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- To discover the relationship between Architecture, Planning and Design,

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- To discover the relationship of Architecture, Planning and Design with other fields of science that are affected and affect,

- To develop theoretical and methodological foundations of Architecture, Planning and Design,

- To discuss the role of architects, planners and designers today and in the future,

- To compare the differences between architecture, planning and design research, practices and education in different countries,

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CONTENTS

Developing Social Sustainability Criteria and Indicators in Urban Planning: A Holistic and Integrated Perspective

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Abstract

One of the main reasons for today's urban problems is the disregarding of social sustainability in urban interventions and the lack of an approach that evaluates social sustainability with all its issues as a universal and holistic one. In this context, the aim of this study is to determine and categorize social sustainability criteria, objectives, and indicators to measure and to assess social sustainability for ensuring the sustainability of cities that could be used in all urban areas and applied in urban planning. Within this scope, social sustainability criteria, objectives, and indicators identified by international organizations and academic/scientific studies on different scales and in urban areas were evaluated systematically and analytically. A matrix has been generated according to the frequency of occurrence of social sustainability criteria and indicators. Although research studies focus on criteria and indicators according to scale, subject, and specified matters. It is a necessity to identify social sustainability criteria and indicators that can be used on every scale and in every urban area. Accordingly, ten criteria have been determined: population, accessibility, education and skills, health, housing, security, belonging, participation, social capital and social cohesion, urban life quality, satisfaction, and adequacy of services. Based on the criteria, targets, sub-targets, indicators, and indicator definitions for each criterion have been identified. However, the significance of each criterion is addressed, as well as the reasons for their necessity for social sustainability. This study proposes a universal, detailed, and holistic perspective for the measurement and assessment of social sustainability that enables the use of both quantitative and qualitative data together and envisages the use of mixed techniques in obtaining and evaluating data. In addition, criteria and indicator systems will be able to guide practitioners and policymakers to make decisions related to the social structure before and after the implementation of urban projects.

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INTRODUCTION

In the process of change and transformation of cities, the concept of sustainability is being integrated into many fields due to human interventions in all systems, including cities. The sustainability concept in the context of finding solutions to universal problems of the world has become an important issue in many different fields as theoretical and practical principles have developed. Even though the necessity of evaluating the three components of a sustainable society emerged after the 1980s, physical and economic renewal have been concentrated on rehabilitating existing cities to respond to the changing needs of cities (Colantonio and Dixon 2011). By neglecting the social dimension of sustainability in urban interventions, problems such as inequality, inadequacy, and insecurity have occurred in cities, especially in the organization of spaces. However, in an environment where urban interventions are limited due to the physical and economic structure of the cities, there is a necessity to address environmental, economic, and social aspects from a holistic perspective to ensure social sustainability as well as to provide the foundation for creating sustainable cities under changing conditions. In this context, the purpose of this paper is to determine and to categorize the social sustainability criteria, goals, indicators, and its definitions taken into account a holistic approach to ensure the sustainability of cities for measuring and assessing social sustainability that could be applied to urban planning practice.

SOCIAL SUSTAINABILITY IN URBAN PLANNING

Although there is no standard general definition for social sustainability, it is seen that the theoretical framework of the concept varies according to the scale, spatial characteristics, subject matter, and working perspectives studied by the scientists. It is clear that the concept of sustainability has been developed more slowly than other aspects of sustainability because social sustainability is the least interesting dimension of sustainability (Woodcraft, 2011). As a result, the goal of the earliest definitions of social sustainability is to clarify the idea. It is evident that thorough explanations and analyses of the idea have been detailed, particularly since the 2010s.

In the most general sense, social sustainability could be described as "the maintenance and development of the well-being of current and future generations (Chiu, 2003) and the fulfilment of the basic social needs of all societies (Eizenberg and Jabareen, 2017). According to more detailed definitions, social sustainability is referred to an integrated relationship between physical space, humans, and society. Individual activities and the produced environment are discussed, as well as the connections between individual life opportunities and institutional structure (Munzel et al., 2018). Focusing on well-being, maintaining in a similar manner, and developing desirable living spaces and working areas highlight the social aspect of sustainability as a growth target that extends beyond economic understanding (Munzel et al., 2018). Some

approaches focus on equality, diversity, and ensuring welfare when defining social sustainability. Barron and Gauntlett (2002) define socially sustainable societies as having an equitable, diverse, connected, self-governing, and good quality of life. The key concept is expressed as the equal access of all residents to resources and fair opportunities for well-being (Murphy, 2012). Equal access and equality should be provided to all basic services such as health, education, transportation, housing, and recreation (McKenzie, 2004). Social sustainability in urban areas, which is part of the concept of sustainable development with a more comprehensive and large-scale structure, is not based solely on the planning of pastoral public spaces that provide humanistic, anthropical, and environmental quality and promote sociality by creating a holistic and accessible social environment (Goosen and Cilliers, 2020).

Traditional approaches associate social sustainability with issues such as employment, social equality, and justice; softer and less concrete issues such as social cohesion and integration, sense of place, and quality of life are starting to be emphasized in the interpretation as the theoretical infrastructure of the concept development (Yifachel and Hedgcock, 1993). While Polese and Stren (2000) define social sustainability as the development and/or growth of a city that supports an environment that is compatible with the regular development of civil society and that enables culturally and socially different groups to live together, they also provide a more comprehensive definition of social integration as a concept that encourages improvements in quality of life. To ensure social sustainability, Chiu (2003) highlights the need to preserve social cohesion and minimize social polarization and exclusion.

As the concept of social sustainability has begun to be emphasized, the issues shaping the concept have begun to differ. In addition to approaches that evaluate the concept from different perspectives, some approaches evaluate the concept holistically and in a multi-layered way. In this context, social sustainability and concepts such as health, participation, needs, social capital, economy, ecology, and, recently, happiness, which is based on the basic values of equality and democracy, are blended with principles such as well-being and quality of life (Cuthill, 2010). All of these principles (social equality, social inclusion, awareness, and the realization of social capital) are all associated with the concept of urban social sustainability, which emphasizes that social sustainability creates synergy with social acceptability (Bramley and Power, 2009). Similarly, the concept emphasizes social cohesion, the necessity to oppose social exclusion and discrimination, and the encouragement of public participation in public affairs.

In its simplest definition, social sustainability means that the environment and its components provide equivalent, equitable, and fair living circumstances for all members of society. Social sustainability is defined as a system that is based on the fundamental values of equality

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and justice, where population distribution and economic well-being is well- balanced; equal access to basic services such as health, housing, and security are provided, and opportunities for individual/social development; individuals have a sense of belonging to the environment and society in which they reside; public participation in management is encouraged; social capital and social cohesion are arranged, and the quality of life is sufficient.

CRITERIA AND INDICATORS USED IN THE MEASUREMENT AND EVALUATION OF SOCIAL SUSTAINABILITY

There are many different studies and research generated by international organizations and research on measuring and assessing whether social sustainability is achieved and also how it will be achieved. Within the scope of this paper, studies and reports of international organizations, books, scientific articles, and project reports have been examined in the literature review regarding the measurement, evaluation of sustainability, and social sustainability in particular. In this context, previous research to examine the criteria, indicators, and assessment methods used to measure social sustainability has been evaluated and divided into two different groups: the research of scientific and international organizations.

To assess social sustainability criteria and indicators, scientific research was examined through databases terms such as "social dimension of sustainability in urban design," "social sustainability," "issues, criteria, and indicators of social sustainability," and "measuring social sustainability." Studies that are relevant to this article's aim, scope, and objectives have been reviewed and discussed. Fourteen scientific research of varying quality that identifies the key elements of the idea, evaluate the concept with its subsystems and contain implementations in the case studies have been selected from all reviewed ones. It is important to note that researches conducted between 2002 and 2018 have different typologies, both geographically and in scale, as well as in terms of the study subject and evaluation method.

Moreover, 9 articles, 2 project reports, 2 papers, and 1 book were among the 14 studies considered in the in-depth review. And 5 studies were chosen from Europe (3 from the United Kingdom, 1 from Finland, and 1 from Germany), 5 from Asia (China, Hong Kong, Jordan, Israel, and Cyprus), and 4 from Australia. However, the studies were chosen from a variety of scales, including national (1), regional (1), urban (1), district-neighbourhood (7), building scale (1), and unknown scale (3). It is important to point out that 7 studies (Omann and Spangenberg 2002, Baron and Guantlett 2002, McKenzie 2004, Cuthill 2010, Dempsey et al 2011, Khan, 2016, Eizenberg and Yosef Jabareen 2017) focus on social sustainability issues and indicators but do not use social sustainability indicators in the sample areas. In the other 7 studies that used exemplary case studies (Chan&lee 2007, Mak and Peacock 2011, Yung et

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al, 2011, Colantonio &Dixon 2011, Woodcraft, 2012, Abed, 2016, Atanda 2018), social sustainability indicators were constructed and described based on the case study characteristics.

It has been determined that the studies conducted up until 2010 were mostly focused on conveying the conceptual framework of social sustainability and did not include implementation studies. The criteria used to measure social sustainability, as seen in research undertaken between 2000 and 2010 [Omann and Spangenberg (2002), Baron and Guantlett (2002), McKenzie (2004), Chan&Lee (2007), and others] focus on key elements such as meeting basic needs, equality/equal opportunities, diversity, security, justice, well-being, cultural relations, participation, social awareness, and quality of life.

In exemplary case studies, social sustainability criteria and indicators are varied and defined depending on the scale and original characteristics of the area or project. And the studies conducted between 2010 and 2018 [Cuthill (2010), Mak and Peacock (2011), Yung Chan, Xu (2011), Dempsey, Bramley, Power, Brown (2011), Colantonio & Dixon (2011), Woodcraft (2012), Abed (2016), Khan (2016), Eizenberg and Yosef Jabareen (2017), Atanda (2018)] focus on criteria such as basic needs, quality of life, wellbeing, demographic change, employment, access, education and skills, health, safety, housing and environmental health, satisfaction, sense of place, belonging, cultural identity and collective memory, image and heritage, local culture, diversity, social capital, social infrastructure, social justice and equality, social cohesion, social inclusion, societal sustainability, and behavioural changes are all taken into consideration.

According to the examination of these scientific research conducted between 2002 and 2018, it has been seen that equality/justice, accessibility/meeting basic needs, quality of life, well-being, demographic change, employment, education and skills, health, safety, housing and environmental health, satisfaction, sense of place, belonging, cultural identity and collective memory, cultural relations image, and heritage, security, participation, social capital and social cohesion, diversity, social awareness social inclusion have been used as social sustainability criteria. In these examined research studies, it has been seen that interviews with specialists or stakeholders involved in the project and surveys of local residents have been used as data collection methods in the case studies. Meantime, it has been found out that different evaluation methods such as scoring systems, factor analysis, frequency evaluation, and analytic hierarchical processes were used in case studies in the 14 scientific studies examined.

The work of international organizations such as the United Nations (UN), the Organization for Economic Development and Co-operation (OECD), the World Health Organization (WHO), the European Commission (EUROSTAT), and the European Union (EU) has been studied to examine and to evaluate the criteria/issues and indicators used by international organizations to measure social sustainability.

Within this framework, although there are common or similar social sustainability issues used by international organizations, social sustainability indicators vary according to the objectives and policies of the organizations. The UN, the OECD, and the WHO, which work on a national scale, have examined high-scale issues such as equality, health, education, housing, security, population, sufficiency, poverty prevention, and the labour market (UN, 2001; UN 2007; OECD, 2011; WHO, 1999). The European Commission has examined social sustainability at a more local/urban level in its studies (EC, 2003). According to these reports, İt has been observed that they address issues such as employment opportunities, the satisfaction of the local community and citizens, provision/availability of local public spaces, and services, children's journeys to and from school, accessibility to basic services, personal security level, socio-economic development, social inclusion, demographic change, public health, and good governance (UN, 2001; UN 2007; OECD, 200; OECD, 2011; WHO, 1999; EUROSTAT, 2013).

Within the scope of the Sustainable Development Indicators determined by the OECD in 2000, were used to measure the sustainability of the social structure and evaluated on a country scale. The OECD (2011) developed the indicators of social justice to ensure social justice. On the other hand, The WHO (1999) determined the environmental health indicators, including the social aspect of sustainability, on a national scale in its study on sustainable development and healthy environments. To measure the change in the sustainable development indicators between the European Union and member states over the years, the social indicators were examined among the indicators developed by the European Commission in 2003 to measure the local sustainability profile. In addition, separate sustainability indicators have been set for the City of Oslo (EC, 2003).

