; Kılıç and Arslan, 2022).

In some scientific researches, it is difficult to obtain data from field surveys. In this context, solutions can be produced for terrestrial problems at various scales by means of remote sensing and geographic information systems and data obtained from satellite images. Remote sensing and geographic information systems enable to use effective analysis methods in a short time. In this way, it is effective in land use decisions and planning by creating decision support mechanisms (Ardahanlıoğlu et al., 2017). For this reason, the use of remote sensing technologies as a tool by landscape researchers has become widespread in recent years (Aşık and Kaçmaz, 2021; Çilek, 2021; Kılıç and Arslan, 2022). Some of these researchers have used remote sensing in studies such as landscape change in the land, annual soil loss due to erosion, and the change of landscape pattern depending on land uses by using land use/land cover maps (Kılıç and Arslan, 2022).

2. MATERIAL AND METHOD

Antalya is located in the south of Turkey. It is one of the important tourism and agricultural cities of the country. The Finike-Kumluca sub-basin, determined as the study area, is located in the Teke Peninsula in the west of Antalya. Study area is surrounded by Elmalı to the north, Kemer to the east, and Demre to the west. The south of the study area is bordered by the Mediterranean.

The Mediterranean climate is observed in the Finike-Kumluca sub-basin. In this context, the region has a hot and dry climate in summers and a mild and rainy climate in winters. At the same time, the fact that the mountains in the north of the region extend parallel to the sea cause different climatic characteristics between the coastal and inner parts of Finike and Kumluca districts. This situation causes differences in vegetation and life styles between inland and coastal areas (Fig. 1).

Finike and Kumluca are cities where agricultural activities are intense. The increase in the demand for agricultural products and exports caused the coastal plains to take on a white cover (plastic greenhouse), especially after 1980. Agricultural activities are important for the economy of the region and Turkey. When the agricultural production value is evaluated among 872 districts in our country; Kumluca is in the 22nd place and Finike is in the 75th place (Yaman Kocadağlı, 2012).

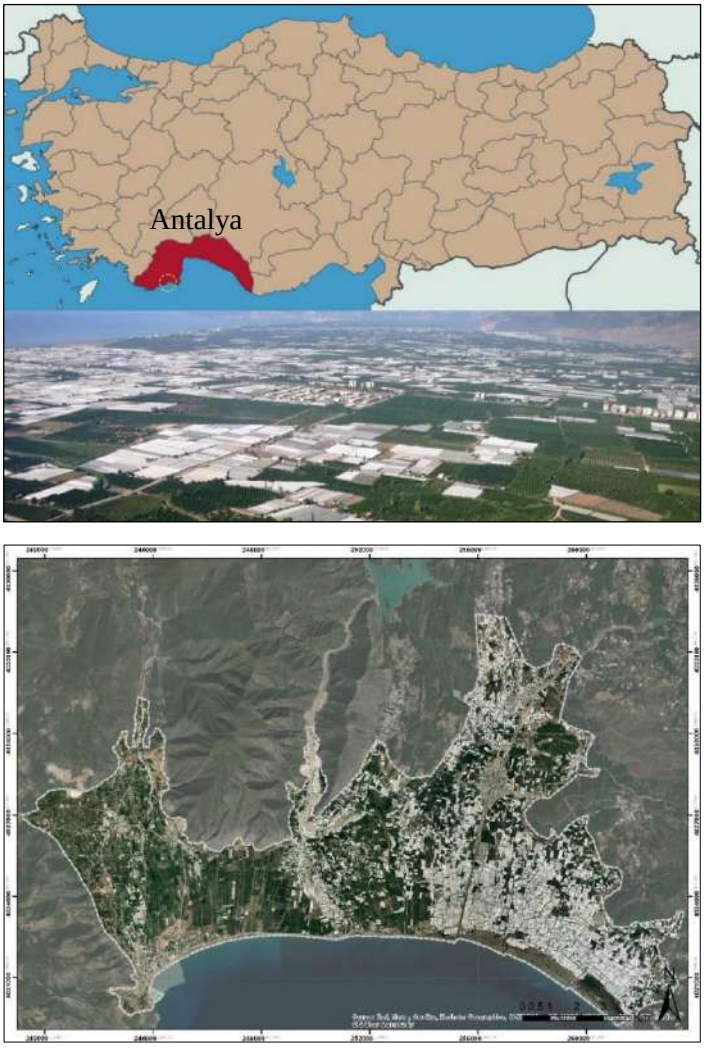

Figure 1. Location of the study area (Kumluca Municipality, 2022)

The study was carried out in 3 stages. In the first stage of the study, data on the natural and cultural structure of Finike and Kumluca regions were obtained. The literature on the subject of the study was reviewed and evaluated together with the field studies. In the second stage of the study, the boundaries of the study area were determined. In this context, the Digital Elevation Model (DEM), which includes the study area, was obtained from the United States Geological Survey (USGS). DEM data are images created in raster format and contain elevation values of locations. In this context, after the necessary pre-processes, the basins on the DEM data were determined with the Hydrology tool in the Spatial Analyst Tools module in ArcGIS

software. Then, the boundaries of the study area were determined by taking into account the sub-basins (Figure 2).

Elevation, slope and aspect analysis were carried out to evaluate the topographic structure of the study area. In addition, Normalized Difference Vegetation Index (NDVI) analysis was performed to monitor the development and change of the study area. NDVI analysis is one of the most preferred methods for monitoring the status of vegetation in remote sensing studies. In the NDVI analysis, calculations are performed using the near infrared (NIR) and red (RED) bands of satellite images. In the analysis, the algorithm of the NDVI is the ratio of the difference between the NIR and the RED to the sum of the difference (Formula 1).

$$NDVI = (NIR-RED) / (NIR+RED) \quad (1)$$

Landsat satellite images of July 2002 and 2022 were downloaded from the USGS for NDVI analysis. After the necessary pre-processing for the satellite images, NDVI analysis was performed. The values obtained as a result of the NDVI analysis vary between -1 and +1. While the index values approach +1 in places with healthy and dense vegetation, the index value approaches -1 in places with unhealthy and weak vegetation. NDVI maps were created with the values obtained as a result of the NDVI analysis.

In the last stage of the study, the natural and cultural landscape structure of the region was evaluated in line with the analysis of the data obtained by literature review, field survey and remote sensing.

3. RESULTS

3.1. Finike

Finike is located in the Teke Peninsula region in South West Anatolia. Finike, which has been home to many civilizations since ancient times, is thought to have taken this name from the Phoenicians who lived in this region for a while. (Durgun, 2017). It is reported in some studies that people have lived in the region since 3000 BC (Çobanoğlu, 2010). Although Finike was an important trade area with its fertile lands, rivers, forest areas and port in the past, its urban development has been slow due to reasons such as its mountainous surroundings and lack of a smooth highway connection (Durgun, 2017). Finike, which was a sub-district of Elmalı district in the past, became a district in 1914 (Çobanoğlu, 2010).

Mediterranean climate type is seen in the district. 75% of precipitation falls in November, December, January and February. The annual average temperature value is 18.7 degrees. Because the district is surrounded by mountains, the relative

humidity (67.4%) is high. This situation causes the temperature to be felt more especially in the summer period. The sea water temperature is 22°C on average. The administrative boundaries of Finike district is 699 km^2. At the same time, the county has a 28 km long coastal coastline. (Finike District Governorship, 2022). According to TUIK data, the population of 2021 is 49407.

The center of Finike district is located on a fertile plain on the Mediterranean coast, on an area of 2458 decares (Çobanoğlu, 2010). Apart from being a port city, it has fertile soils thanks to the alluviums brought by the Akçay and Alakır streams, which originate from Beydağları (Öner and Vardar, 2018; Polat, 2021). In addition, the fertile alluvial soil structure, microclimate and water resources of the Finike Plain increase agricultural productivity in the region (Arıkan, 2017). The prevailing economic structure in and around Finike district has an agricultural character and the existing trade and industry is based on the agricultural. The biggest source of livelihood in the region is vegetables and citrus fruits. In addition, there is a small amount of fishing in the region (Wikipedia, 2022).

The first citrus tree was brought to the town of Finike from the island of Rhodes in the early 1900s. And in the 1940s, orange production began to be grown in the Finike region. After this date, citrus production has increased continuously in Finike (Arıkan, 2017). At the same time, the famous orange of Finike, known as the land of oranges in our country and in the world, came first in the scientific research conducted by the University of California (Çobanoğlu, 2010).

Finike has a great potential in terms of tourism. It is one of the important destination centers in terms of yacht tourism with its marina. In addition to ancient cities such as Arykanda (Arif) and Limyra (Turunçova, Zengeder) within the borders of the district, Suluin Cave is among the natural and cultural values of the district. However, Finike has not developed as much as other coastal cities of the Mediterranean in terms of tourism. Especially the tourism investment policy after the 1980s has not been popular in Finike (Wikipedia, 2022).

3.2. Kumluca

Kumluca, located in the west of Antalya, is a district with valuable natural and cultural landscapes. Kumluca district has been in the settlement area of many states since ancient times. Lycians, Phoenicians and Romans are known as the first settled communities. (Sarı, 2012). For this reason, there are important ancient cities such as Olympos, Corydella, Rhodiapolis, Idebessiois and Gagae in the district. In particular, Olympos is visited by many domestic and foreign tourists. The studies and historical artifacts unearthed in this ancient city in 1991 further increased the historical and touristic value of this place.

Kumluca was separated from Finike in 1958 and became a district. In the first years of its establishment, the economy of Kumluca was based on cereals, livestock and a very small amount of fruit growing. After the 1970s, with the use of plastic as a cover material, greenhouse agriculture has progressed rapidly and greenhouse cultivation has become an important source of income for the district. The total land of the district is 1,253.000 decares. 170.000 decares of this area is agricultural land, 89.969 decares of the area is meadow and pasture land, and 993.031 decares of the area is forest and other areas. (Günay, 2020). The population of the district, which has a 30 km long coastline, is 72478 people in 2021 according to TUIK data. (Anonymous, 2022).

The agricultural production activities of the district are carried out in the Kumluca plain, which has an altitude range of 0-300 m within the borders of the district. Kumluca Plain, which is an alluvial plain, is a plain where all kinds of agricultural plants can be grown easily due to the fertile soils and the suitability of the climatic conditions. The climate and land conditions in these areas are especially suitable for greenhouse and citrus farming. While citrus agriculture was predominant in this plain, greenhouse cultivation has gained more importance now that greenhouse cultivation yields twice a year. At the same time, as we move towards the Taurus Mountains around the district, cereals, pomegranates, olives and citrus fruits are cultivated in the region between 300 m and 600 m altitude due to the climatic conditions. Greenhouse cultivation can also be done on the slopes facing the sea (Ayaz, 2010).

3.3. Finike-Kumluca Sub-basin

The study area, located on the Teke Peninsula, has a flat and slightly sloping terrain in terms of topographic structure. There are high mountainous areas in the northern, eastern and western parts of the study area, which is located within the boundaries of Finike and Kumluca districts. For this reason, there are changes in the topography of the land within short distances. Finike and Kumluca plains, which are bordered by the Mediterranean to the south, are also deltas and flood plains formed by the alluviums carried by the Akçay and Alakır Streams coming from these mountainous areas (Öner and Vardar, 2018; Canpolat et al., 2021). In this context, the study area has a coastal plain character (Fig. 2).

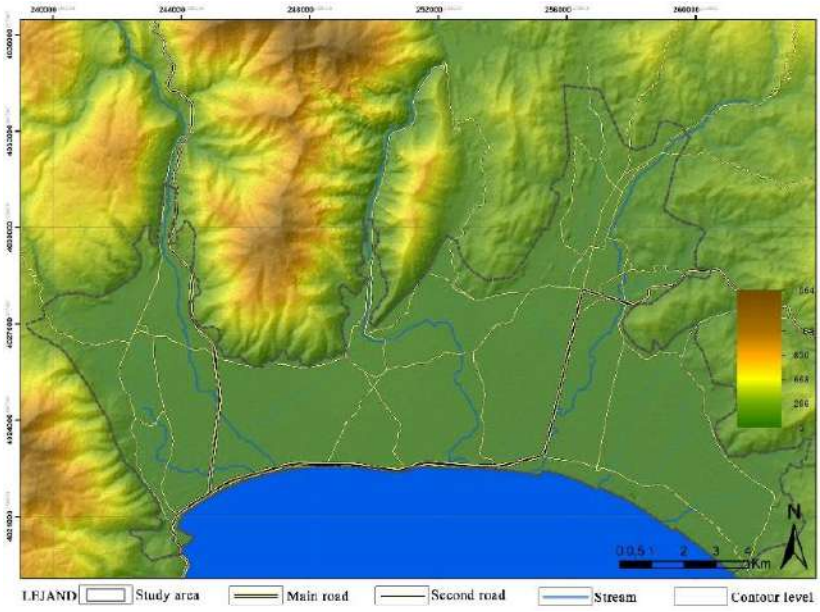

Figure 2. Elevation map

Especially the north and west of the study area, which has a low slope, has high slope values. At the same time, there are slope differences in some regions due to the streams in the area. Agricultural activities are intense because there is not much slope in the study area and it has a fertile soil structure. Citrus and greenhouse cultivation agricultural activities are carried out in a large part of the study area (Fig. 3).

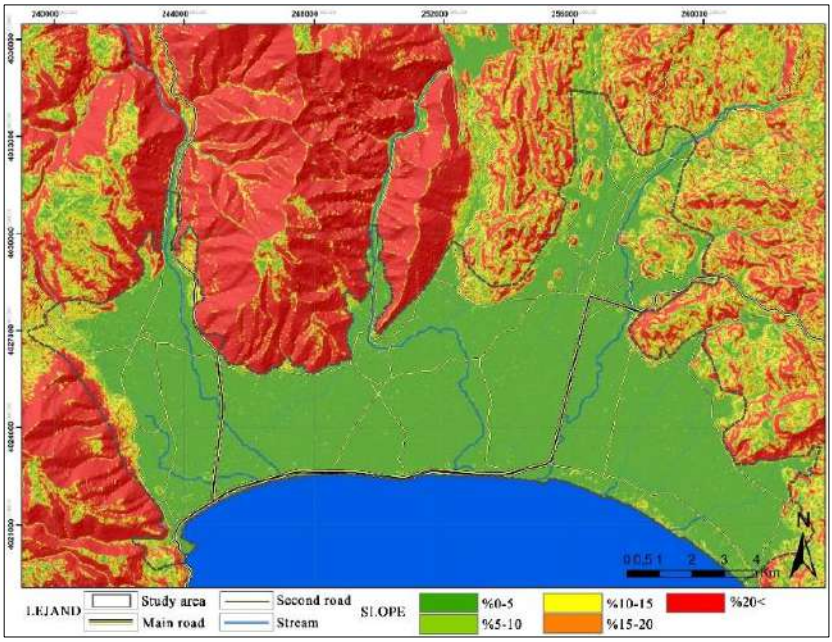

Figure 3. Slope map

Ten different aspects are seen due to the elevation differences in the study area and its surroundings. In particular, the absence of any elevation in the south of the study area and the fact that it is surrounded by the Mediterranean increases the sunshine duration of the area. In addition, breeze winds coming from the sea also enter the area. Different citrus varieties are grown in the study area. The soil structure and microclimate conditions of the region have a great effect on the increase in the quality value of the product, which is grown in the region and has brand value as Finike Orange. The fact that the area receives breeze winds from the south and prevailing winds from the north and northwest increases the quality of the orange. At the same time, greenhouse production activities are carried out throughout the year due to suitable climatic conditions (Fig. 4).

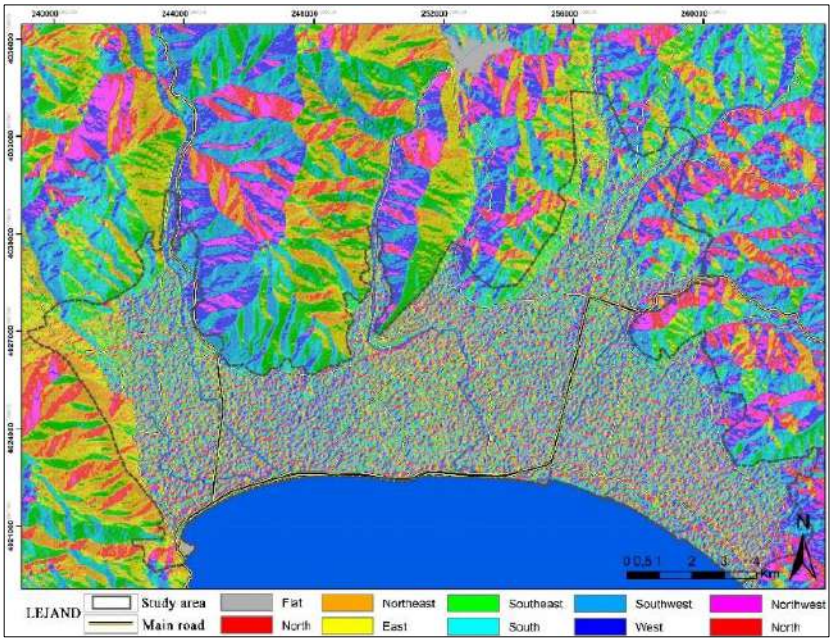

Figure 4. Aspect map

At the beginning of the 20th century, the Finike-Kumluca plain was not suitable for agriculture and settlement due to the fact that it was a heath and swampy land. For this reason, settlement areas in the Finike and Kumluca regions were first established on the foothills of the mountains. However, in the first quarter of the 20th century, swampy areas were dried in order to increase agricultural production throughout the country. In this context, the drainage problem of the Finike-Kumluca plain was solved and the swampy areas were dried. Thus, agricultural activities started in this region. At the same time, residential areas began to be established on the plain. The fact that the climatic conditions of the region are suitable for agricultural activities, the fertile soil structure and especially the solution of the transportation problems of the region have enabled the development of agricultural activities. Since the 1970s, with the use of plastic as a covering material, greenhouse cultivation has spread rapidly and has become the city's most important source of income. The widespread use of greenhouse cultivation in the 1980s made the region one of the most important greenhouse areas of our country (Yaman Kocadağlı, 2012).

At the same time, the region has a great potential in terms of tourism. The historical places in the region, the climatic conditions of the region, the long coastline of the region increase the tourism potential of the region. However, due to the lack

of tourism investments in the region and agricultural activities in the region, the development of the region in terms of tourism has been slow.

Since the region is not developed in terms of tourism and population growth is slow, there has been no increase in urbanization for a long time. However, it is possible to say that there has been a rapid construction in the region in the last 10 years. Urbanization has accelerated, especially with the expansion of the Kumluca city center and the construction on the Finike coastline. This will lead to the reduction of agricultural areas over time.

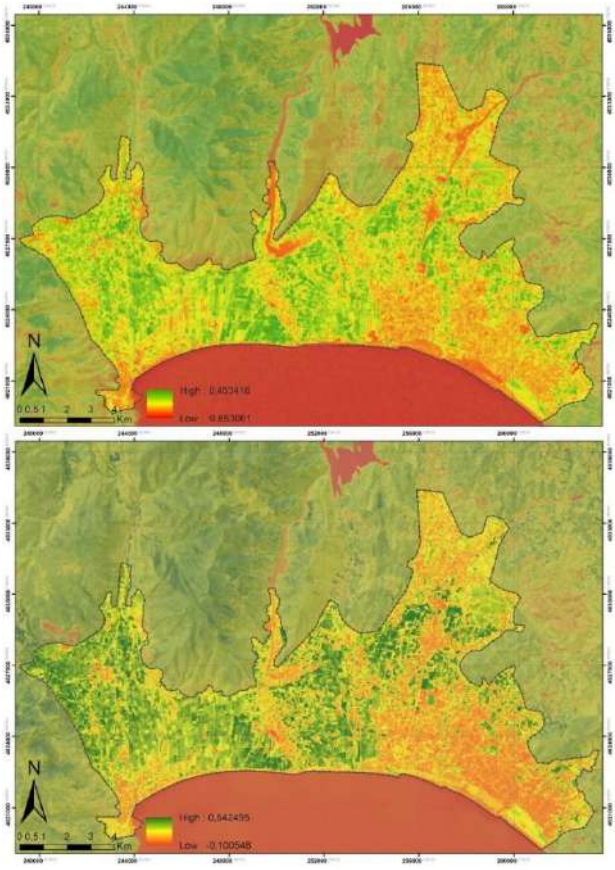

Figure 5. NDVI maps for 2002 and 2022 years.

4. CONCLUSION

The study area is one of the important agricultural areas of the region thanks to its microclimate, fertile soils and topographic structure. For this reason, agricultural lands should be taken into account in the plans and strategies to be made for the region.

The development of the city should be controlled by placing agricultural belts. Purdom (1949) states that the agricultural belt is an indispensable part of the city's economy and structure, and constitutes a border and buffer to the growth of the city. Agricultural belt plans, which are not yet implemented in our country in conservation planning, are one of the important tools that can be used to protect agricultural areas and natural resources around cities (Taşkan and Atik, 2020). In particular, agricultural belt areas should be planned in upper-scale plans and detailed in lower-scale plans.

In the planning of the Finike-Kumluca sub-basin, a data infrastructure should be created for the status of the existing structure and the potential of the region. This data infrastructure should be used in the planning studies for the land use to be made. According to Ardahanlioglu et al. (2015) and Ardahanlıoğlu et al. (2018), in order to ensure the sustainable use of the region, it is necessary to base the planning studies on an ecological-based, to be carried out in accordance with these plans in their applications, and to monitor the land cover change at certain periods.

Landscape plans and policies should be created in order to protect the natural and cultural landscape values of the Finike-Kumluca sub-basin. As Benliay (2009) and Benliay and Başal (2010) suggest in their research, landscape strategies should be formed in a structure that supports upper scale landscape policies. Because the accuracy of the evaluation and suitability factors to be determined for the usage types will make the landscape plans more reliable.