The criteria and indicators used to measure and evaluate social sustainability vary depending on the study approach, the country's planning system, the scale, planning approaches, whether sample application work has been done, the characteristics of the project area or the implementation area, as well as the data collection method. Although, the indicators used by both academic studies and international organizations to measure social sustainability are different from each other in terms of scale, purpose, policy, and data acquisition methods. It is noted that the social sustainability criteria/subjects are largely similar. In this context, demographics, population, equality, health, education, access, housing, satisfaction, quality, basic services, security, social cohesion, and social inclusion have been identified as common social sustainability issues in both study typologies.

CRITERIA AND INDICATORS SYSTEM FOR MEASURING AND ASSESSING SOCIAL SUSTAINABILITY

The main purpose of this criteria and indicator system is to measure and assess social sustainability. In order to achieve this goal, an

evaluation system to ensure social sustainability by taking a holistic approach to spatial change and development has been developed. In this context, the system defines the basic issues and criteria of social sustainability, the objectives for the provision of social sustainability, and the indicators that enable us to measure and evaluate these goals. The system has been developed to be applicable to all urban areas and at all urban scales. The indicators may vary according to the characteristics, spatial dynamics, and scale of the application area. The system scale and scope to be evaluated have been determined as the district/neighbourhood unit in this study.

The determination of social sustainability criteria and indicators is a part of the more comprehensive research called the model of assessing and measuring social sustainability. This model has an eight-step process. To establish the criteria and indicator system, initially, social sustainability criteria have been determined. And in the second step, social sustainability targets have been established. In the third step, social sustainability indicators, which are the means of measuring social sustainability, have been defined. The methods for obtaining the data that will form the indicators in the implementation area have been defined, and then the methods for evaluating the data have been decided. In the next step, social sustainability is measured by obtaining data from the selected implementation area. And in the last stage, by measuring social sustainability, it has been determined whether social sustainability can be achieved or not, and an interpretation of the results and relations has been made (Figure 1).

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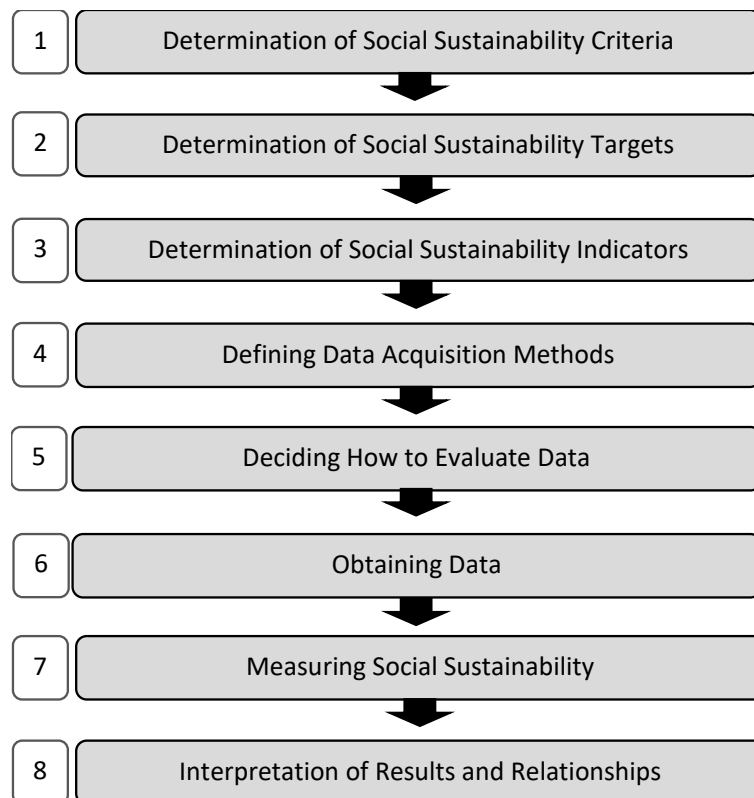
Figure 1. Flowchart for measuring and evaluating the social sustainability.

1	Determination of Social Sustainability Criteria
2	Determination of Social Sustainability Targets
3	Determination of Social Sustainability Indicators
4	Defining Data Acquisition Methods
5	Deciding How to Evaluate Data
6	Obtaining Data
7	Measuring Social Sustainability
8	Interpretation of Results and Relationships

Criteria, Objectives, Indicators, and Indicator Definitions of the Social Sustainability

The criteria have been determined by considering the synthesis of the literature review, which is explained in chapter 3, the environmental and economic dimensions of sustainability, and the intersection of these issues with social sustainability. Each study evaluated in the literature review has been examined according to its criteria, and the criteria and indicators have been synthesized by creating a matrix including all of them. This matrix was utilized for selecting social sustainability criteria and indicators according to the repetition and frequency of the criteria and indicators, taking into consideration the spatial planning system. According to this matrix, the 10 criteria that form the top headings of the proposed/created indicator system for measuring and evaluating social sustainability have been determined as follows: Population, Accessibility, Education aSnd Skills, Health, Housing, Security, Belonging, Participation, Social Capital, and Social Cohesion, Urban life quality Satisfaction, and Adequacy of Services (Figure 2).
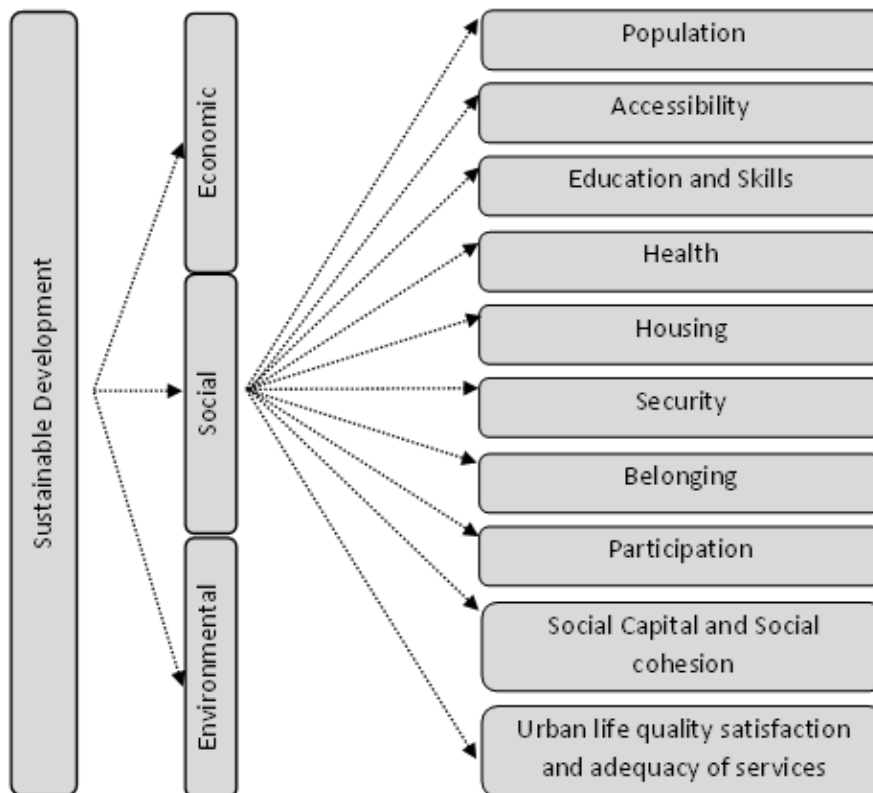
Figure 2. The criteria for measuring and evaluating the social sustainability.

Although the criteria describing the main system of social sustainability have been examined in certain headings, they have been evaluated holistically during the evaluation phase. If the components of urban space are inseparable and form a coherent, holistic structure, the basic elements that affect and create the urban space are also entire. In this respect, the principles of equality and justice, which are the basic principles of the social sustainability concept, are evaluated holistically

within all the criteria since they are related to and include all the criteria. To evaluate whether social sustainability has been achieved or not, and also to make planning decisions to ensure it, answers are being sought to questions about the subjects that constitute the conceptual framework of social sustainability. These questions, for which answers are being found, correspond to the social sustainability criteria, and they provide guidance in reaching the goal in the process of measuring and evaluating social sustainability.

Indicators and indicator definitions have been determined to test and measure whether the targets and sub-targets that are the requirements of each social sustainability criteria have been achieved or not. Indicator definitions are used to specify the data that will be used to measure the indicators. For each criterion, tables with definitions of the main target, sub-target, indicator, and indicator definitions have been developed. The main target and sub-targets of the criterion are symbolized by (TA), and indicators (I) on the tables for each criterion. Under the heading of 10 criteria in the system, 12 targets consist of 49 indicators that enable the realization of the target/sub-targets together with 25 sub-targets and indicator definitions to measure these indicators.

Population

Several characteristics related to population dynamics, such as change, characteristics of the population, population growth or zero population growth, poverty, and employment status, are the main subjects and indicators of sustainable development, as well as social sustainability. However, it is seen that the population criterion is also correlated with all the other criteria of social sustainability. This criterion is the main element that defines urban spaces of all sizes in their internal dynamic. The unbalanced characteristics of the population pose a risk to the continuity of social sustainability. It is an important requirement to ensure the balanced distribution and economic welfare of the population for human beings, which is the main subject of social sustainability, to use other resources effectively and in a balanced and fair manner. Factors that determine population dynamics, such as spatial distribution of the population, age, gender, employment status, income level, and income equality by gender, are also closely related to social sustainability. In this context, the objectives, sub-targets, indicators, and indicator definitions for the provision of the population criteria are seen in table 1. All indicators of population criteria are measured by household surveys.

Table 1. Population criteria, targets, sub-targets, indicators, and indicator definitions.

TA(1) Ensuring a Balanced Distribution of the Population		
Sub-Targets	**Indicators**	**Indicator Definitions**
TA(1.1) Ensuring a Balanced Distribution of the Population by Age Groups	I(1) Level of the distribution of the population by age groups	Distribution level of households by age group

TA(1.2) Ensuring a Balanced Distribution of the Population by Birthplace	I(2) The level of distribution of the population by birthplace	The level of distance from the birthplace of the population to the aging area

TA(2) Ensuring the Balance of the Economic Well-Being of the Population

Sub-Targets	Indicators	Indicator Definitions
TA(2.1) Poverty Prevention	I(3) Income level distribution of the population	The proportion of the population living below the poverty line
		The proportion of the population with a monthly income below the minimum wage
TA(2.2) Provision of Employment Opportunities	I(4) The level of employment of the population	Unemployment rate
		The proportion of the working population
		The proportion of the working population over 65
TA(2.3) Ensuring Productivity in Employment	I(5) The level of productivity of employment	The proportion of long-term employees
		The proportion of low-skilled occupations (such as labour)
		Percentage of Medium-High Skilled Occupations (Such as Management)
		The proportion of independent jobs
TA(2.4) Ensuring Gender Equality in Employment Opportunities	I(6) Gender equality level in employment opportunities	The ratio of the number of female employees to the number of male employees
		The ratio of average women's wages to male wages
		The ratio of the number of unemployed women to the number of unemployed men

Accessibility

Providing equality of access to basic services is an important requirement to ensure the social sustainability of both urban spaces and communities. Although accessibility is seen as a level of physical accessibility to urban services in a spatial context, it allows individuals to create social interactions and networks within society and to access information, services, and basic needs. However, it also plays an active role in obtaining social justice, improving the quality of life, and the development and transformation of society. The effectiveness of an approach in which the interventions made under the name of improvement in urban areas where social infrastructure areas are often inadequate in the current situation is limited to the physical renewal of buildings and poses the risk of restricting the access of all segments of the population to basic services. In this context, the objectives, sub-targets, indicators, and indicator definitions for the provision of the

accessibility criteria are seen in table 2. All indicators of accessibility criteria are measured by spatial analysis.

Table.2 Accessibility criteria, targets, sub-targets, indicators, and indicator definitions.