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THINKING WITH SKETCH IN LANDSCAPE ARCHITECTURE EDUCATION: SKETCHING AND FREE-HAND COURSE EXPERIENCES

Doruk Görkem ÖZKAN[1]

Duygu AKYOL KUYUMCUOĞLU[2]

1.INTRODUCTION

Landscape architecture is the art of analyzing, producing and designing the environment based on functional, ecological, economic, aesthetic and social criteria in order to meet human needs at the highest level. Today, architectural disciplines are changing and developing. Social and environmental changes, together with the change in needs, force the professional discipline of landscape architecture to be constantly renewed in terms of content and scope. Design education is an essential element of design professions and practices. Therefore, the content and methods of design education continue to be discussed since the beginning of vocational education.

In recent years, it has been stated that vocational education should be offered to students who can think creatively, make innovations, solve problems and combine all these with analytical thinking, as well as professional knowledge. (Özkök, 2005; Özkan et al. 2016). Salama (1995) "Since architecture is created in a field of tension between reason, emotion and intution, design education in arhitecture is manifestation of the ability to conceptualize, coordinate and execute the idea of building rooted in the tradition of humanism" expressed as. Landscape architecture education designs, transmits and supervises depending on human needs, considering the values of the profession and society, as in architecture and design education types. In this context, environmental behavior studies are defined as the systematic

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evaluation of the relationships between human behavior, cultural values and the physical environment (Moore, 1979).

The environmental design process, as in the architectural design process, is the application of existing ideas and thoughts within the framework of certain scientific methods to obtain a detailed solution of environmental design (Idi & Khaidzir, 2015). In the problem solving process, the thoughts, ideas and drawings of the designers are used as a tool to reach the necessary creative result (Goldschmidt & Smolkov, 2006; Regular et.al,2017a; Regular et al,2017b; Mumcu et al., 2021). Design is a complex, often contradictory, non-linear process, and this complex situation is valid for design students as well as professionals (Bielefeld & Khouli, 2017). Within this complex structure, design education should focus on how the process will work, not on what the result should be. As Öztürk (2007) states, creativity is a design process and an effort to reach the unknown and the non-existent by combining the known. Design is a phenomenon that brings everyone operating in architectural disciplines together on a common ground. The design method depends on the person's work style, skills, and design problem at hand. In addition, the design method may differ from design to design. Each student will have the opportunity to try different approaches and solutions while searching for a solution to the design problem. According to Biefeld & Khouli (2017), the aim here is to identify the strengths and weaknesses of each approach and to try to find the best fit for the design problem. In this quest, even if the details of the design problem are clear, it is unclear how the process will proceed and how it will end. Therefore, creative design is result-oriented, not process-oriented.

While Aksoy (1975) defined the design process as the preparation process of the schemes or plans required for an activity, he expressed it as the creative process itself in the field of fine arts. In architectural disciplines, the stages of the design process are expressed with information gathering, analysis, synthesis, and evaluation processes.

In the first stage of the design process, the designer uses ambiguous drawings and sketch that contain unclear expressions, such as sketches. Using the sketch is one of the most important and creative stages of the design process. Freehand drawing and sketching is an action performed by all people like writing (Goldschmidt, 1991, 2003). Sketch is one of the ways of visualizing an idea in the mind, which makes the invisible visible. Through sketches, the abstract world turns into a concrete one and ideas can be developed (Manolopoulou, 2005; Mumcu & Özkan,2018).

Goldschmidt (2003) emphasized that sketches are a new source of information. Doodling is the potential to increase thinking in the design process. The sketching

process constitutes the designer's process of interaction between the brain, hand and eye. The designer draws what he thinks and thinks what he has drawn and draws again. This process continues continuously.

The sketching process begins with the pre-design programming process. At this stage, answers to the problems are sought. Functions are determined. The determined functions are related to each other. Afterwards, capacities are discussed. In the last stage, the answer to the question "how" is sought and the form is determined. This whole stage is expressed as idea sketches (Verstijnen et all. 1998). After the idea sketches are completed, presentation sketches are prepared and the sketch process is completed.

In this study, the investigation of ideas and presentation sketches will be discussed within the scope of Karadeniz Technical University, Department of Landscape Architecture, Sketching and Freehand course.

2. MATERIAL AND METHOD

The material of this study is Karadeniz Technical University, Landscape Architecture Department, 2019-2020 Spring Semester Sketching and Freehand course student studies. The course was conducted by Associate Professor Doruk Görkem ÖZKAN in the studio. Theoretical information on design, designer thinking, abstraction, sketching and sketching processes in landscape architecture is shared. Afterwards, sketch applications are made. Within the scope of sketch applications, it is aimed to "research and determine functions", "associate functions", "determine capacities" and finally "form representation". In this study, students were asked to design the immediate environment of the department. In their designs, they were asked to organize the circulation-promenade axis, sitting areas, resting areas and focal meeting and gathering areas together. In this direction, it is aimed to examine two different applications as idea sketches and presentation sketches. This review focused on the process rather than the end product.

3.FINDINGS

4 student studies selected in the findings section; It was examined in two stages as idea sketches (research and identification of functions, association of functions, determination of capacities) and presentation sketches.

Findings of Study No. 1

Study number 1 belongs to a student named Asya Arslan. In this study, the student first thought of himself as the user of that area and wanted to determine the activity

venues. It is seen that circulation and spaces begin to become clear while the activities he determines are constructing their relations with each other. It is seen that the paid system is combined in the final product. The entrances have been clarified, the main circulation axis, green areas, viewing, sitting, resting areas and meeting points for the dominant view have been designed. (Figure 1).

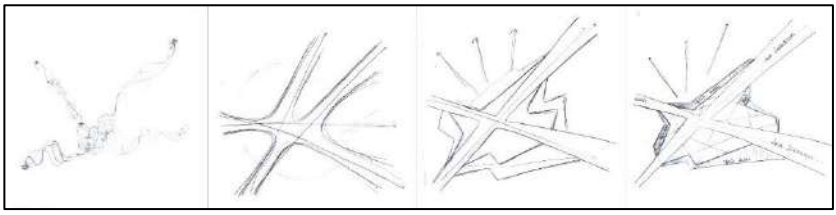

Figure 1. Asya Arslan idea-sketches

As a result of the development of idea sketches, spatial organizations, structural elements, plant elements, equipment and people were expressed in presentation sketches (Figure 2).

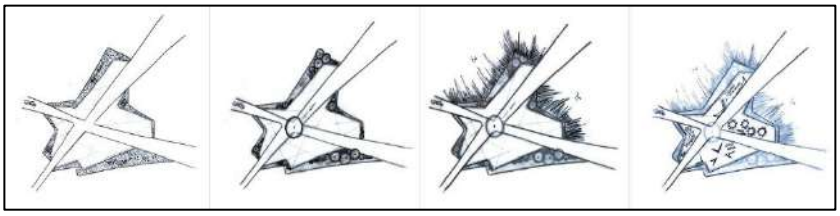

Figure 2. Asya Arslan presentation sketches

Findings of Study No. 1

Study number 2 belongs to a student named Gülnihal Tetik. In this study, it is seen that the student clarifies the activity spaces and circulation and continues the development of the sketch at every step. The relationship and capacity of sitting, resting, watching and meeting focus, which is one of the event venues, were questioned. In this study, although we observe that the student slowly moves from one idea to another during the form creation process, it is seen that one idea is mainly elaborated (Figure 3).

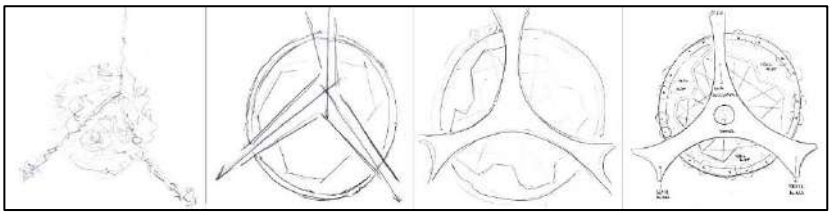

Figure 3. Gülnihal Tetik idea sketches

The presentations of the spatial organizations determined as a result of the idea sketches were created. In this context, firstly the expression of green space and hard ground, then the planting design, equipment and people were placed. At the last stage, graphic representations of all these (with techniques such as shading, punctuation, darkening, etc.) were prepared (Figure 4).

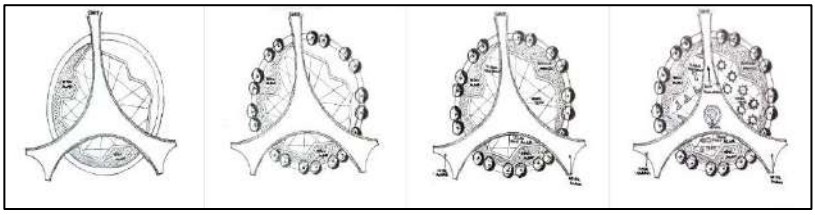

Figure 4. Gülnihal Tetik presentation sketches

Findings of Study No. 3

Study number 3 belongs to a student named Damla Nur Kocaman. In this study, it is seen that the student first determines the circulation and transportation axes. Then, it is seen that he started to create the event spaces with these axes and revealed a holistic system. Unlike other studies, it is seen that "slowly transitioning from one idea to another" is dominant in this study. In other words, it is a lateral change-weighted study (Figure 5).

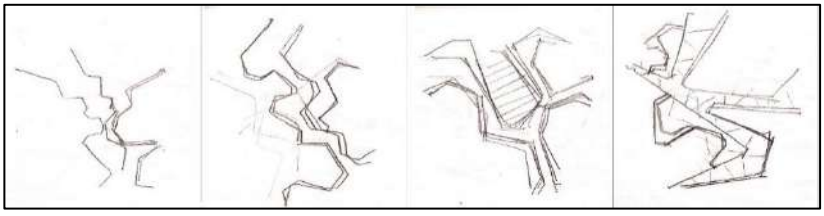

Figure 5. Damla Nur Kocaman idea sketches

After the development of the idea sketches, the presentation of the decided design was started. At this stage, it is seen that the distribution of hard floors and green areas, then the event spaces, equipment, flooring and trees are placed. Presentations for space organization are shown in Figure 6.

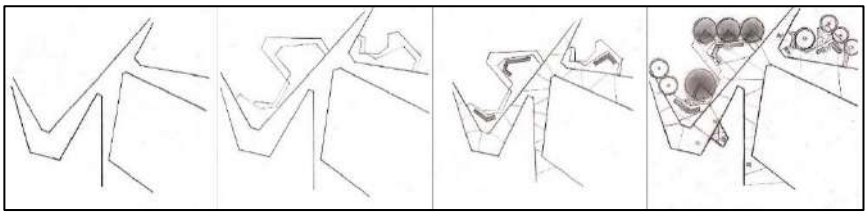

Figure 6. Damla Nur Kocaman presentation sketches

DISCUSSION AND CONCLUSION

Goldschmidt (2003) stated that doodling allows the designer to communicate with himself. In the Landscape Architecture education program, where the design and creativity process is very important, it should be aimed to gain this skill to the student (Regular 2017c). In the "sketching and freehand" course discussed in the study, it was stated to the students that the sketch is a communication tool in the design process, it is the source of new information and discoveries, and it is the most prioritized tool for the expression and recording of thoughts. In this direction, in-class applications were made in order to increase the interaction of the students with the sketch. It is thought that these practices are very important in establishing the brain-hand and eye coordination of the students. In the sketching process, it was stated that it should be process-oriented, not result-oriented.