TB(1) Ensuring Equality of Access to Basic Urban Services		
Sub-Targets	**Indicators**	**Indicator Definitions**
TB(1.1) Ensuring Equality of Access to Social Infrastructure, Open Green and Urban Working	I(7) Access level to social infrastructure areas	Level of access to educational facilities
		Level of access to health facilities
		Level of access to cultural facilities
		Level of access to religious centres
	I(8) Level of access to open and green areas	Level of access to green spaces
	I(9) Level of access to the urban working areas	Level of access to government agencies

Education and Skills

It is not enough to meet the physical requirements of a human being to maintain his/her existence in society. Meeting the requirements such as education and skills play an important role in ensuring social development. Improving the educational level thus societies is an important necessity for improving the skills and abilities of individuals and increasing their employability, for them to continue their daily life and social activities, and for ensuring communal and social sustainability. In addition, education is an important element that provides increasing individual and social capacity, learning knowledge and skills, and increasing productivity in present rapidly changing and developing technological conditions. It is overlooked that one of the main reasons for physical destruction, and economic and social collapse in cities requiring spatial intervention is the lack of educational opportunities. To improve the education and abilities of individuals, equal and adequate opportunities should be provided and a structure suitable for all members of society, regardless of the socio-economical-cultural differences of the population. In this context, the objectives, sub-targets, indicators, and indicator definitions for the provision of the education and skills criteria are seen in table 3. Indicators of housing criteria are measured by spatial analysis and household surveys. I(10) Literacy level, I(11) Level of education, I(13) Level of participation in vocational courses, and I(14) Level of participation in talent development courses is measured by household surveys. I(12) Spatial adequacy level of educational facilities is measured by spatial analysis.

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Table 3. Education and Skills criteria, targets, sub-targets, indicators, and indicator definitions.

TC(1) Individual and Social Education, Raising and Promoting The Level of Development		
Sub-Targets	**Indicators**	**Indicator Definitions**
TC(1.1) Raising literacy and education levels	I(10) Literacy level	Adult literacy levels
	I(11) Level of education	Latest graduated school levels
	I(12) Spatial adequacy level of educational facilities	The level of competence of the current situation is according to the standards of educational facilities that should be according to the population
TC(1.2) Promoting Participation in Vocational Education	I(13) Level of participation in vocational courses	Level of participation in existing vocational courses
		Level of participation in case of alternative vocational courses are open
TC(1.3) Promoting Participation in Talent Development Educations	I(14) Level of participation in talent development courses	Level of participation in existing talent development courses
		Level of participation in case of alternative talent development courses are opened
		Level of participation in professional education

Health

Aside from the adequacy of health services, which is one of the most basic needs of individuals and societies, the fact that they are large enough and accessible in proportion to the population size demonstrates the population's degree of development. The continuity of vital and social activities is indicative of the possibility of developing societies composed of physically and mentally healthy individuals with a good quality of life. In this context, it is an important requirement for social sustainability that all individuals from all segments of the population have access to health services without any discrimination. In this context, the objectives, sub-targets, indicators, and indicator definitions for the provision of the education and skills criteria are seen in table 4. Indicators of housing criteria are measured by spatial analysis and household surveys. I(15) Spatial adequacy level of health facilities is measured by spatial analysis. I(16) Level of access to healthcare is measured by household surveys.

Table 4. Health criteria, targets, sub-targets, indicators, and indicator definitions.

TD(1) Ensuring the Adequacy of Health Services		
Sub-Targets	**Indicators**	**Indicator Definitions**
TD(1.1) Ensuring the Adequacy of Health Services	I(15) Spatial adequacy level of health facilities	The level of adequacy of the current situation is according to the standards of health facilities should be according to the population
	I(16) Level of access to healthcare	The level of access of local people to have health services
		The distance level of the health institution to the area that the local people access when they have health problems

Housing

Housing, which is the most fundamental and crucial activity of an individual, is a human right as well as a constitutional right. The disadvantaged population may face housing challenges as a result of the negative reflection of economic problems on urban space, particularly in developing and underdeveloped countries. When the public interest is overlooked in urban interventions, the failure to address housing needs or inadequate social structure provisions endanger the issue of maintaining the social structure. In terms of legal, humanitarian, urban, and other elements, meeting everyone's housing needs is not only a necessity but also an obligation. In this context, the objectives, sub-targets, indicators, and indicator definitions for the provision of the education and skills criteria are seen in table 5. Indicators of housing criteria are measured by spatial analysis and household surveys. I(17) the Property status of the houses and I(18) The level of affordability of rents with household income are measured by household surveys. I(19) Physical condition of the houses is measured by spatial analysis.

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Table 5. Housing criteria, targets, sub-targets, indicators, and indicator definitions.

TE(1) Ensuring Housing Conditions for All		
Sub-Targets	**Indicators**	**Indicator Definitions**
TE(1.1) Ensuring Increasing Housing Capacity	I(17) Property status of the houses	The ratio of homeownership to tenancy
	I(18) The level of affordability of rents with household income	The ratio of average housing rent to average household income
TE(1.2) Improving the Physical Condition of Housing	I(19) Physical condition of the houses	Building status levels of houses

Security

The safety criterion is a necessary one for maintaining the vital activities of the individual and for ensuring the sustainability of the use of urban living spaces. The creation of safe urban spaces at the personal and social levels is a necessity for ensuring spatial and social sustainability, but it is also a necessity for the creation of social capital

and for cities to be active and liveable spaces. In this context, the objectives, sub-targets, indicators, and indicator definitions for the provision of the education and skills criteria are seen in table 6. Indicators of safety criteria are measured by household surveys.

Table 6. Safety criteria, targets, sub-targets, indicators, and indicator definitions.

TF(1) Ensuring Individual Safety		
Sub-Targets	**Indicators**	**Indicator Definitions**
TF(1.1) Ensuring Security in Public spaces and Private Areas	I(20) Level of security in housing	Level of feeling safe in residences during the day
		Level of feeling safe in residences at night
	I(21) Level of security in public spaces	Level of feeling safe walking on the road during the day
		Level of feeling safe walking on the road at night
		Level of feeling safe in public spaces during the day
		Level of feeling safe in public spaces at night
	I(22) Level of trust in neighbourly relationships	Level of trust in neighbours

Belonging

People integrate with the spatial and social system as long as they feel a sense of belonging to the place and society in which they live, form bonds, and see themselves as a part of the whole. This integration is an important element of social sustainability for individuals to feel a sense of belonging to the society and the place, to gain awareness about the image of the area, and protect heritage items. In this context, the objectives, sub-targets, indicators, and indicator definitions for the provision of the education and skills criteria are seen in table 7. Indicators of belonging criteria are measured by the household surveys.

Table 7. Belonging criteria, targets, sub-targets, indicators, and indicator definitions.

TG(1) Ensuring the Acquisition of Social, Spatial Belonging, Urban Image , and Heritage Values		
Sub-Targets	**Indicators**	**Indicator Definitions**
TG(1.1) Ensuring Social and Spatial Belonging	I(23) The level of belonging of local people to the society they live in	The level of local people's feeling like part of society
	I(24) The level of the local people's sense of	The level of life expectancy in the area

	belonging to the area where they live	The level of feeling of belonging to the place they live
TG(1.2) Creation of Urban Image Awareness	I(25)Awareness level of local people about the changing conditions of the area	The level of desire for the area to improve its urban image
		The level of thinking that the urban image of the area has improved with the project
TG(1.3) Creating Awareness of Conservation of Heritage Values	I(26) Level of activities that contribute to the conservation of heritage values	Level of awareness of activities related to the protection of natural heritage in the area of living

Participation

Participation of the public and stakeholders in the country's administration, city management, and planning processes is an important tool for a democratic, egalitarian, and fair management and implementation system in the national, urban, and local contexts. The inclusion of users and other stakeholders living in the area in the analysis, synthesis, and solution proposals of the problems, especially experienced in the destroyed urban areas, is an important factor in both directing the spatial transformation in line with the needs and wishes of the local people and ensuring spatial sustainability. In urban policies where local users are often ignored in areas that require spatial intervention, it is one of the basic principles that will ensure social sustainability that the public has a say in the decisions to be taken regarding both social issues and the area they live in and that they are informed openly and transparently. In this context, the objectives, sub-targets, indicators, and indicator definitions for the provision of the education and skills criteria are seen in table 8. Indicators of participation criteria are measured by household surveys

Table 8. Participation criteria, targets, sub-targets, indicators, and indicator definitions.

TH(1) Promoting Public Participation in Management, Planning Processes, and Works Related to Municipal Services		
Sub-Targets	**Indicators**	**Indicator Definitions**
TH(1.1) Ensuring Participation in Country and Local Government	I(27) Level of participation in the country's administration	Level of participation of local people in general elections
	I(28) Level of participation in local government	Level of participation of local people in local elections
TH(1.2) Ensuring Public Participation in the Planning Process	I(29) Level of public participation in the project design process	Level of participation of local people in the project design process
	I(30) Level of public participation in the completion of the final project	Level of participation of local people in the completion of projects

	I(31) Level of public participation in the monitoring process of the project	Level of participation of local people in monitoring of projects
		The level of ability of local people to influence the decisions made in the area where they live
TH(1.3) Ensuring Transparency in Works Related to Municipal Services	I(32) Level of knowledge of local people about municipal works	Level of informing the local people about the municipal work

Social capital and social cohesion

While social capital and social cohesion could be defined as the ability of people to live together in a strict sense, in a broad sense. And It could mean individuals are in harmony and interact with the society in which they live without any discrimination. In today's cities, where the population is growing rapidly, the heterogeneous and multi-layered population structure causes urban segregation as well as social segregation. Differences in the socio-cultural and economic structures of the local population currently living in the area and the new population that later started to live in the area create a risk in terms of coexistence, integration, and interaction in the intervened areas of the cities. This situation affects social development, social interaction, and diversity, and jeopardizes the sustainability of the social structure. With this approach, increasing the level of social development and social interaction becomes an important criterion for ensuring social sustainability. In this context, the objectives, sub-targets, indicators, and indicator definitions for the provision of the education and skills criteria are seen in table 9. Indicators of social capital and social cohesion criteria are measured by household surveys

Table 9. Social capital and social cohesion criteria, targets, sub-targets, indicators, and indicator definitions.

TI(1) Ensuring The Level of Social Development and Social Interaction		
Sub-Targets	**Indicators**	**Indicator Definitions**
TI(1.1) Increasing Social Development	I(33) Level of participation in information studies	Level of participation in the information studies organized about the area of living
	I (34) Level of participation in social awareness studies	Level of participation in social awareness studies
	I (35) NGO/association membership status	Membership in any association/non-governmental organization
	I(36) Level of participation in social works	Level of voluntary activity in any association/non-governmental organization

		Status of being a member of an association operating in the area of living
		Status of being a member of an association/organization that works on the project
		Level of participation of the members in the activities of the association
TI(1.2) Level of Social Interaction	I(37) Level of interaction in public space	Level of going to public space
		Level of communication with neighbours in public space
	I(38) Level of social interaction by gender	The ratio of men who go to the public space to women who go to the public space

TI(2) Ensuring Diversity and Cultural Integration

Sub-Targets	Indicators	Indicator Definitions
TI(2.1) Ensuring Cultural Diversity and Cultural Integration	I(39) Level of the interaction of people of different cultural structures	People with different ethnic backgrounds/identities being friends with each other in the living area
		Level of collaboration with people of different ethnic backgrounds/identities

Urban life quality satisfaction and adequacy of services

It is critical for spatial, communal, and social sustainability as well as for people's well-being and happiness in cities that urban services are sufficient, fair, equal, and balanced for all, that the population is satisfied with the quality of urban life, and that they consider the services adequate. Individual happiness will occur to the extent that the human is satisfied with the urban area in which he/she lives and considers it sufficient. And individual happiness will allow him/her to bond with the area in which he/she lives and to create prosperous societies that are open to progress. The physical dimension of interventions in areas that require spatial intervention, the lack of fair, equal, and adequate urban services for everyone, the dissatisfaction with the quality of life, and the inadequacy of the services put the sustainability of the social structure at risk. In this context, the objectives, sub-targets, indicators, and indicator definitions for the provision of the education and skills criteria are seen in table 10. Indicators of Urban life quality satisfaction and adequacy of services criteria are measured by household surveys.

Table 10. Urban life quality satisfaction and adequacy of services criteria, targets, sub-targets, indicators, and indicator definitions.

TI(1) Ensuring The Level of Social Development and Social Interaction		
Sub-Targets	**Indicators**	**Indicator Definitions**
TI(1.1) Increasing Social Development	I(33) Level of participation in information studies	Level of participation in the information studies organized about the area of living
	I (34) Level of participation in social awareness studies	Level of participation in social awareness studies
	I (35) NGO/association membership status	Membership in any association/non-governmental organization
	I(36) Level of participation in social works	Level of voluntary activity in any association/non-governmental organization
		Status of being a member of an association operating in the area of living
		Status of being a member of an association/organization that works on the project
		Level of participation of the members in the activities of the association
TI(1.2) Level of Social Interaction	I(37) Level of interaction in public space	Level of going to public space
		Level of communication with neighbours in public space
	I(38) Level of social interaction by gender	The ratio of men who go to the public space to women who go to the public space

TI(2) Ensuring Diversity and Cultural Integration		
Sub-Targets	**Indicators**	**Indicator Definitions**
TI(2.1) Ensuring Cultural Diversity and Cultural Integration	I(39) Level of the interaction of people of different cultural structures	People with different ethnic backgrounds/identities being friends with each other in the living area
		Level of collaboration with people of different ethnic backgrounds/identities

Implementation and Evaluation Method for Measurement and Evaluation of Social Sustainability

The system has been proposed as a guiding tool for both decision-makers and stakeholders in ensuring spatial sustainability by going beyond just improving, transforming, and renewing the physical and

environmental structure and incorporating social components into this change process in urban projects, which are seen as one of the basic methods of solving urban problems. The system includes an approach that can be used and implemented both in the process of proposing urban projects and in evaluating the social sustainability of implemented urban projects. In the process of proposing urban projects, the current state of the social structure in the first stage should be measured with the criteria and indicators determined in the system. After the determination of the current situation, social sustainability will be achieved by making decisions about the social structure in the light of the criteria, objectives, and indicators proposed in the system during the proposal phase of the projects. Whether social sustainability is achieved in the implemented urban projects can be measured by the system proposed in the system, and solution proposals or strategies can be developed to ensure social sustainability.

Mixed techniques are used both in the data acquisition and evaluation phases. In the implementation of the system after the sample area is selected, literature research, spatial analysis, in-depth interviews, and survey studies have been determined as the methods that can be used in the process of obtaining the data.

CONCLUSION

Referring to sustainability studies, social sustainability is still largely unexplored and undertheorized. However, the assessment of the literature has revealed that a thorough conception and operationalization of urban social sustainability are still lacking. This study is a part of the more comprehensive research called the model of ensuring and evaluating social sustainability. This study aims to determine criteria and indicators that foresee the development and maintenance of the social structure by going beyond the physical transformation of urban interventions. Therefore, the general principles, targets, and indicators in the integrated system are determined to develop evaluation methods to measure and assess social sustainability.

In this context, in the literature review, studies at different conceptual and practical scales are examined. In previous studies until 2010, social sustainability has been considered and defined from a general perspective. In this context, a general and limited paradigm for social sustainability has been established. Since 2010, research related to measuring and assessing social sustainability has gained more significance and relevance. Previous studies concentrate on defined social sustainability criteria and indicators according to the characteristics of the application area and the content of the projects. For this reason, developed measurement and evaluation systems regarding the concept have been limited in focusing on specific issues however, most of the research in the literature review has not adequately examined social sustainability and its relationship with

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other dimensions of sustainability. There are deficiencies in the general, comprehensive, systematic, and holistic evaluation of the concept of the theoretical and practical fields in the literature. In most of the studies, it has been seen that the social sustainability criteria cannot go beyond the components of the social dimension of urban planning, which are determined according to the project subject and are not multidimensional or comprehensive. Therefore, there is a need to identify social sustainability criteria that can be used in every urban space.

However, it has been seen that there is a necessity for a holistic evaluation system, including the evaluations and thoughts of stakeholders, in the evaluation of quantitative and qualitative data. In this respect; conceptually, this study examines social sustainability with all its dimensions from a broad perspective, comprehensively, and holistically. From this point of view, a multi-stage system in which mixed data and mixed assessment methods are used to measure and evaluate social sustainability has been put forward.

In the first stage, the main problem of the study is: "How is social sustainability evaluated in an integrated system?" In light of the question, the criteria that should be used for measuring and evaluating social sustainability have been discussed. Indicators that can be used to measure and evaluate social sustainability may vary according to the scale and characteristics of the application area. However, the criteria to be used for the evaluation, measurement, and provision of social sustainability must be universal and comprehensive. Therefore, all the factors that compose the social structure are taken into account in the social sustainability criteria determined in the system. In this study, the following criteria are set as population, accessibility, education and skills, health, housing, security, belonging, participation, social capital and social cohesion, urban life quality, satisfaction, and adequacy of services. Social sustainability criteria have a quality that can be used in all urban areas. Indicators and indicator definitions are created to measure whether the objectives of the criteria are fulfilled or not are also universal. The most important reason for the physical destruction of urban areas is that the social structure cannot be changed and developed according to present changing and development conditions.

With this system in all urban areas, it is possible to measure the achievement of targets in the context of social sustainability criteria. As a result of measuring each criterion with indicators, the points where the social structure cannot be sustained are determined. The identified issues are a guide to what will be done to ensure social sustainability in both areas that require urban intervention and those exposed to the urban intervention. In other words, this system defines the direction and the subject of the interventions and actions to be taken in urban areas.

This study, which is the guide to leading experts about the interventions made or to be made in cities; presents the phases,

principles, and methods that should be evaluated in order to measure and provide social sustainability in urban space within a system. The proposed system will shed light on the principles, indicators, and implementation processes that could be used in the formation of the system for future studies and in measuring and providing social sustainability in the implementation phase. In addition, this study contributes to filling the gap in the literature with a developed system that includes the intersection points and effects of sustainability dimensions, universal criteria, targets, and indicators applicable to urban spatial systems in a holistic approach.

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Resume

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Accessibility Analysis of Urban Green Space: The Case of Erbil City

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Abstract

Urban green areas are open spaces in urban areas that are mainly covered by vegetation. They can be public or private urban green spaces that include parks, community gardens, forests, and nature reserves. Parks are an important component of urban quality of life if they are well designed and accessible. Accessible parks contribute to physical activity among urban residents. Therefore, the objective of the study was to identify the most significant main accessibility factors that discourage the use of public urban green areas, and examine the extent to which they influence the use of green areas in residential areas of the city of Erbil. This study was conducted in 2017 and 2020 to measure the accessibility of green spaces using network analysis with GIS for Erbil city. The present study represents the first known investigation regarding the accessibility of public green spaces within the city of Erbil. The results show that for community parks, 68% of the population has access with a travel time of 5 minutes, 99% of the population has access with a travel time of 10 minutes, and 100% of the population has access with a travel time of 15 minutes. For district parks, 70% of the population had access with 5 minute drive time. With 10-minute drive time, 96% of the population had access and 100% of the population had access with 15-minute drive time. For neighborhood parks, the results show that 43% of the population had access with 5-minute walk and, 71% of the population had access with 10-minute walk. At 15-minute walk time, 80% of Erbil residents had access to neighborhood parks. Mini parks were accessed by 22% of the population with a 5 minute walk and they were accessed by 52% of the population with a 10 minute walk. With a 15 minute walk, mini parks were accessible to 70% of the population.

INTRODUCTION

Urban green areas are places that provide opportunities for people to engage in a variety of sporting and recreational activities. Therefore, public green areas and recreational facilities are important for social and economic health of cities and towns (Sallis et al., 2004). Therefore, there is increasing desire for the creation of organized public green spaces such as public parks and open sports facilities in residential areas like cities. These urban green areas are an essential urban function and land use in the urban development plan. Although a number of such public green areas and recreational facilities were developed in the urban area of Erbil, except for a small number of larger parks and organized facilities, the others are not used for many reasons. The main reasons for the underutilization of urban green spaces include lack of accessibility, lack of attractiveness, unsuitable location and behaviour such as lack of time, and lifestyle and social problems. The success of urban green spaces and open recreation spaces is highly dependent on accessibility (Project for Public Spaces, 2011). Physical accessibility, such as the quality and availability of access, cost of access, time distance, connection to residential areas, and parking and safety, is considered one of the most important characteristics that influences the successful use of these urban green spaces. Similarly, it is argued that visual access variables such as sight distance and visibility of parks influence the use of urban green areas.

Accessibility to urban green areas in a city is generally affected by the degradation of an efficient and sufficient public transportation system, the increase in commercial and related activities that occupy these spaces, the lack of good physical transport facilities such as roads, pedestrian facilities, security, parking, and policies, and the growth of traffic volume, resulting in traffic congestion and increased travel times. Similarly, accessibility to urban green spaces is measured by characteristics such as continuity, proximity, connectivity, walkability, and convenience, as well as pedestrian and vehicular infrastructure and visual accessibility parameters. Thus, it is critical to assess the key factors that influence the accessibility of public green spaces in a city's residential neighbourhoods, and then develop planning and design guidelines to improve accessibility so that urban green areas will be more vibrant and can be used to their fullest potential.

As an attribute of urban land use, green spaces have many functions, such as providing resources and serving as a habitat for life (Solecki and Welchb, 1995). Urban green spaces are areas built as facilities within the city (Bilgili and Gokyer, 2013). They are green spaces that have similar layout and characteristics. Urban green spaces impact traffic flow and emissions, air quality, microclimate, noise, accessibility, economic impacts, and social benefits. These impacts vary from the neighbourhood level to the regional level. The use of various green spaces that serve the entire urban area should be evaluated in urban planning and green space design.

The adequacy of green space was evaluated by many researchers. It is not correct to evaluate the total area of green space created for recreational purposes in cities by relating it to population size. It is necessary to evaluate the green areas created, or that will be created, based on planning principles and criteria using methods that are consistent with planning principles.

Therefore, the objective of the study was to identify the most significant main accessibility factors that discourage the use of public urban green areas, and examine the extent to which they influence the use of green areas in residential areas of the city of Erbil. Studies indicate that the ratio of road network to pedestrian network (paved paths), the number of access streets to the green areas, and the size of green spaces affect the use of the urban green areas to varying degrees. The questions this study seeks to answer are listed below;

• How accessible are public green areas for different populations within 300 m, 600 m, and 900 m of each other, or 5 minutes, 10 minutes, and 15 minutes by foot for mini-parks and neighbourhood parks, and by car for community parks and district parks?
• In which areas of the city of Erbil do new public green spaces need to be created and accessibility to public green areas need to be improved?

To find answers to these research questions, a two-stage method was applied. First, all green spaces and streets in the city of Erbil were classified, and then the geographic data for the neighbourhoods were linked to demographic data to calculate the population that has access to these green areas.

The study consists of five main parts, after the introduction, the relevant literature review is given, while method, study area and materials used in the study are explained in the next section. The results of the network analysis are given in the results section, which precedes the discussion and conclusion.

LITERATURE REVIEW
Urban Green Areas

Urban green areas are open spaces in urban areas that are mainly covered by vegetation. They can be public or private urban green spaces that include parks, community gardens, forests, and nature reserves. In this study, only public urban green spaces were examined because these public green spaces are free and most of the population do not have access to private green spaces.

Green areas, as a concept, generally refer to a tract of land that is covered wholly or partially with living vegetation, grass or trees and openly accessible by the public free of charge and with ecological, social and economic benefits. Frederick Law Olmsted used the word "park" in his address in 1870 " A Consideration of the Justifying Value of a Public

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Park" to mean a large tract of land set apart by the public for the enjoyment of the rural landscape (Czerniak, 2007). The State Government of Victoria (SGV) defined green space as an area that is publicly owned, protected land, set aside primarily for nature conservation, recreation, public gatherings, and passive outdoor enjoyment (SGV, 2008). The State Government of Victoria determined that public green space (including publicly-owned parks, gardens, squares, waterways, forecourts and green space on universities campuses and schools, nature strips along streets, major sporting areas that are managed by the government) should be offered to the city residents freely. Green spaces usually contain many trees and large areas of grass cover. Their contribution to the environment is important. Urban green spaces improve the quality of the urban environment by regulating urban air temperature and humidity, preventing water pollution and urban air pollution, and maintaining biodiversity (Hirokawa, 2011; Sun et al., 2013; Watmough et al., 2013). Green spaces help store and process storm water, cool air temperature in the urban center, and provide habitats for a rich community of animal, plant, bird, aquatic and microbial species.

Accessibility and access to green spaces

One of the characteristic features of human behaviour is the ambition and ability to move all around the world to exchange merchandise and information over long distances (Hodgart, 1978). Commuting, moving, shopping, gathering, distributing, communicating, and vacationing often take place over some distance. Therefore, accessibility requires special forms of public social behaviour - spatial interaction.