Verstijnen et al. (1998) divided the classification of sketches into two groups: idea sketches and presentation sketches. idea sketches; It includes the processes of discovering activities, associating them, discussing capacities and producing forms. Presentation sketches, on the other hand, are sketches that express how space organizations create the final product by layering.

In the evaluation of the sketches, the dimensions that Goel (1995) called lateral, vertical and copying in the sketch were used. Lateral change; It refers to the slow transition from one idea to another. vertical change; It refers to the transition from an idea to a more detailed version of the same idea. If copying; It represents the transition from one drawing to the same drawing. In the design process, this is called the fix idea and is expressed as an undesirable approach in design.

In Turkey, sketching and freehand drawing processes are a neglected subject in landscape architecture departments. Therefore, this research deals with the sketching process. In this study, student studies were evaluated, but the reasons for the differences were not questioned. The source of these differences can be investigated in future studies.

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THE EFFECT of METROPOLITAN CITY LAW NO. 6360 on SPATIAL PLANNING: THE TRABZON CITY CASE

Duygu AKYOL KUYUMCUOĞLU[1]

Doruk Görkem ÖZKAN[2]

1.Introduction

With the changes in the global administrative perspective, especially the local government paradigm is changing in Turkey. As the scale of metropolitan areas expands, applied plans need to be addressed within a framework that covers the entire region and determines macro policies. Thus, the metropolitan municipality government model is going through a rapid and dynamic transformation.

The urban growth led to the emergence of new administrative problems. Law No. 6360 aimed to introduce a new government system, while providing solutions to these problems. The law changed the urban administration system in Turkey. The number of metropolitan cities was increased, and administrative areas were expanded to the provincial borders. In these provinces, the special provincial administrations were abolished. The debates in the scope of the law mainly focused on scale regulations, regional/provincial administrations, compliance to the constitution and the local electoral system.

The abovementioned law did not only introduce administrative complexity, but also several questions related to spatial planning. The confusion in the planning aspect could also result in several conflicts/contradictions between the local government units in the implementation stage.

In the present study, the content of the Metropolitan Law No. 6360 will be examined and the innovations that it would introduce in spatial planning and possible losses will be identified and the effects of the said law on the case of the city of Trabzon will be scrutinized.

2.Historical Developments In Turkish Local Government System And The Impact Of The Law No. 6360

The phenomenon of local government was introduced in the 18th and 19th centuries as a result of the industrial revolution in developed countries and the

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modern local government approach was implemented and developed in consistence with the economic and social change of the time (Berk, 2003). In Turkey, the military reforms that were initiated after the acceptance of the European superiority affected the administrative and social fields in time. The changes in the local government system in Turkey can be discussed in three phases: pre-1980, post-1980, and post-2004 periods. The present study will focus on the post-1980 and post-2004 changes by comparing these changes with those introduced by the law no. 6360. Because, it would not be possible to scrutinize the law no. 6360 or all other metropolitan municipality laws separately and consider these as correct or incorrect when the east-west and north-south axes in the country are taken into account. Depending on the regional levels, population, economic structure and urban needs, the effective service areas of local governments could change.

In this context, the metropolitan city law no. 3030 that initiated the changes in the local government system in Turkey is significant.

2.1 Metropolitan City Law No. 3030 and Its Impact on the Field of Planning

Urbanization movements that started in the 1950s led to a higher population density in the residential areas and based on the view that the classical municipality approach was not able to solve the problems, the two-level metropolitan administrative model was introduced with statutory decree no. 195 enacted on March 23, 1984. After the decree, the Metropolitan Municipality Administration Law no. 3030 was adopted on June 27, 1984. With this law, a separate administrative model was envisaged for metropolitan cities and the term "metropolitan" was legally recognized for the first time in Turkey (Oğuz, 2011,.

The objective of the Law No. 3030 was stipulated as follows in Article 1: “to organize the legal status of the metropolitan municipality administration to provide planned, programmed, active and harmonious services.” Within the scope of this law, certain duties and services that the district municipalities could not fulfill were also defined. These were:

- Lay out metropolitan city invetment plans and programs
- Lay out and implement the metropolitan development plans, approve and supervise the implementation of the application plans laid out by the district municipalities based on the master plan
- Conduct metropolitan water-sewage and public transport services.

Based on the special law no. 3030, a two-level municipal government structure was established in Istanbul, Ankara and Izmir and the metropolitan municipalities

were defined based on the district municipalities. According to the law, it was foreseen that there should be more than one district within the borders of the municipality for the establishment of the metropolitan municipal administration and if not, initially at least two districts should be established by the central government. Per Article 3 of the abovementioned law, cities with more than one district within the borders of the municipality were named metropolitan cities and the municipalities established in the districts within the metropolitan cities were called district municipalities (Oğuz, 2011).

Between 1984 and 1993, provinces were transformed into metropolitan cities with subsequent laws. However, after this date, due to economic reasons, the method of establishing metropolitan municipalities based on district municipalities was abandoned and municipalities were started to be promoted to metropolitan municipalities with statutory decrees.

2.2 Metropolitan Municipality Law No. 5216 and Its Impact on the Field of Planning

Before The Law on Metropolitan Municipality No. 5216 dated 2004, municipalities were governed within the framework of the law no. 3030. The new Metropolitan Municipality Law No. 5216, which regulated the expansion of metropolitan municipality borders and inclusion of higher number of municipalities and villages within the borders, was enacted in July 2004 after it was approved by the President. The metropolitan municipal government model, which was first established in Turkey with the law no. 3030, was then reformed by the law no. 5216, which was different from the previous law in the new scale regulations introduced for metropolitan municipality borders.

Metropolitan Municipality Law No. 5216 was different from its predecessors due to the fact that it introduced population and distance criteria for the foundation of metropolis administration, similar to those utilized in the US for metropolitan area borders (Tuzcuoglu, 2003, p.119-123).

It was indicated in the general preamble of the law that the solution should be addressed in the national scale, not only in the urban scale based on the assumption that the population was concentrated in urban areas and as a result, demand for services and costs increased and this increase caused a decrease in quality of services, loss of time and resources, and urban problems created nationwide issues. According to the law no. 5216, the following criteria were required to establish a metropolitan municipality in a location:

- Presence of at least three district or low level municipalities,

- A minimum population of 750,000 including municipality area and central municipalities within 10 km of the municipality borders,
- A demand for metropolitan municipality due to physical settlement and economic development.

Law no. 5216 further clarified zoning authority between metropolitan municipalities, district and first level municipalities. The new law provided significant supervisory functions that were effective, enforceable and ipso facto for the metropolitan municipality in the control of illegal construction. For example, in order to eliminate the applications against the zoning law that were identified by the metropolitan municipalities, a period of not more than three months would be given to the relevant municipality and if the irregularities were not remedied within the given period, the metropolitan municipality might act and use all necessary powers recognized by the municipal law to take the initiative to remove the irregularities (Tuzcuoğlu, 2007).

According to the Article 7, the authority and responsibilities of the metropolitan municipality included laying out, authorizing third parties to lay out, approving and implementing all master plans of 1 / 5.000 to 1 / 25.000 scale in compliance with the environmental plan. It was also with the authority of the metropolitan municipality to approve and implement the development plans, the changes to be made in these plans, the subdivision plans and the zoning development plans, which the municipalities within the metropolitan area would lay out in compliance with the master plan (Oğuz, 2011).

With provisional Article 1 of the Act, the metropolitan municipalities were obliged to lay out or authorize third parties to lay out 1 / 25.000 scale master plans within two years from the date the law enters into force. Laying out and licensing all development plans, subdivision plans in all scales related to the projects, construction, maintenance and repair works required by the duties and services assigned to the metropolitan municipality by law and implementation of all construction were assigned to the metropolitan municipality (Oguz, 2011).

Again, in the fourth paragraph of the same article of the law no. 5216, allows the inclusion of the district center and municipalities and villages of the district center located outside the borders of the metropolitan municipality in the municipal boundaries of the metropolitan area. Accordingly, these municipalities and villages could be included in the metropolitan municipality borders within 6 months of the effective date of the law upon the request of the municipal council or the village alderman board and the decision of the metropolitan municipality council and the approval of the Interior Ministry, without any further process. However, due to

reservation that the villages, which did not apply during the 6 month period and would be left out of the metropolitan municipality borders, would affect the integrity of municipal services negatively, the law no. 5390 dated July 2, 2005 was enacted to prevent this disadvantage.

2.3 Metropolitan Municipality Law No. 5390 and Its Impact on the Field of Planning

Law No. 5390 stipulated that the district municipalities that were within the borders of the metropolitan municipality would be transformed into the metropolitan district municipalities and other municipalities would become first-level municipalities and the legal identity of the villages would be abolished, becoming neighborhoods and the municipalities that these villages would be included would be determined by the Cabinet.

The most striking aspect of this law, which entered into force on 03.07.2005, was the provision of articles that would enable the municipalities to play a more active role in the housing market. In Article 69 of the said law, the following regulations regarding the duties of the municipalities about the "land and housing administration" were stipulated. The municipality was assigned the authority to create “zoned lands with infrastructure,” to construct, sell, lease housing and public housing, to purchase or expropriate land, to swap these lands, to collaborate with other public organizations or institutions and banks for these purposes and to create joint projects if necessary in order to ensure organized urbanization, to meet the residential, industrial and commercial zoning needs of the location and within the municipal and neighboring areas and except the spaces protected with special laws and agricultural lands (Keleş, 2012).

Similarly, the article no. 73 of the said act was striking as well. Here, the municipalities were authorized for urban transformation projects. Furthermore, Articles 70 and 71 indicated that municipalities could establish partnerships (corporations) and businesses for operations indicated in their duties and services including housing and land operations.

In the process between the law no. 3030 and the law no. 5390, the content of several articles of the law were amended with statutory decrees.

However, the fundamental change in the definition of local governments in the administrative sense and the determination of their authority was stipulated with the Law on Establishment of Metropolitan Municipalities in Thirteen Provinces and Twenty-Six Districts and Amendment of Certain Laws and Statutory Decrees no. 6360 dated December 13, 2011.

2.4 Law No. 6360 and Its Impact

The number of metropolitan cities in Turkey was increased to 29 by Law no. 6360, and another important change was stipulated with the same law and the borders of these metropolitan cities were altered. The Metropolitan Municipalities Law no. 5216, which entered into force on 10.07.2004 (Provisional Article 2), had extended the borders of metropolitan municipalities to a radius that ranged between 20 to 50 km based on the population. With the new regulation, the borders of metropolitan cities were extended to provincial borders. Thus, for the first time in the history of the Republic, the municipal boundaries of the metropolitan municipalities was extended to provincial borders, which previously applied only to the provinces of Istanbul and Kocaeli in 2004. With the law no. 6360, the boundaries of the 29 metropolitan municipalities including the new additions matched the provincial borders and the legal entity of the special provincial administrations in these provinces was abolished. Without doubt, this regulation was quite radical in terms of spatial planning as it is in several other respects.