Accessibility is an indicator that reflects the ease with which an intended point or place can be reached from the user's perspective. From the perspective of a product, device, service, or environment, on the other hand, it is defined as the number of users who can use the phenomenon in question. Accessibility analyses are widely used to check the benefits of plans as a planning control tool, to help decision makers to investigate new locations for urban services, to test the benefits of current locations of urban services, to identify thresholds for urban services, and to determine the capacity and service area of urban services such as education, emergency facilities, leisure, industry and shopping, etc. (Kuntay, 1976; Kuntay, 1990). Halden et al. (2000) also emphasized accessibility analyses as practical tools for evaluating the performance of transportation systems. Accessibility results can be used to check if urban services are highly accessible by walking, cycling or public transport etc., to identify critical regions that are out of current service range or to select appropriate sites for new services.

Failure to consider accessibility in the spatial planning and decision processes of a city may result in total barriers to accessing the relevant service for those living in the city and disability in terms of users. In this sense, accessibility is important for decision-makers when selecting locations for new urban facilities (education, health, fire, etc.), it is also

used to guide planning by determining the capacity and service area of the facilities in question. With network analysis applied for this purpose, it is possible to determine the areas outside the service area for the service in question or to determine the most appropriate location for new urban infrastructure under consideration (Kuntay, 1976; Kemec, 2001).

One of the important issues highlighted in the literature related to public green spaces and public recreation facilities is access, which significantly affects their success. The access to public green areas is related to improved physical and mental health of individuals (Sugiyama et al., 2008; Payne et al., 2005; Potwarka et al., 2008). Green area users are more likely to have good levels of health and physical activity compared with non-users (Deshpande et al., 2005) because there is proof that lack of accessibility of green areas and distance from green areas are inversely related with utilization and physical activity behaviour (Kaczynski et al., 2008).

The significance of green space for urban residents lies in quantity, spatial arrangement, and dispersion across communities or geographical areas, which ultimately govern accessibility. The accessibility of green spaces is frequently determined by factors such as location, proximity, and size, as noted by Zhang et al. (2011). The accessibility of a place is contingent upon its geographical location and the surrounding environment. It is imperative that green spaces designated for public use possess the qualities of being accessible, passable, and visible from a distance. According to Wilbur et al. (2002), the utilization of green space is positively impacted by the presence of local public green space that can be accessed by walking. Conversely, the need to travel to a park may have a negative effect on green space utilization. The utilization of public green spaces is influenced by factors such as geographical location and safety considerations. According to Herzele and Wiedeman's (2003) findings, the most significant factor affecting access and utilization of green spaces is the walking time or distance from one's residence. Proximity to green spaces and ease of access were found to positively impact the frequency of visits and utilization by nearby communities, as noted by Atiqul Haq (2011) and Herzele and Wiedeman (2003). According to research conducted in Helsinki, individuals residing within a 0.50 km radius of green spaces tend to visit them more than four times per week (Neuvonen et al., 2007; Atiqul Haq, 2011). As per the findings of Etzioni (1998), it is recommended that public green spaces should be situated in close proximity to the neighbourhood centre and should not be farther than a five-minute walk for the residents. The concept of accessibility can encompass a wide range of considerations. According to Comber et al. (2008), accessibility in the context of the green space literature refers to the proximity of residential areas to locations providing access to green spaces, measured in terms of walking distance. Green spaces differ in size and characteristics and therefore have different impacts. Some studies indicate that people visit neighbourhood green spaces more

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frequently than district or regional green spaces (VDSE, 2002). Neighbourhoods are considered a meaningful territorial element of urban life for many people and a planning ideal in many parts of the world (Lee, 1968; Pacione, 1982; Martin, 1998). A neighbourhood should provide a number of green areas that serve several uses; to ensure all inhabitants have accessible neighbourhood green areas within a specific distance (800 m, 1200 m, or 1600 m, etc.); and to ensure a walking network links the green space to the broader green space network - as the network of green spaces may form the main component of travel through a neighbourhood (Lee, 1968; Pacione, 1982; Martin, 1998).

GIS and Green Space

GIS plays an important role in environmental justice and green space accessibility analysis. GIS and network analysis within it can compute time of travel from one place to another. Studies use network analysis within GIS to explain how different religious groups, ethnic groups, and socio-economic groups access urban green space (Comber et al., 2008). The reason that many studies utilize GIS to carry out environmental justice analysis is because it is only possible to solve different social problems after recognizing the issues. Importance of equal access to green space must be noted by planners, because all inhabitants living in a city deserve to have equal accessibility to public green areas. Studies can raise awareness about utilizing GIS so that scholars can use it to address different kinds of environmental or social issues. This research is the first to utilize GIS network analysis to study the accessibility of public urban green areas, in the city of Erbil. Network analysis within GIS allows landscape architects and urban planners to understand how environmental justice influences cities and to help societies have more equitable accessibility to healthier environments, such as public green spaces. GIS network analysis can be used as a method for architects and urban planners to analyse neighbourhoods in need of renovation.

There are two popular measurement methods that are utilized to study accessibility: network analysis and Euclidean analysis. Urban planners most commonly use the Euclidean technique, referred to as straight-line distance, to measure accessibility (Coutts et al., 2010; Coutts et al., 2013 and Moseley et al., 2013), but the Euclidean technique simplifies the real world because it does not account for obstacles to movement in a city. On other hand, network analysis depends on the actual roads and their related speeds and is much more accurate for an accessibility study (Steadman, 2004). Researchers and urban analysts increasingly focus on the distribution of green spaces in urban environments.

Ann (1991) utilized GIS to measure accessibility as the straight-line distance from open green spaces including rivers, green belts, and water bodies, to residential areas (Ann, 1991). Some research results explained that spaces within a linear distance of 700 m from open areas comprised 98.6% of all areas in the city of Seoul, and so the provision of

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open areas was judged to be more than adequate (Eom et al., 2008 and Eom and Lee, 2009). Gobster (1995) in exploring issues related to access and use of green space and recreation facilities by poor and minorities found that sections of the Chicago River Corridor adjacent to lower-income minority neighbourhoods tended to have lower vegetation quality, poorer maintenance, and low accessibility compared to sections adjacent to higher-income 'white' neighbourhoods. He hypothesized that lower-income minority neighbourhoods may not have access to quality open space environments like those available to upper-income majority neighbourhoods. Talen (1998) used an equity mapping method and a needs-based measure of equity derived from professional green space planning standards and planning policy documents to examine accessibility to green space in Pueblo, Colorado. They found that areas with Hispanic populations had low accessibility. Nicholls (2001) studied distributional equity within a system of public green areas in Bryan County, Texas and accessibility using GIS and the Mann-Whitney U test procedure in SPSS. The results showed that no inequality was present. Lindsay et al. (2001) explored the nature of green ways as public spaces in Indianapolis, Indiana. Their research study used simple GIS analysis of census and proximity as a measure of accessibility and other data to determine equality of accessibility. The results showed that minorities and low-income majorities have unequal accessibility to open spaces. Recently, the Gaussian-based 2SFCA approach was utilized to estimate green space accessibility in Georgia (Dai, 2011) and the results showed that many of the census tracts were beyond walkable distance to the nearest green area.

Health outcomes may be influenced by socioeconomic status, environmental quality, and access to health care (Massey, 2004). Low-income communities need the same amenities as affluent communities. Cancer and other diseases are directly linked to the disposal of chemical or toxic wastes. Low quality of life and the environment in these locations contribute to high prevalence of health issues among the local population. Good access to urban green areas can help reduce these health problems, but the high quality of the living environment should not be restricted to high-income groups. Bolin et al. (2005) argued that the historical development of the socio-spatial effect produced unequal and unsafe environmental burdens in low-income and minority communities in Southern Phoenix. Therefore, understanding environmental hazards and the current and historical distribution of different racial groups is necessary to research environmental injustice. In the same way, Bolin et al. (2005) studied how racial categories and companion social relations were constructed by the white majorities to produce a stigmatized area of economic and marginality racial exclusion in South Phoenix at the end of 19th century. Chona et al. (2010) argued that some minority groups don't have good accessibility to green areas and parks in Los Angeles as the city has grown and become increasingly dense. Inner-city minorities and low-income people dwell in poorly-planned neighbourhoods. These areas lack green space and other

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recreational possibilities. Urban green space is in demand because individuals may meet friends, get fresh air, play with children, and interact here. Most research shows that low-income and minority groups have reduced access to these green places.

Several researchers chose network analysis because it has an advantage over the covering approach as it reflects actual travel and avoids all the barriers that make routes inaccessible to pedestrians. Scholars examined environmental justice in the Phoenix urban area and the socio-spatial distribution of different types of facilities in the Phoenix metropolitan area in relation to the demographics of nearby neighbourhoods. They found that ethnicity and social-class are directly related to the distribution of air pollution and immigrants, low-income and Latino inhabitants had higher exposure to pollutants than high income and white residents. Comber et al. (2008) studied green area access for different ethnic and religious groups in Leicester, UK, and they explained that Sikh, Hindu and Indian groups, which are ethnic minorities in Leicester, had limited access to green areas. Comber et al. (2008) utilized network analysis to determine green area access for different religious and ethnic groups in the UK. Boone et al. (2009) found that more African Americans in Baltimore, Maryland had access to green areas within 400 meters walking distance while white people had access to more green spaces in less than 400 meters distance.

Numerous academic studies showed that parks are often distributed in a manner that disproportionately benefits affluent and white populations, thereby creating a significant environmental justice issue with regards to the unequal allocation of green spaces. Although it is impossible to alter an existing neighbourhood, it is important to study where injustice exists and the ways that this injustice can be overcome. Coombes et al. (2010) found that residents living with high accessibility to green areas were more likely to fulfil physical activity recommendations and less likely to be obese or overweight. Coombes suggested that the provision of good access to green space in metropolitan areas may promote physical activity for the population (Coombes et al., 2010). Zhang et al. (2011) explained that developed states in the western and midwestern US had higher neighbourhood green space accessibility, while developing states had lower accessibility (Dai, 2011). More recently, the Gaussian-based 2SFCA approach was utilized to determine green space accessibility in Georgia. The results showed that Georgia still faces the challenge that many of the census tracts are beyond walkable distance to the nearest green area. Bennet et al. (2012) used the network analysis approach to measure the walking distance to the nearest playground and to determine the number of users of playgrounds within the playground's service area.

METHOD, STUDY AREA AND MATERIALS
Method
This study analysed the green spaces in Erbil city and measured the accessibility of green spaces with environmental justice in Erbil city for

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public green spaces. The study examined the accessibility of active green spaces in Erbil city. If all green areas in the city are divided into two categories according to their usability as explained in the diagram (Figure 1), there are two main classes, namely active and passive green areas. In the active green spaces, a total of 264 parks were included in the study. Active green spaces consist of four groups (community parks, district parks, neighbourhood parks, and mini parks) according to the area size and facilities provided. All quarters of Erbil city were selected, and all roads and streets were classified according to speed limitations. All of the datasets were prepared with AutoCAD and then converted to GIS to analyse and calculate time costs to access green spaces, area that encompassed by public green space services and number of residents who access these services, as shown in the diagrams (Figure 2 and Figure 3) (Kemec et al. 2019).
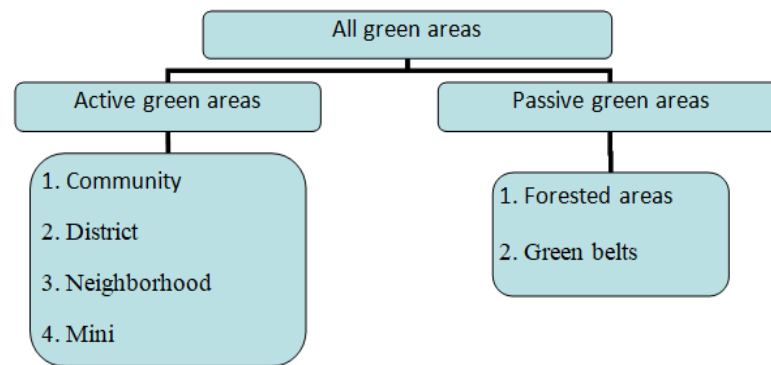
Figure 1. Classification of green space

The green space classes created after classification, taking into account areal size and facilities provided by the park are defined below;

1. Community Parks: Community parks are considered the largest green space in size and are well known amongst all residents. Community green spaces contain all facilities, serve all age groups and provide a wide variety of opportunities to a broad cross section of residents. Ten community parks were included to the study.

2. District Parks: A district park is a mid-sized green area providing space for recreation or sport and facilities. These types of green space serve large groups in the city and are attractive to a range of users. They serve several communities or suburbs and are quite well known for residents living in their catchment. Ten district parks were included to the study.

3. Neighbourhood Parks: Neighbourhood parks serve a small population area, have convenient standard size. The population for this kind of green space is 1 hectare per 1000 people and they usually range in size from 0.5 hectare to 4 hectare. These parks provide facilities for a range of age groups. Neighbourhood parks are considered one of the most significant features of the green space system. They are deemed one of the major elements in neighbourhood design and their essential role is provision of recreational space for surrounding neighbourhoods.

These types of green areas should be located at the centre of the neighbourhood, have a service area of about 800 meters, convenient and safe pedestrian access and range in size from over 0.25 hectare up to 5 hectares. The study encompasses a total of 189 neighbourhood parks.

    4. Mini Parks: Local green areas are small green spaces for use by a very small population. These green areas normally serve a population between 500 to 1000 people, usually include a playground for children or have aesthetic purposes. In relation to size, they are generally less than 0.25 hectare. A total of 55 mini parks were included in the study.
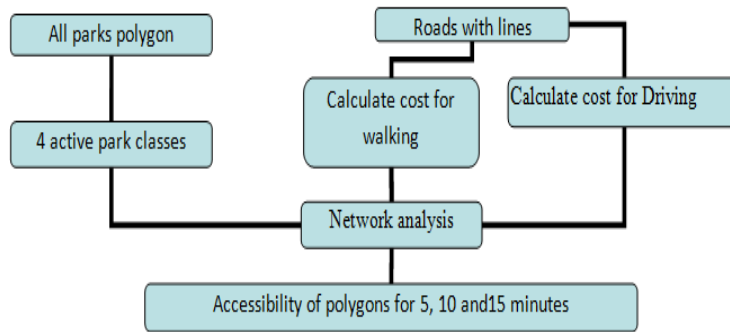
Figure 2. Methods for analysing with the GIS Network analysis tool
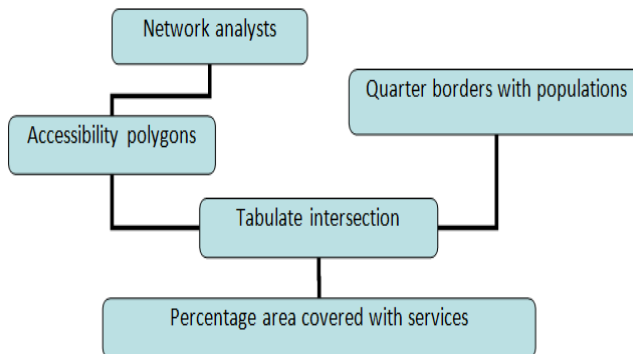
Figure 3. Methods of calculating area and population covered by services.

Study area

    This research was carried out in the city of Erbil (Figure 4), which has a population of almost 1,000,000 people. Because Erbil gets very hot in the summer, there must be enough green space. Green spaces should be freely accessible to inhabitants, and residents should have easy access to public green spaces. Erbil has a lot of urban green space. All public green space evaluated in this study were chosen with the input of Erbil Municipality and the Green Space Directorate. A comprehensive accessibility study should incorporate multiple criteria to effectively gauge and comprehend the significance and practical value of accessibility to green areas. These criteria may include:

1. Availability of datasets that are required and accessible for the study area to allow focus on matters related to

        mapping, measuring and analysis of green space accessibility.

2. The study area must have a high level of accessibility to allow verification and workable field-based observations when necessary.

3. The study area should be a significant metropolitan area with green space provision and development to allow the assessment of space and time changes in relationships between demand and availability of urban green space.

Due to the factors mentioned above, the city of Erbil was chosen as the location for the research project since it is desirable to conduct concentrated research about the availability of green space.

Erbil city is located in the north of Iraq with latitude: 36°11'33.25" N and longitude: 44°0'38.23" E and elevation above sea level of 429.00 m. The climate of Erbil City is dry and semi-arid climate according to the Köppen-Geiger climate classification (steppe BSh and Mediterranean Csa). It is cold and damp in winter and hot and dry in summer, with short autumn and spring seasons compared to winter and summer. In winter, this locale is affected by Mediterranean cyclones that move east to northeast over the area. Arabian Sea winds move northward passing over the Arabian Gulf carrying significant moisture causing high precipitation in the region. In summer, the region is impacted by tropical high pressure belts and Mediterranean anticyclones. The sub-tropical high pressure centres that move from west to northeast and north pass over the Middle Eastern landmass carrying sand to the region. The highest daily temperature may reach 50 ^{o}C in hot summer periods, while the lowest daily temperature can drop to 0 ^{o}C in cold winters. Therefore, it is necessary to provide green spaces in Erbil city in terms with significant numbers and features for inhabitants because of the higher amount of hot days within a year.

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(a)

(b)

(c)
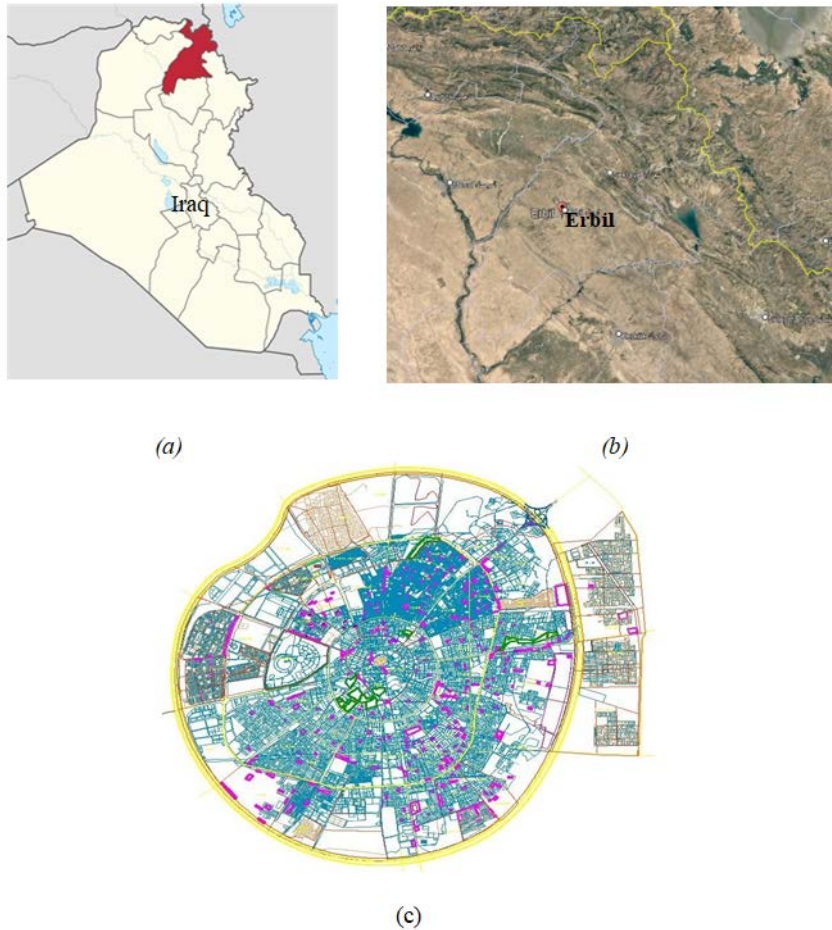
Figure 4. Location of the study area (a) in Iraq, (b) Erbil city and near surroundings (Google Earth), (c) Erbil city center (source: U.S. Agency for International Development (USAID)

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Material

As is common in GIS applications, it was envisaged that the data collection phase would take the majority of the time in the study, comprising 80-85% of the time. The data obtained for the study (Table 1) included;

- Green space locations; in point data format, green space location data should have a distance that can be articulated to the transportation network used for accessibility analysis. In other words, the transportation network data should be obtained for an area wide enough to cover all green space points
- Transport network; roadways to be included in the analysis in vector format with in line detail, hierarchical and average velocity data were entered into the attribute table
- Quarter borders and population data; used to find the access status in each neighbourhood in terms of population

Table 1. Data used in this study

No.	Datasets	Purpose of dataset	Sources of dataset
1.	Green space locations	To determine the green area	Directorate of Green Areas
2.	Road network	To calculate distance and time to access green spaces	Erbil City Municipality
3.	Quarter borders	Combine with population data	Erbil City Municipality
4.	Population	To calculate population	KRG Statistics Office

Data processing stages

1. Green space locations: The study covers the accessibility of active green spaces in the city of Erbil. Therefore, passive green areas were excluded from the scope of the study. Green space boundaries were acquired in CAD format. This data was first transferred to the GIS environment and converted to point detail in order to be used as input for network analysis. There were 264 green spaces in the study area, classified in to two categories as active green areas and passive green areas. Active green space included 10 community parks, 10 district park, 189 neighbourhood parks and 55 mini parks.

2. Road network: Another input for network analysis is road network data. For the analysis, the required impedance information was created by seconds required to traverse the relevant road segment. To calculate the impedance input, which constitutes the next step in the method, the path data must be created in a hierarchical manner. The road network data used in the study comprised road hierarchy information created by expert definition. Road network data must be hierarchical. Considering academic studies and Erbil's road conditions, the average speed for each road segment was incorporated into the created road network data. The average speed values were as follows; intercity roads 70 km/h, degree I urban roads 50 km/h, degree II urban roads 30 km/h and degree III urban roads 15 km/h.

Calculation of impedance (cost): Costs must be calculated. These costs can be stated in a variety of measures, including time, money, and land. The time required to pass each line segment is used as cost in this analysis. The mathematical logic of the method on which network analysis is based is the determination of input time determined in seconds to be spent on each road segment (the cost of traveling the road segment is calculated by the length of the related road segment and the average speed observed on the related road segment) and finally reaches the point where it is '0'. As a result of the analysis, service areas were created by combining the end points of road segments where the input time reaches zero.

After hierarchical classification of the road network, average speeds determined in 'kilometers/hour' were then converted to 'meters/second'. The length of each road segment was calculated in meters in the GIS environment and entered into the road network data. By dividing the calculated road segment lengths in meters by the

average speeds in meters/second, the time required to traverse each road segment was obtained in 'seconds'.

3. and 4. Quarter borders and population: Quarter borders and population of these quarters were used for the evaluation of accessibility analysis results. The quarter border layer in CAD format was converted to the GIS environment. Then tabular population data was integrated with the quarter border layer by using the joint tool in the equipped software.

RESULTS

Accessibility analysis results for public urban green space in different quarters of Erbil city are given below (according to park type);

1. Community Parks: There were 10 community parks with accessibility measured by GIS network analysis for 5, 10 and 15 minutes of driving. The results show that for 5 minutes driving, 68% of the population have access to green space and 32% of population don't have access to green areas. For 10 minutes of driving, there was accessibility for 99% of population and 1% of population don't have access to green areas. For 15 minutes driving, there was accessibility for 100% of population to public community parks (Figure 5).
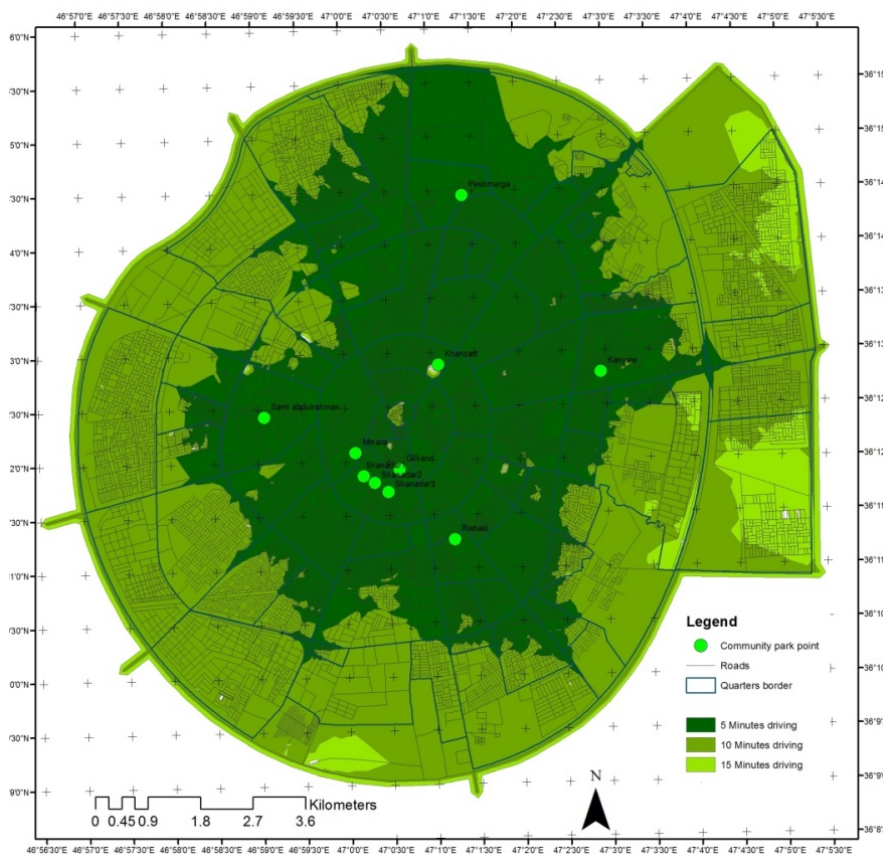
Figure 5. Community Park accessibility with 5, 10 and 15 minutes driving