The first major change related to spatial planning was the termination of all county municipalities within the provincial borders and their annexation to the district municipalities as neighborhoods. THus, a total of 1022 county municipalities were abolished in metropolitan municipality areas and planning authority in these settlements were transferred to district and metropolitan municipalities. Therefore, only metropolitan municipality and district municipalities were left as provincial level local government units (Ersoy, 2013).

Table 1: Changes in the number of municipalities

TYPE OF MUNICIPALITY	Pre-6360	Post-6360
Metropolitan Municipality	16	30
Metropolitan District Municipality	143	519
Provincial Municipality	65	51
District Municipality	749	400
County Municipality	1977	395
Total of Municipalities	2950	1395

Resource: Development Plan 2014-2018, s. 152.

Table 2: Provincial municipalities that were converted to metropolitan municipalities

MUNICIPALITY	POPULATION OF MUNICIPAL	POPULATION OF PROVINCE
Aydın	736.465	989.862
Balıkesir	825.980	1.152.323
Denizli	778.209	931.823
Hatay	1164.243	1.480.571
Malatya	419.959	757.930
Manisa	1.089.431	1.379.484
Kahramanmaraş	801.592	1.044.816
Mardin	446.426	764.033
Muğla	564.742	817.503
Tekirdağ	701.640	798.109
Trabzon	593.168	763.714
Şanlıurfa	1.021.382	1.663.371
Van	598.931	1.035.418

Resource: TBB, 2011; TÜİK, 2011

Table 3: Districts established in metropolitan cities

MUNICIPALITY	ESTABLISHED DISTRICT
Aydın	Efeler
Balıkesir	Karesi, Altıeylül
Denizli	Merkezefendi, Pamukkale (Pamukkale district was formed by the participation of new neighborhoods in the Akköy district and the change of name as Pamukkale.)
Hatay	Antakya, Defne, Arsuz, Payas
Manisa	Şehzadeler, Yunusemre
Kahramanmaraş	Dulkadiroğlu, Onikişubat
Mardin	Artuklu
Muğla	Menteşe, Seydikemer

Tekirdağ	Süleymanpaşa, Kapaklı, Ergene
Trabzon	Ortahisar
Şanlıurfa	Eyyübiye, Haliliye, Karaköprü
Van	Tuşba, İpekyolu
Zonguldak	Kilimli, Kozlu

Resource:TUİK, 2016

Table 4: Pre and Post-6360 Total Local Government Units

LOCAL MANAGEMENT UNITS	Pre6360 Total Local Management Units	Established by law number 6360 Total Local Management Units	Removed by Law No. 6360 Total Local Management Units	Post 6360 Total Local Management Units
Metropolitan Municipality	16	14		30
District Municipality of Metropolitan	143	25		519
Province Municipality	65		14	51
District Municipality	749	2	349	416
Town Municipality	1.977		1.635	342
Total Municipality	2.950	41	1.998	1.358
İÖİ	81		30	51
Village	34.395		16.561	17.834
Neighborhood	19.103	17.637		36.740

Resource: Adıgüzel,2012

It is an adequate approach in terms of planning principles to plan the whole provincial area in a larger scale by a single authority to prevent addressing the fragmented pieces of small areas with the authority stipulated by the Law No. 6360 (Keles, 2013). Based on the perspective of spatial planning, it must be stated that the abovementioned regulation was more adequate in designation of metropolitan municipalities when compared to the previous method, which was not based on any research or assessment and introduced by the "compass rule," although it could be

argued that the provincial borders were designated by the civil structure approach, which is a separate administrative organization.

However, this should not mean that the provincial borders were the most appropriate planning area limits. Because, as mentioned above, the network of associations for certain metropolitan cities extends to the global scale, while for others it might be limited with the settlements within the provincial borders. The amendments in the law no. 6360 should not be considered only within the context of plan hierarchy. Relations between the institutions that would lay out the plans should also be examined within the scope of this law.

"The number of public institutions and organizations with planning authority rapidly increased between late 1980s and the 1990s. Today, a total of 19 public organizations and institutions, 14 of which were central organizations, possess the planning authority in areas related to their fields of interest and the number of spatial plans conducted by these organizations was 61."5 This institutional chaos introduced new problems based on the planning borders as defined by Law No. 6360. Based on the current legislation, the provincial level upper-scale plans could be listed as follows: 1) Regional Plans prepared by the Ministry of Development and Development Agencies; 2) Environmental Plans that cover multiple provinces and laid out by the Ministry of Environment and Urban Planning; 3) Provincial Environment Plans 4) 1 / 25.000 scale master plans prepared by metropolitan municipalities (Ersoy, 2013).

The new regulation could lead to problems in NUTS 2 levels, especially those including one or more metropolitan areas. Thus, the upper scale plans that would be prepared by the Development Agencies, the Environmental Plans that would be prepared by the Ministry of Environment and Urban Planning at the regional level and the 1 / 25.000 scale master plans that would be prepared by the metropolitan municipalities in the provincial scale should be prepared with different content and form – if they would not repeat the same content. These differences should be designed to prevent intermingling with each other's jurisdiction in both scale and planning approach, content, presentation techniques, etc. If not, jurisdiction and authority conflicts would arise and documents that include different planning decisions for the same land would emerge and serious problems would be encountered in practice (Ersoy, 2013).

Another problem that could arise in the same field is related to the Provincial Environment Plans. The related article stated that "the provincial environment plan is laid out or third parties are delegated to lay it out by the metropolitan municipalities where the metropolitan municipality borders are the provincial

borders and approved directly by the municipal council". With the new regulation introduced by the law no. 6360, all metropolitan municipalities now had the duty and authority to lay out provincial environmental plans for the province. However, considering that the Provincial Environment Plans are prepared on a higher scale than the metropolitan municipal master plan in line with the principle of hierarchy, further debate on the law could be expected.

The other problem was the confusion and ambiguity between plans defined as subscale and upper scale plans. Because, since the distinction between these two types of plans was not clear in terms of legislation or planning applications, metropolitan municipalities could lay out both the provincial environmental plan and the master plans for the same area with the same approach. Similarly, if the conventional attitude is maintained in the environment plans prepared by the Ministry of Environment and Urban Planning for the same area, multiple and similar type of plans would be produced for the same area. If different planning decisions are made for the same areas in these plans, the problems could become even more intractable. Thus, the qualifications and content of the plan types should be clearly defined with close cooperation between the relevant institutions with the authority to lay out plans at the provincial level.

In conclusion, with the recent legislation, the alienation of the people to the administration and politics would increase further and the democratization trend, which was already insufficient in the field of planning, would be reversed. Then, how the current situation is reflected on the case of Trabzon? In this context, it would be beneficial to review the History of Spatial Planning in Trabzon first.

3. A Historical Review Of Spatial Planning In Trabzon Province

The initial Trabzon urban plan was the "Lambert Plan" constructed in 1937 by the French architect-urbanist Jacques H. Lambert and enacted in 1938. The main decisions of the Lambert Plan were to construct the Maraş Street as the main street and commercial axis in the east-west direction in order to remedy the fragmentation in the city's business and service elements, to build the New Road that would connect the neighborhoods in the east-west direction in the south, and to organize new settlements in the west as garden houses and to construct green channels that would increase the air flow from the sea.

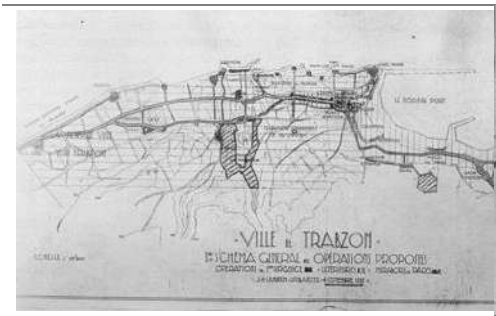
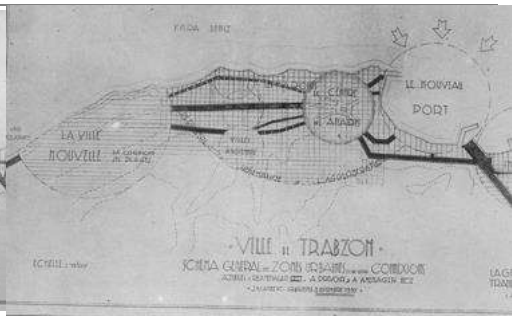
Ortahisar transit route proposed in the 1938 Lambert plan.	Sketches of the plan laid out by Lambert in 1938 for Trabzon.
	
Resource: Sağlam, 1995	Resource: Sağlam, 1995

Figure 1: Lambert's plans for Trabzon

On the target year of the plan, it was observed that the valleys that Lambert envisioned as air channels were full of illegal buildings, the coastal road was implemented as a state highway in contrast with Lambert's vision, and the roads that he proposed to flow towards the sea became unattainable dreams (Gür, 2016). Thirty years later, Irfan Bayhan, Hüseyin Kaptan and Emre Aysu team won the national competition organized by Provincial Bank in 1967-68. The master plan, which was enacted on 24.07.1970, was planned on an area of 725 hectares that covered the land between Karadeniz Technical University and Ayasofya Quarter, in 1985, it was targeted for a population of 140,000 and a linear development was assumed.

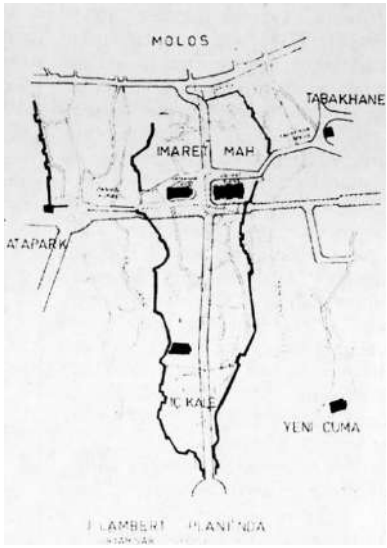


Figure 2: The plan that won the competition organized by the Provincial Bank and enacted with the 1970 master plan (Bahçecik Underground Pass) (Sağlam, 1995)

The still debated Tangent Road, which would change the fate of the city of Trabzon, was proposed in this plan. This road that was planned to feed the southern artery of the city and distribute the traffic to the villages was then divided the city into two parts, failed to solve the problem of transportation, on the contrary, increased accidents and disrupted pedestrians after its construction. In this time period, Trabzon local government included Toklu and Besirli Villages within the boundaries of the master plan in 04.05.1977 and 80 hectares of land was added and the planned total area reached 805 hectares. An additional and revised master plan was prepared on 09.05.1984 and the plan was extended to include Söğütlü Village in the west and Yomra District in the east. An additional 570 hectares were planned and the total planned area reached 1375 hectares. Development areas were limited to Akçaabat district in the west, Yomra district in the east and Pulmonary Diseases Hospital in the south. Thus, the 1969 master plan was revised in 1975, 1977 and 1984, and the plan boundaries were gradually extended on the east and the west (Gür, 2016).