2. District Parks: There are 10 district parks with accessibility measured by GIS network analysis for 5, 10 and 15 minutes for driving. The results show that for 5 minutes driving, 70% of Erbil city population had access and 30% of population don't have easy access to district

parks. For 10 minutes driving, there was accessibility for 96% of Erbil residents to district parks. For 15 minutes driving, there was 100% accessibility to district parks (Figure 6).
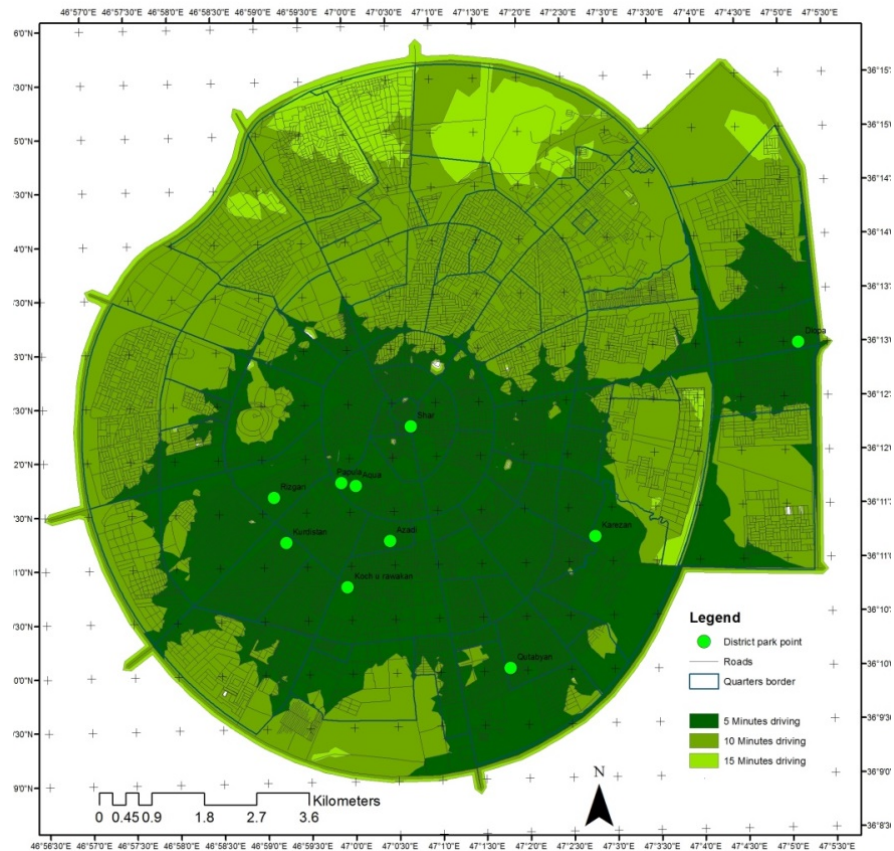
Figure 6. District park accessibility with 5, 10 and 15 minutes driving

3. Neighbourhood Parks: There were 189 neighbourhood parks with accessibility measured by GIS network analysis for 5, 10 and 15 minutes walking. The results show that for 5 minutes walking, 43% of Erbil city population have access and 57% of population don't have easy access to neighbourhood parks. For 10 minutes walking, there was accessibility for 71% of Erbil residents to district parks. For 15 minutes walking, 80% of Erbil city residents have accessibility to neighbourhood parks (Figure 7).

4. Mini Parks: There were 55 mini parks in Erbil city with areas less than 2000 m2 and accessibility measured by GIS network analysis for 5, 10 and 15 minutes walking. The results show that for 5 minutes walking, 22% of Erbil city population have accessibility and 78% of the population don't have easy access to mini parks. For 10 minutes walking, there was accessibility for 52% of Erbil residents to mini parks. For 15 minutes walking, 70% of Erbil city residents have accessibility to mini parks (Figure 8).
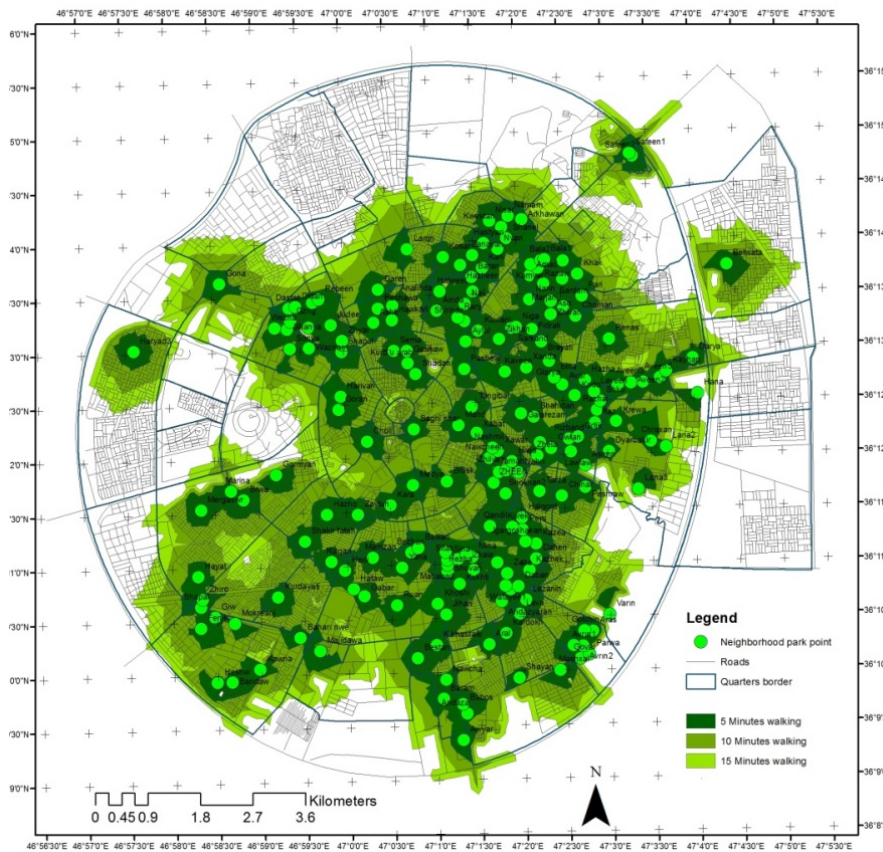
Figure 7. Accessibility of neighbourhood parks with 5, 10 and 15 minutes walking

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DISCUSSION AND CONCLUSION

The aim of this research conducted in Erbil, Iraq was to evaluate the overall state of public green space and assess their accessibility within the city. Additionally, the study sought to ascertain the costs associated with accessing these green spaces, compare the accessibility of public green spaces in Erbil with global benchmarks, and identify areas within the city that require additional parks. There are many green spaces in Erbil city which were classified into active and passive types according to their daily use by people. The present study specifically focused on the active types, as they are deemed to be the most significant component of public green spaces within the metropolitan area. Additionally, the roads were categorized into four distinct groups based on their average speed limits.

To date, there is no extant research about the accessibility of green spaces in Erbil city, which would enable a comprehensive evaluation of the overall state of public green space. The present study represents the first known investigation regarding the accessibility of public green spaces within the city of Erbil. The network analysis tool in environmental GIS was used to determine time cost access to public green spaces divided into groups of small parks and large parks. Small parks include neighbourhood parks and mini parks with time cost calculated for walking distances of 300 m, 600 m and 900 m; meaning 5 minutes, 10 minutes and 15 minutes. Results for neighbourhood park access show 43% of the population had access with 5 minutes walking;

71% of the population had accessibility in 10 minutes; and 80% of the population had access with 15 minutes walking. Access to mini parks with 5 minutes walking was available for 22% of the population; it encompassed 52% of residents with 10 minutes walking; and 70% of population had access with 15 minutes walking. For access to large parks, access to community parks and district parks was calculated for 5 minutes, 10 minutes and 15 minutes driving. For community parks, with 5 minutes driving 68% of population had access; with 10 minutes driving 99% of residents had access; and with 15 minutes driving 100% of the population had access. Network analysis for district parks found that with 5 minutes driving, 70% of residents had access; for 10 minutes driving 96% of the population had access; and for 15 minutes driving 100% of residents of Erbil city had access.
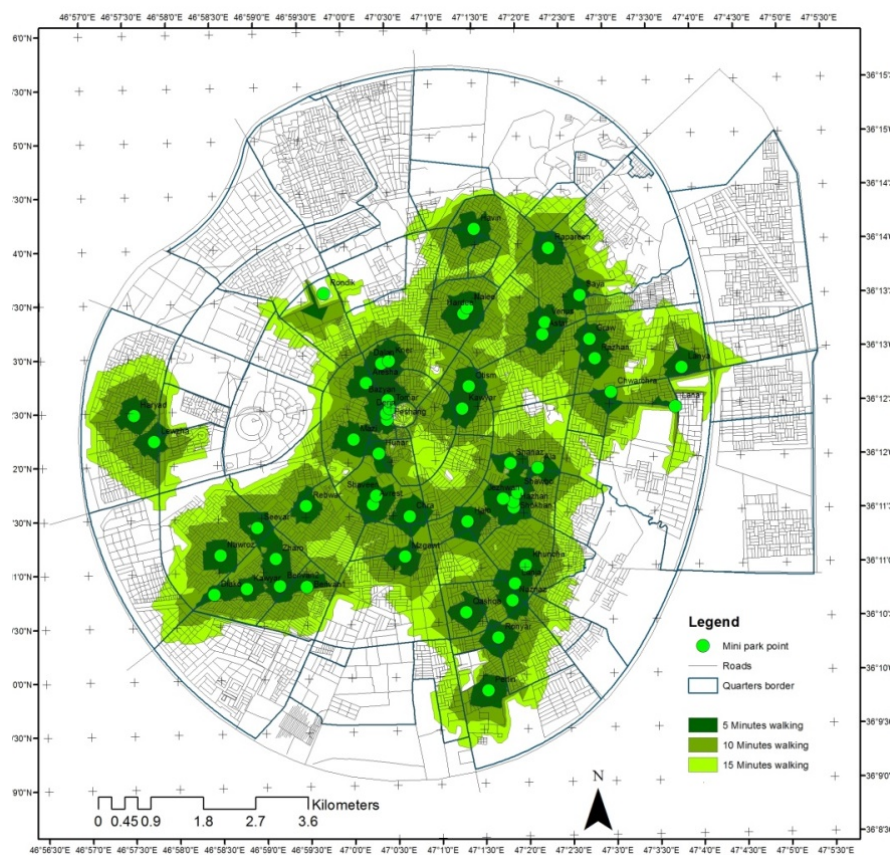
Figure 8. Accessibility to mini parks with 5, 10 and 15 minutes walking

Analysis possibilities offered by GIS software are important for the detection and/or modelling of spatial processes operating in a city. However, there are serious problems with spatial data to enable this type of analysis in the city of Erbil. These problems can be listed as lack of data, temporal and spatial extent of the data found, and problems related to timeliness and access. Additional challenges encountered in this investigation included the arduous task of procuring datasets from governmental entities due to security apprehensions, which impeded the accessibility of said datasets. All datasets utilized in this study are primary data that were manually generated. In terms of future research directions, it is recommended that further investigations be conducted

about critical urban facilities and services such as health, fire fighting, and police stations. Additionally, incorporating real-time speed data in accessibility analyses may enhance the precision of the findings.

Within the scope of publications, the position-based service levels of the parks in the city were evaluated. However, in future studies, it will be possible to make an ecological network-based assessment of the green areas that provide input to the study with the data used, as in Cetin (2015). In this context, in addition to the presentation of green infrastructure as a service with an equitable approach, visual, recreational and aesthetic concerns, evaluation of the adequacy of green spaces as an ecological function and the status and potential of creating an ecological network will be the main criteria.