While the 1984 plan was in force, the zoning legislation no. 3194, which went into effect by publication in the Official Gazette dated 22.05.1985, accelerated the planning procedures in the municipalities due to the newly established

zoning/planning groups in the municipalities with the transfer of planning authority from the central to the local government. In 1987, additional-revision master plan studies were initiated by Trabzon Municipality. The master plan designed by master architect Bülent Berksan was approved and entered into force in 1989. With this plan, a new development area of 1700 hectares was added to the previously planned areas. This plan targeted the year 2005 and it estimated the target year population as 265,000 and a total of 4000 hectares was considered in the plan. The plan kept the Tangent Road, a second Tangent Road (Corniche Road) was added and small business industrial areas were planned on the road to Erzurum. Kaşüstü, Yalıncak, Pelitli, Akyazı, Çukurcayır counties were determined as areas of development. However, the administrative borders of the municipalities were amended, and these planned areas, which were included in 1989 master plan and planned as approximately 1600 hectares, became the responsibility of the county municipalities (Keskinsoy, 2013).

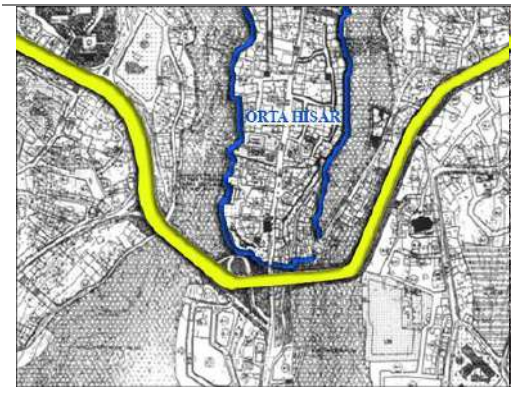
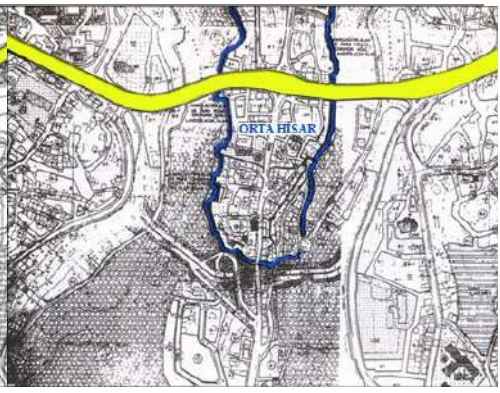
Ortahisar level crossing approved with the zoning modification in 1986.	**Ortahisar viaduct crossing approved with the zoning modification in 1991.**
	
Resource: (Sağlam, 1995)	Resource: (Sağlam, 1995)

Figure 3: In 1986, the zoning regulation for Trabzon

In the years following the 1989 revised master plan, approximately 50 improvement and 1800 modification master plans were laid out, and it was observed that the plan mostly lost its function and "Trabzon New Revised Master Plan" was designed. The new master plan that was approved by the decision of the municipal council dated 25.12.2002 was designed by urban planner Rahmi Bıyık. This plan, approved by the Municipal Council decision dated 25.12.2002 and no. 165, received 3750 objections during the public display period and these objections were discussed

in the municipal council and decisions were made on these issues. However, the new revised master plan aimed to create an urban identity in Trabzon City Center, to plan valley areas that were located in the center of Trabzon due to its natural structure and which included partial constructions as public green spaces and the status of these areas was determined as special planning areas in certain sections. The plan clearly reflected an order where the building density that started from the coast decreased towards the south. Destroyed coastal zone was organized as a recreational coastal zone within the scope of the new coastal road project and included a marina, fishermen shelters, highway crossing, large parks, sports and fair fields (Zorlu, Aydıntan, Engin, 2010). Within this plan, the project of the Southern Ring Road Project, a project developed by the central government, and the sections that passed through the borders of Trabzon Municipality were integrated with the plan. Later, Kisarna, Lirechhane, Beştaş, Çilekçi and Çamoba Villages were included in the Trabzon municipality urban contiguous area, and the total area of the municipality reached a total of 3878 hectares that included 2678 hectares of municipality, 1211 hectares of urban contiguous areas.

As mentioned above, it could be clearly observed that no constructive solutions were produced for the preservation of the historical skyline and natural and cultural riches of the city in the planning history of Trabzon. The planning decisions taken in the three main periods resulted in the loss of the urban identity. Based on the structural, functional changes in the responsibilities of the local governments, the main question that should be asked after 2012 is how the Trabzon action plan would change with the Law No. 6360. Because, several plan-based decisions taken by the local and central governments did not achieve positive results.

4.Analysis Of The Impact Of Law No 6360 On Spatial Planning In The City Of Trabzon Planning Process

As a developing country, perhaps zoning and planning issues are one of the most important problems in Turkish cities. There are several public institutions and organizations authorized for zone planning in Turkey. Today, a total of 19 public institutions, 14 of which are central, have the authority to make plans in areas related to their interests and the number of such plans is 61.

Table 5: The size of the municipalities in the district of Ortahisar

District	Municipalities	Area (ha)
Ortahisar	Akoluk	37,2569
	Akyazı	632,7849
	Çağlayan	162,238
	Çukurçayır	550,4480
	Gürbulak	222,2659
	Kutlugün	297,6599
	Ortahisar	**2321,818**
	Pelitli	302,5618
	Yalıncak	418,2883
	Yeşilova	232,1735

Resource:

Table 8: Current master plan for the urban center

TYPE OF USE	AREA(ha)	RATE(%)	TYPE OF USE	AREA(ha)	RATE(%)
Area to be Forested	81,39213	3,505535	Middle School Area	40,5801	1,747773
Fuel and Service Station Area	4,731749	0,203795	Hotel Area	1,4532	0,062589
Kindergarten Area	0,341589	0,014712	Special Education Area	1,0389	0,044745
Military Area	31,2645	1,346553	Park	339,9643	14,64216
Fisher shelter	6,295092	0,271128	Passive Green Area	58,3692	2,513944
Municipal Service Area	7,24945	0,312232	Market Area	0,4792	0,020639
Bike Road	0,431129	0,018569	Recreation Area	22,2433	0,958012
Mosque	17,54788	0,755782	Health Facility Area	13,9355	0,600198
Children's Garden and Playground	0,187809	0,008089	Social Facility Area	11,901	0,512573
Fair, Fair and Festival Area	20,11263	0,866245	Water Surface	34,7911	1,498442
Development Residential Area	506,8232	21,82872	Agricultural Qualified Field	191,126	8,23174
Public Parking Area	1,969	0,084804	Technical Infrastructure Area	4,1068	0,176879

Daily Facility Area	4,6473	0,200158	Technology Development Zone	1,7616	0,075872
Airport / Airport	66,1589	2,849444	Registered Memorial Building	0,9725	0,041885
Helicopter Landing Area	0,6551	0,028215	Registered Parcel	2,7679	0,119213
Administrative Service Area	30,2705	1,303741	Trade Area	133,286	5,740588
Primary School Area	32,4717	1,398546	Commercial-Residential Area	0,8547	0,036812
Indoor Sports Facility Area	47,2019	2,032972	Trade-Tourism Area	0,2024	0,008717
Highway Road Border Protection Zone	1,9824	0,085381	Collective Workplaces	6,0324	0,259814
Urban Design Project Limit	7,7905	0,335535	Transformer Field	1,5734	0,067766
Coastal Protection Structures	71,0848	3,061601	Built-in Residential Area	335,1849	14,43631
Container Port	44,6344	1,92239	Dormitory Area	0,7505	0,032324
Small Industrial Area	0,0631	0,002718	Higher Education Area	130,5779	5,623951
Square	2,5582	0,110181			
TOTAL				**2321,818**	**100**

Resource: https://www.nufusu.com/ilceleri/trabzon-ilceleri-nufusu

The new law stipulated that the construction of the Trabzon province master plan is under the authority of the metropolitan municipality. Implementer development plans will be constructed by the district municipalities but all supervisory authority will remain with the metropolitan municipality. Thus, the implementation plan constructed by the district municipality based on the needs and desires of the district inhabitants could be annulled if it did not comply with the outputs of the metropolitan master plan. Although it was claimed that the law would emphasize localization at first, it is obvious that in reality it strengthens centralization. As a matter of fact, Keles (2012), criticizing the urban planning method introduced by the Law No. 6360, stated that this method did not contribute to the elimination of the disagreements between the two levels and at the same time argued that it did not comply with the principle of autonomy that the metropolitan municipalities should possess as a local government units.

Another issue that was introduced with the changes was about the Environmental Plan. What would be the distinction between the environmental plant that was left to the responsibility of the metropolitan municipalities and the regional plan that would be prepared by the development agencies? For example, how the environmental plan for Trabzon province that would be constructed by the metropolitan municipality and the regional plan designed by the Eastern Black Sea Development Agency will be integrated? Furthermore, the mentioned regional plans cover only one province for İzmir, İstanbul and Ankara and there are several provinces in the region plans like the one that includes the Trabzon province. When it is considered that each province would have an environment plan designed by the metropolitan municipalities, the dimension of the probable conflicts could be perceived.

Another problem is that there will be more than one plan for the same region. Even in the case of the present planning theory, the distinction between 1/25000 environment plan and 1/5000 master plan could not be clearly made especially for developing cities like Trabzon. Furthermore, when the environment plans that would be constructed by the Ministry of Environment and Urban Planning are considered, there would be 3 similar plans designed for Trabzon city at the same time. When the decisions included in these plans would differ for the same area, coordination between the institutions could completely disappear. Thus, the Metropolitan Municipality of Trabzon would need to coordinate with both the development agency and the Ministry of Environment and Urban Planning.

Centralizing all planning authority at the metropolitan municipality would lead to practical problems in cities with a high rural population like Trabzon. It is also a question mark that how efficient the implementation of local government would be in the case of a district located 150-200 km away from the city center of Trabzon when the authority to lay out both upper and sub-scale plans is centralized in the metropolitan municipality.

Table 6 Distances between the city center and districts in Trabzon province

DİSTRİCT	NUMBER OF VILLAGE (Closed And Dıstrıct Rural Vıllage)	NUMBER OF NEİGHBOR HOODS	POPULATION 2016	DISTANCE TO PROVINCE CENTER
AKÇAABAT	50	73	119.463	16 KM
ARSİN	20	35	27.712	22 KM
ARAKLI	42	50	47.334	34 KM
BEŞİKDÜZÜ	25	35	21.666	50 KM
ÇARŞIBAŞI	17	23	15.149	36 KM
ÇAYKARA	28	32	12.672	77 KM
DERNEKPAZARI	10	14	3.550	71 KM
DÜZKÖY	7	16	14.059	37 KM
HAYRAT	18	32	6.923	68 KM
KÖPRÜBAŞI	4	8	4.444	58 KM
MAÇKA	56	62	23.357	30 KM
OF	52	68	40.914	53 KM
ORTAHİSAR	39	85	327.701	0 KM
SÜRMENE	25	37	25.833	40 KM
ŞALPAZARI	23	30	10.978	67 KM
TONYA	15	21	14.471	66 KM
VAKFIKEBİR	34	44	26.788	46 KM
YOMRA	17	24	36.365	14 KM

Resource: https://www.nufusu.com/ilceleri/trabzon-ilceleri-nufusu

Another footnote in the law was on rural areas, which is of great significance for the rural areas that make up the natural and cultural structure of Trabzon. The related article stated that "The said authority includes the support that would be provided by metropolitan municipality when district municipalities demand about the design or delegating the design of 'typical architecture' projects that comply with the regional architectural characteristics for non-commercial buildings in villages that were converted into neighborhoods by the district municipalities, the construction maintenance and repair of shrines, the evacuation and demolition of the buildings with a risk of disaster and endanger safety of life and property." Considering that examination the past of type projects would not reveal positive outcomes, it is not clear whether a district municipality that is bound by the metropolitan plan scale would be able to make right decisions. If a rural scale problem is resolved using urban scale solutions, it is obvious that deteriorations not only in urban center

identity, but also in the rural identity and natural culture of Trabzon would be observed in the following years.

5.Conclusion

In conclusion, this change, which would lead to a radical change in the administrative structure in Turkey, would also have important implications for spatial planning. All planning powers in the province would be centralized in a single authority, namely the metropolitan municipalities with the latest legislation. Primarily, it could be considered that, in terms of planning principles, it is an appropriate approach to prevent fragmentation of small sections by providing a single planning authority such as the authority provided by the law no. 6360 for upper scale plans. However, this should not mean that the provincial boundaries are the most appropriate definition for planning purposes. This scope, which could be considered as narrow for settlements with a relation network that goes beyond the national borders, would be extremely wide for certain provinces. This is obvious in the scale of the province of Trabzon. The existing institutional chaos in the planning field would introduce new problems considering the planning boundaries defined by the Law No. 6360. With the new regulation, a confusion is experienced in terms of the upper scale plans for regions that include more than one provinces including the only metropolitan province in NUTS 2 level and the province of Trabzon.

When all planning scales, authority boundaries and overlaps are set aside, it could be observed that a fundamental problem had surfaced. This problem is about the representation and participation in the spatial planning process. In the study, the number of abolished counties and villages were presented in tables. The figures actually demonstrated how the concept of participation in planning was weakened. Planning decisions will be made entirely by the central authority, not by the local inhabitants. When it is considered that the planning process was prioritized rather than the outcome in planning particularly in European cities, the consistency of the centralization in Turkey should be discussed. Thus, it could be observed that the new regulation is far behind the previous structure.

In conclusion, the recent legislation increased the alienation of the people with the government and politics and reversed the democratization trend, which was already inadequate in the field of planning. It is unfortunate that the presence of for example “green roads” in highlands, and hotels in archeological sites would not be unbelievable in a city where locality is revered by the people and several rural areas and urban center are full of historical buildings with cultural values.

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FURNITURE DESIGNS THAT CAN BE USED IN RECREATIONAL ACTIVITIES, AN ASSESSMENT ABOUT THE RECREATION COURSE OUTCOMES

Assoc. Prof. Emine TARAKCİ EREN[1]

INTRODUCTION

The recreation concept is studied by researchers from many professional groups. Each professional group should obtain information about the studies carried out in terms of other professions, while determining an approach in their own context. Looking at the fields of postgraduate studies that contain the concept of recreation in Türkiye, it has been studied by researchers from many professions such as tourism, sociology, sports, business, performing and visual arts, psychology, public administration, geography, folklore, physiotherapy and rehabilitation, public health, gastronomy, ballet dance and landscape architecture. It shows that the recreation concept is a multifaceted concept that contains many unknowns, is very suitable for different perspectives, and has profoundness. Looking at the dictionary meaning of recreation, it is defined as leisure activities that people participate voluntarily for entertainment and sports. Concepts such as leisure, entertainment, sports activities, and volunteering emerge with this definition. Thorstein stated that the concept of leisure can also be expressed as consumption without production over time (Can, 2015). When evaluated in general, it is the time left from the hustle and bustle of work and daily life. Nowadays, this concept is studied by many researchers as a result of the increasing importance and at the same time, many courses related to recreation are opened and taught in undergraduate and graduate education. In this study, students were asked to design furniture that can be used in open, closed, or semi-open spaces in line with the knowledge they gained about recreation during the 8th semester of the Recreation Areas course given in Afyon Kocatepe University Department of Interior Architecture and Environmental Design. The design process has conducted by receiving critiques from the lecturer. Giving information about which users will use this furniture in which recreational activities, they also prepared technical drawings (plans, sections, views, three-dimensional views) of the furniture. Some of these studies are considered as the

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final exam of the end-of-term course, have been examined in the context of this study.

People are very tired and worn out in today's busy business and city life. This situation affects both physical and mental health of people negatively. In addition, factors such as the decrease in working hours, the widespread use of transportation and communication systems and social media, especially thanks to technological developments, have made people engage in recreational activities and make it a part of their lives (Gunter, 1987; Köktaş 2004; Yılmaz 2004; Can, 2015).

Recreational activities are very rich and diverse in content. Recreational activities can be grouped under general headings such as games, artistic activities, musical pursuits, activities that require skill, sport activities, nature activities, social and cultural activities (Table 1).

Table1. Some recreational action categories (Simonds, 1983)

Recreational Activity Categories	**Activity groups**	**Activity samples**
Physical Recreation Activities		
Open spaces	Freelance and solo activities	Jumping, leaping, climbing, swimming, walking, etc.
	Organized activities	Volleyball, basketball, tennis etc.
	Lawn-related activities	Cricket, golf, lawn bowling etc.
	Lawn-related organized activities	Baseball, rugby, football, etc.
Indoor	Solo activities	Basketball, handball, squash etc.
	Organized sport activities	Basketball, bowling, tennis, wrestling, gymnastics, etc.
Social Recreation Activities		
Open spaces	Participatory activities	Picnic, dancing, fair, flea market, bazaar outing, etc.
	Audience activities	Sports watching, listening to music, watching, etc.
Indoor	Participatory activities	Board games, art shows, etc.
	Audience activities	Sports, television, movie watching, etc.

Five basic stages of recreational activities are essential in studies aimed at determining both user preferences and satisfaction of uses in recreational areas. These stages are decision-making and preparation for action, departure, action,

retrospect, relief effect of action and recreation impressions. According to many planners, all of these five phases have an effect on the user's sense of preference and satisfaction although only the recreational action phase is important (Gold, 1980).

Providing the quality phenomenon and classifying leisure time activities are of great benefit in the design of recreational areas. The important thing is to know what the user expects from the recreation area and what level of resource and usage quality they want. In this case, a correct classification can be made, and the desired quality can be created in the recreational area (Uzun and Altunkasa, 1991).

Classifications can be made in four basic categories. These are physical, social, mental, and environmental based recreational activities. The potential and requirements of the users and the functionality of the uses gain importance in recreational areas. For this purpose, the basic determinants of to be planned a recreational area should be revealed firstly. These are what will be the main function or basic use in the recreation area, who will use the area more, which level of usage intensity and development capacity will be, how should be the organization in the design, which level the relationship and proximity between uses should be kept.

The recreation concept, as a social institution and a set of activities that help people to create a balance and rhythm in their lives, can be expressed as a tool having the feature of meeting needs and is adopted as valuable within its own framework apart from work (Karakuş and Akgül, 2016; Şenel, 2021). At this point, other factors affecting recreation are the user, the space, the equipment in the space, and the purpose of the activity. Recreation is categorized according to all these factors. It is possible to classify recreation according to active or passive participation, indoor or outdoor (open areas in the city and open areas outside the city), its purpose, public, commercial, private, voluntary, therapy, school, private membership, cultural, social relations, sports, tourism and artistic purposes (Bucher, 1972; Mansuroğlu, 2002; Mull et al., 1997; Özbey and Çelebi, 2003; Pehlivanoğlu, 1986; Yılmaz, 2015; Özkan et al., 2017; Alpak et al., 2020; Düzenli, 2012). Apart from these, it is also possible to classify as open space recreation, tourism recreation, health recreation, park recreation, recreational sports management, campus recreation, therapeutic recreation, workplace recreation and hospital recreation according to the place and purpose of its activities (Ardahan and Lapa, 2011).

In this study, while choosing from the furniture designed by the students, it has been asked to pay attention to the fact that there are users of all ages, in all kinds of spaces, both active and passive recreational activities, and furniture that

can be used in all different recreational activities such as voluntary, therapy, sports, art. The designers were also asked to clearly define these activities, the users, and specify which leisure time, which activities and recreational activities they will be used in.

MATERIAL and METHOD

The material of this research consists of the visuals of the furniture designs produced in the Recreation Areas course given in the Department of Interior Architecture and Environmental Design in Afyon Kocatepe University.

RESULTS

In the first design, the user is determined as a child. She designed a playhouse can be used in recreational activities by children. Organic form was used in playground design. Hollows in the door and window were made by using organic form on the playhouse wall surface. At the same time, a climbing wall was built on both sides of the playhouse. Playhouse design was created in many different ways as a result of cutting the different surfaces of the box shape. Many different versions were created, not adhering to a single shape in the playhouse design. A playhouse design was created for the children where they can have fun, interact actively with the outdoors, and play comfortably (Figure 1).

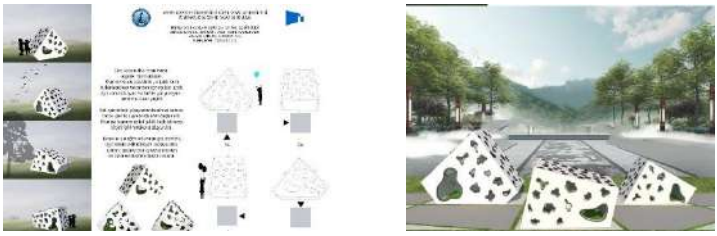

Figure 1. First furniture, Designer: Kübra Ezer

An open-air public library with a rich collection of books in open spaces in green and fresh air was designed for another recreational activity for reading books. Reading books contributes to the physical, psychological, and personal development of people besides being a recreational activity. It has been stated in previous studies that reading has an important in the continuation of learning outside of school with lifelong personal education and in the development of the intellectual side of the individual. Reading is “the process of constructing meaning as a result of the interaction between written and unwritten sources, the reader and the environment” (Akyol, 1997). Books appeal to all emotions of human besides to providing information (Balat, 2002). Reading is important for

everyone in coping with new information in the changing world of technology. The importance and necessity of this will continue to increase with every passing year. However, the number of people who can read but do not read adequately is increasing (Sangkaeo,1999). At this point, there is a need for such recreational furniture and different open or semi-open spaces where this furniture is used in order to make reading popular. In this design, a furniture is designed, can be used in open spaces, unlike conventional reading spaces (Figure 2).

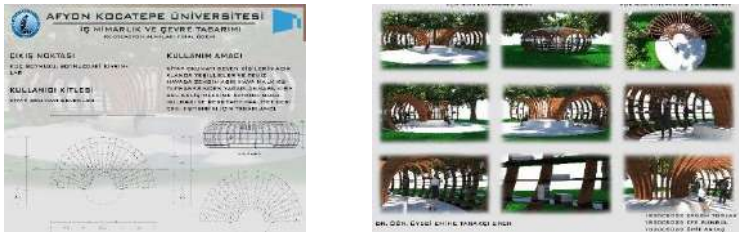

Figure 2. Second furniture, Designers: Erdem Torlak, Efe Sümbül, Ümit Aktaş

The third furniture is designed for meditation activity. In this design, there are activities that can be done with meditation and applications that are thought to be used together in. These are meditation capsules, walking path, bicycle path, sitting areas. The coexistence of these functions in an area creates alternative options for the user. At the same time, they are activities related to meditation as they have healthy effects on both mind and body (Figure 3).

Figure 3. Third furniture, Designer: Beste Öztürk

Fourth furniture is the amphitheatre seating steps. This furniture was designed as a furniture to watch the view for the Lovers Hill in Istanbul. In other words, it

is thought for recreational activities such as cruising and resting. At the same time, it will be possible to sell food and beverages with a buffet under this furniture. Thanks to this furniture, it is planned that the people come here will do many recreational activities together (Figure 4).

Figure 4. Fourth furniture, Designers: Şühedanur Sarımert, Damla Öztürk, Sema Ersöz

The fifth design is designed to be used in recreational activities in urban areas and also in playgrounds that can be used for outdoor recreation. The designed furniture is aimed to be in colours and shapes that will attract children's attention and appeal to them. The furniture which functions as a swing for children with its revolving mechanism and contains many kinds of books on the shelves, is ergonomically designed with materials and dimensions suitable for children. The ceiling part of the furniture is made of coloured plexy material, the body part and shelves are wooden, and the different sizes platform floor is made of plasterboard, and white lighting is used on the ceiling and shelves of the furniture (Figure 5).

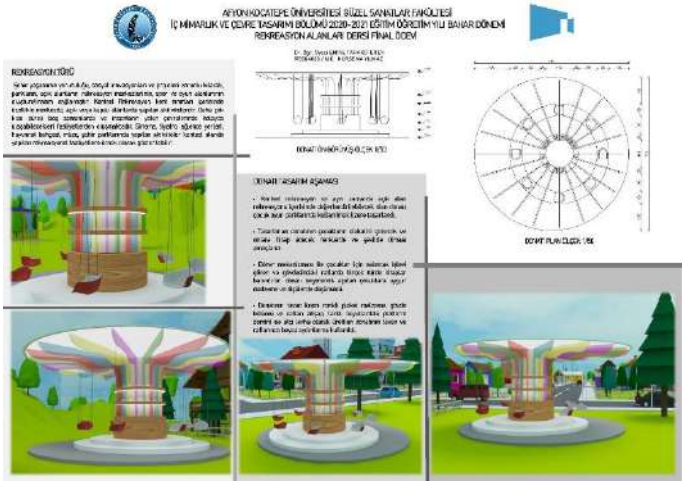

Figure 5. Fifth furniture, Designer: Nursema Yılmaz

Another design is the sixth furniture for meditative activities. Meditative recreation area is a space that combines activities do not contain intense movement and noise such as rest, lying, meditation, and yoga. Users will use this furniture for mental and physical relaxation in areas where people are not intense in parks and coastal areas. Furniture that can be used by 5-6 people at the same time without disturbing each other; there will be a hammock rope net in the sitting /lying area, and portable yoga blocks as an auxiliary material during the activity in the yoga area. This recreational activity is active recreation. Participants are active spiritually, physically, and mentally. It is urban and rural recreation according to local classification. While it is easily and quickly accessible in the city center, it can be also used in rural areas. It is an open space recreation spatially. There is land use, and it can be preferred to be commune with nature/sea. It is individual and group recreation according to the number of participants. While the yoga and meditation area allow individuals to spend time alone, the relaxation area allows 2-3 people to be together. Functionally, it is mental and social recreation. While individuals can concentrate on learning and mind, they can socialize according to the situation. In temporal aspect, it is daily recreation. It provides a short time to get away from various stressful moments during the day and to relax (Figure 6).

Figure 6. Sixth furniture, Designer: Meryem Elif Altınışık

The seventh furniture is a complex designed furniture. It hosted recreational activities as sitting, sky watching, cycling track and park, walking. Spatially, it includes seating areas, skywalk, bicycle route and park, passages, walking route, play of light, green area, and ornamental pools. This furniture has been designed with an understanding that shows continuity in terms of its design feature. In other words, while it contains spatial connection, it also provides continuity in terms of activity by hosting a series of activities in the context of recreational activities. In this respect, it differs from other furniture (Figure 7).

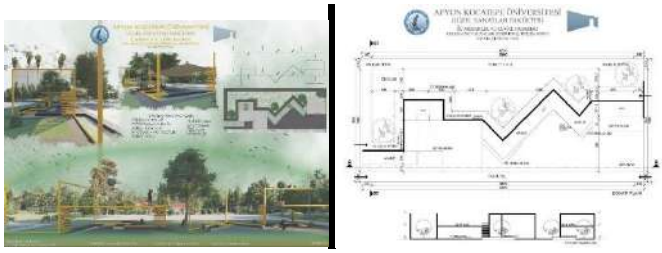

Figure 7. Seventh furniture, Designers: Emine Karaaslan, Gülşah Karataş, İsmail Yılmaz

Based on the concept of dynamism, the eighth furniture has been given attention to be dynamic both in terms of design, use and user. For example, when choosing the material of the furniture, several different materials and equipment were chosen, thus eliminating the monotony. It has been ensured that the furniture can be used at different heights and in different directions from the heights, thus providing dynamism again. The designed furniture will be evaluated in public urban open green areas. As a user group, it is organized in suitable sizes for all ages users to use it comfortably. Recreational activities that can be done while using this furniture are swinging, reading, picnicking, walking, cycling, and watching. The furniture can be easily used in waterside recreation areas, green areas, or open areas. It can be easily evaluated in both urban and rural recreation areas (Figure 8).

Figure 8. Eighth furniture, Designer: Ayşenur Yüce

The furniture seen in Figure 9 is designed as both walking and sitting-resting areas for users. Circle-formed seating areas have been designed to sit comfortably while doing sports. While the furniture shows continuity, it functions as a cover element at some points. The sitting activity can be carried out as a group or individual recreational activity in it.

Figure 9. Ninth furniture, Designer: Ayşenur Yüce

The designers gave importance to aesthetic features as well as being functional in this furniture. They have designed a seating element in a fit and form suitable for many open spaces. Inspired by the dense building pattern in urban areas, it has been made aesthetic by using mass form and adding water and green elements. It has been thought to appeal to all age's users and segments, including disabled, old, young, adults and children as the user group, inspired by the diversity of the demographic characteristics of the city users (Figure 10).

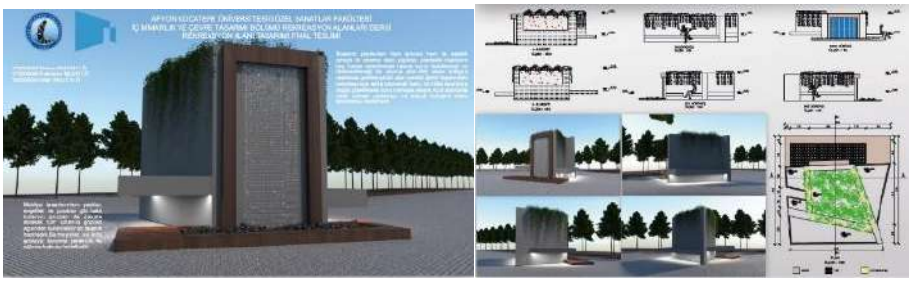

Figure 10. Tenth furniture, Designers:
Merve Dikmen, Fatma Nur İşler, Hilal Yavuz

Last furniture was designed for the activities such as storage, lighting, parking, sitting for all users of sports facilities such as jogging, cycling, and using the sports courts for other purposes (Figure 11).

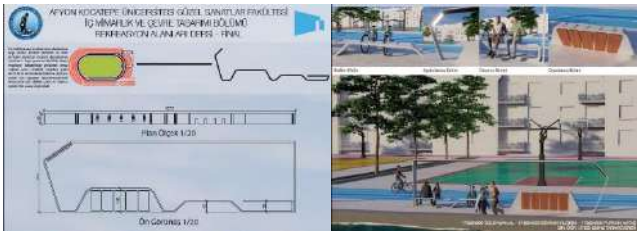

Figure 11. Tenth furniture, Designers: Süleyman Al, Devran Yıldırım, Furkan Aktaş

CONCLUSION

There are some reasons that increase or decrease the society' demands for recreational activities (Çorbacı et al., 2020). The reasons that increase the demand for many recreational activities are called positive factors, while the factors that decrease it are called negative factors (Gold, 1980). Some of the positive factors are population, shortening of working hours, ease of transportation, increase in income level, increase in education and culture level, health and environmental conditions, urbanization, mass media, credit facilities, technology and automation, social standing, environmental quality of cities, environmental stress, early retirement , weekend and summer holidays, traditions and habits, while the negative factors are reluctance and disregard, insufficient income level, religious attitudes, generation gap, lack of opportunity and time, pollution, traditionalism, lack of energy, natural hazards or disasters, second job, promotion lack of advertisements, programs and organizations (Demirel et al., 2005; Surat 2009; Yılmaz et al., 2009; Özdemir and Demirel 2014; Karaşah and Sarı 2015; Işık and Demirel, 2016; Karaşah, 2017; Kahveci and Hergül 2019; Sarı 2019; Kahveci et al., 2021; Kurdoğlu and Konakoğlu 2018; Karaşah and Aşık, 2021; Seyhan and Kurdoğlu 2022).

Considering all these factors, the designers considered the positive effects of the positive factors and the negative effects of the negative factors on the furniture designs. An application was made in the light of all the information transferred as the content of Recreation Areas Course given in the 8th semester of Afyon Kocatepe University Department of Interior Architecture and Environmental Design, the concept of recreation and recreational activity was made more active by the students' participation. It was ensured that this information they learned became more permanent in their minds. Learning is also defined as 'the development of behaviours that change the way an individual adapts to their environment through their own reactions, activities and experiences, or differentiation of their behaviours' (Ülkü 1981; Sünbül, 2011). One of the things that needs to be done to convey student success is to provide timely and effective feedback, and to ensure that information is repeated through appropriate

homework. While designing the furniture, it was ensured that they used the environment as a source for learning, when necessary, by considering the appropriate environments. Thus, it was aimed to teach the student as well as the teaching the course. The problem of failure and inefficiency that may occur in learning has been also eliminated in this way. In the same way, the students as the learners had to make a constant effort to work and create something. Considering that the students are willing to learn and acquire the necessary skills for learning by the 8th semester, the success of the course has been inevitable. In the first week, it has been decided together with the students what kind of process and method used in the lesson would be taught and the method to be used to measure the success of the lesson. The principle of relevance, the principle of effectiveness, the principle of participation, the principle of feedback to students was used by incorporating the student's decision at this point.

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