This study exhibits a dynamic nature, as it pertains to fluctuations in both the quality and quantity of green space. Furthermore, alterations to road networks may potentially impact the accessibility outcomes; thereby necessitating the need for updated data in future analyses.

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Resume

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The Impacts of Urban Environment Aspects on The Life Satisfaction of Older Adults

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Abstract

Ageing comes with several discomforts such as a decline in mobility and losses in social networks as well as societal roles. Therefore, improving the life satisfaction of older adults has become a significant policy focus for delivering age-friendliness in national and international movements in the living environment. The hypothesis of the current study is that older people, who live in urban neighbourhoods that provide safe, aesthetic and accessible environments, experience greater life satisfaction. Accessibility, attractiveness and attachment as the three key dimensions of life satisfaction were used to understand the key aspects of the life satisfaction of older people in the neighbourhoods and how the urban environment serves as an indicator. This research consists of two steps. The first step involved in-depth interviews with the older adults aged over 65 in different urban areas, the district of Fatih and Şişli in the city of Istanbul, Turkey, with sampling based on the diversity, heterogeneity and urban functions. Second, these urban areas were analysed using space syntax to understand the street network and connectivity to reveal the urban structure. The qualitative and quantitative findings were analysed comparatively. The study concluded that when attachment to the place is supported by walkability and psychical enticing, the older adults experience a higher level of life satisfaction. Additionally, financial independence serves as a backup solution to access a better environment. This comparative analysis also highlights a mixed method for policymakers to analyse the urban environment and makes room for older adults to raise their voices and participate in the policy and planning process.

INTRODUCTION

This research stands on the idea of physical and social features provided by a neighbourhood have a greater proportion to the life satisfaction of older people. This section will reveal the literature review regarding ageing and life satisfaction in the urban environment, and the theoretical structure of the study.

Since it is estimated that urban areas will host 4.6 billion people aged over 60 in middle and low-income countries by 2050, urban environments are particularly relevant in considering the life satisfaction of older adults (URL 1). In addition, as people age, they become more dependent on their immediate surroundings, especially at the neighbourhood scale. Therefore, the life satisfaction of older adults has become a major issue in the urban environment debates.

Life satisfaction in this research is defined as how much people enjoy their life, but it is also associated with well-being and self-esteem (Fry, 2000; Veenhoven, 1996). However, measuring life satisfaction for a sub-group of the population such as older adults should also consider concepts of self-preservation, self-organising, and self-creating to support ageing well (Wiesmann & Hannich, 2013). The concept of 'well-being of older people' is interbedded with 'ageing well' and studies on well-being point out that it is influenced by social networks and relationships with the community (Antonucci et al., 2006; Lee et al., 2016). The largest body of research emphasizes that socialisation and being active in social life enhance the mental and physical health of older people (Astell-Burt et al., 2013; Dean et al., 1992; Kloos & Townley, 2011; Thoits & Hewitt, 2001). So, given that the design of the living environment can support socialising and participating in social activities, the living urban environment is deeply engrained in the well-being of older people as well as their life satisfaction (Berkman & Glass, 2000; Bowling et al., 2003). Especially, the neighbourhood environment is a wider determinant of life satisfaction in older adults (Cramm et al., 2013; Robinette et al., 2013; Tucker et al., 2010).

The neighbourhoods characterised by a sense of comfort and ease of access to facilities assist emotional, physical, and mental aspects of welfare in ageing, where people also feel safe (Burton et al., 2011; Gilleard et al., 2007; Perez et al., 2001). Moreover, neighbourhood features related to outdoor activity patterns such as walkability, cohesion, land use, and residential mix (Frank et al., 2005; Friedman et al., 2012) are also important indicators of older people life satisfaction. In alignment with this, Türkoğlu (2018) argues that the key features of neighbourhood quality have a profound influence on life satisfaction, which can be categorised into three dimensions: attachment, attractiveness and accessibility. Thus, considering these three as the essential dimensions of urban environment quality and life satisfaction has led us to question how the living environment interferes with experiencing life satisfaction later in life. It seems that these three dimensions adequately outline the design principles for urban life quality (Marans & Stimson, 2011).

Attachment can be explained in a sociological context as the sense of place for citizens. Accordingly, researchers have categorised place attachment at certain levels such as home, neighbourhood and city levels (Vaske & Kobrin, 2001). It can also be explained as an emotional bond that occurs in the individuals towards the living place, which can either be the home building, the living environment, the city or all of them

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(Giuliani, 2003; Hudson, 1979). The attachment phenomenon has been widely studied to understand the experience of public space by individuals for the sake of planning policies (Kyle et al., 2005; Scannell & Gifford, 2010).

The attractiveness of a place relates to amenities, resources, and the environmental comfort that support individuals' life satisfaction (Bayar & Türkoğlu, 2021; Stokols & Shumaker, 1981). Physical features related to attractiveness are conceptualized as houses, streets, open green spaces, natural environment, and quality design of the neighbourhood (Manzo, 2003; 2005). Older adults are particularly dependent on the neighbourhood environment; hence, the physical features at this scale are especially important for this group's daily activities, independence, and health. Ramps, pedestrian pavements and paths, public toilets, sitting areas, lighting, signage, and shelters from the weather are essential physical elements of neighbourhood environments to support life satisfaction for older people(Ambrey & Fleming, 2014; Berkoz & Yirmibesoglu, 2013; Griffin & McKenna, 1999; Oswald et al., 2011). Also, living in a decent urban environment facilitates emotional attachment when they feel safe, happy, and independent (Pain, 2000).

The accessibility of neighbourhood environment encompasses both physical accessibility as well as affordability. For older people, physical accessibility is described as being able to access basic needs within walking distance (Jun & Hur, 2015) as well as reaching out to a wider range of facilities such as hospitals, shopping malls, or higher education facilities through public transport or on foot. Accessibility of an urban environment means walkability to older people as they tend to walk or utilize the facilities within walking distance to be more independent and perform daily activities without asking for help or even just to meet and have a little chat with a neighbour (Wiles et al., 2012). In the context of Turkey, accessibility to basic needs particularly corresponds to accessibility to health facilities, pharmacies, open green spaces, and religious buildings since they are regularly used for gathering and socialising in Turkey (Bayar & Türkoğlu, 2021; Biando, 2005). Therefore, in this study, open green spaces and religious buildings were accepted as fundamental gathering points and activity areas. These facilities are the top priorities for older people to maintain their daily activities as well as promote their life satisfaction (WHO, 2007). On the other hand, affordability is associated with reduced income, which is a major concern of older people due to retirement age regulations etc. In response to this, the affordability of public transportation is essential to create accessible environments (Wong et al., 2017).

To conclude, this research assumes that physical and social features provided by a neighbourhood contribute to the life satisfaction of older people to a great extent. Particularly attachment, attractiveness, and accessibility were addressed as evaluation criteria. Thus, this study aimed to investigate which of these three aspects has more effect on later life satisfaction in comparison to the others to provide insight into urban policies. In addition, how sociodemographic diversity among the older adults' controls life satisfaction in later life was also examined.

METHODOLOGY

The hypothesis of this research is that "older people, who live in the neighbourhood environments that provide a safe, aesthetic and

accessible environment, experience greater life satisfaction". Therefore, the aim of the study was to examine the relationship between neighbourhood design and the life satisfaction of older adults. Neighbourhood design here primarily refers to the accessibility to basic needs such as health facilities, pharmacies, open green spaces, and religious facilities.

The assessment of life satisfaction can be clearly identified by both subjective responses and objective conditions (Cummins, 2000; Marans, 2003). Although objective and subjective indicators are considerably independent, this study seeks to understand the link between personal characteristics and environmental support since life satisfaction differs based on living geography (McCrea et al., 2006). Therefore, this study used comparative analysis to reveal the relationship between subjective responses to objective conditions (table 1) (Schneider & Wagemann, 2012).

Responses such as economic status, use of public transport, managing daily routine, and experiencing living environment were obtained through semi-structured in-depth interviews. 20 participants aged 65 and above were asked 35 questions that reveal the subjective parameters affecting life satisfaction. The neighbourhood level is considered in this study; the number of participants was limited to 20 people because the interviews were conducted face-to-face by the researcher personally and it is considerably difficult to reach such a fragile group for forty-five minutes of an interview. Many of them refused to contribute and some participants were eliminated due to answering only yes and no to semi-structured questions. Therefore, the number of participants in this study was limited to 20 people. Moreover, although the researcher followed semi-structured questions, she also deviated from the interview to access more information as a result the sample groups were limited to 10 each (Adams & Cox, 2008). The participants resided in two different neighbourhoods that have similar characteristics in terms of built environment elements but differ in demographic and financial terms. These two sites were selected for their diversity, heterogeneity and urban functions. The study areas are representing the oldest district in Istanbul which is Fatih and its connection and extension throughout history which is Şişli. Fatih district is the beginning of Istanbul city itself and it has been extended from the city wall to the Galata, Pera and to Sişli throughout the history (Fatih Municipality, 2018). Fatih district is a growth point where Constantinople and, afterwards, Istanbul; hereupon, deliver heterogenous population, urban and building structures as well as attraction sites. So, Fatih and Şişli as the two study sides have a historical connection. While Fatih represents the older face of Istanbul, Sişli is prestigious and demanded perspective (Mağgönül, 2006). The connection is not only urbanism related but also there is a famous novel called Fatih-Harbiye (historical name of Şişli) that compares the social and economic life in these areas (Safa, 1931). This underlines another important reason that heterogeneity regarding income level. Moreover, both areas are central in terms of land use diversity with the provision of mixed housing opportunities, public transport facilities, open spaces, and

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basic needs such as grocery, personal grooming facilities, post offices, and health services.

The objective conditions in this study were accessibility to basic needs (table 1). These were comprised of health facilities, pharmacies, open green spaces, and religious buildings. These resources were measured through a spatial analysis tool, Space Syntax Tool (SST) kit in Quantum Geographic Information System (QGIS). The SSTxQGIS analyses the role that land use carries on the street network. There are multiple analyses that can be conducted in SS such as integration, choice and connectivity. This study used 400 meters to analyse normalised integration values that focus on to-movements that calculate the potential destinations and the depth of a total urban system. Up to a certain distance in other words radius (400 meters in this study), SS normalised integration analysis measures the mathematical closeness of the distance from each spatial element to all others in the urban network; additionally, normalised integration aims to normalise total depth by comparing the system to the urban average. (Hillier et al., 2012). Briefly, normalised integration analysis explains to us how well-integrated urban network is and 400 meters buffer of the walkability that older adults live their daily lives on the local scale was determined based on previous studies (Alves et al., 2020; Horak et al., 2022; Jun & Hur, 2015). The main idea of the graphs is to represent the values of segments in a categorised colour palette. Accordingly, the scale goes up to warm colours (red and orange) to point out better accessibility of larger segments while cold colours (blue and green) represent the less integrated and even segregated smaller segments from the urban network.

The spatial data of urban facilities are derived from Open Street Map (OSM). OSM Is a reliable and open source of cities globally for such analysis and provides accurate and updated spatial data for researchers. The key reasons for choosing to collect data through OSM are that first it is coordinated, detailed data of the study area, and secondly, it is compatible with SS analysis in QGIS. SSxQGIS kit requires to use of segment data which is an equivalence of OSM road network and all other spatial data.

Study Area

Istanbul is the metropolitan city of Turkey that is home to more than fifteen million residents and it consists of Asian and European sides that have multiple core centres. As the two sides are connected to each other with three bridges, there is a major commuting flow between the two sides every day. More than one million people, who are aged 65 and above, live in the city (TUIK, 2020)(see figure 1 below).

The study areas were determined based on several points: a) two study areas contain a certain number of older people which is more than %10. This number is officiated by the Turkish Statistical Institute (TUIK, 2020); b) the study areas deliver urban facilities such as mixed housing, different modes of public transportation, open spaces, health facilities,

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and commercial areas (Fatih Municipality, 2012c, 2018; Şişli Belediyesi, 1987, 2014); c) the study areas are referring to the history that also underlines key details such as old housing structure, land use and population diversity (Fatih Municipality, 2012a, 2012b, 2018; İnancık, 2015; Safa, 1931); and d) the mixture of different income and education levels can be found in both areas (Fatih Municipality, 2012c; Mağgönül, 2006; TUIK, 2020). In sum, demographic structure, spatial structure and historical bond are the key criteria for the study areas.
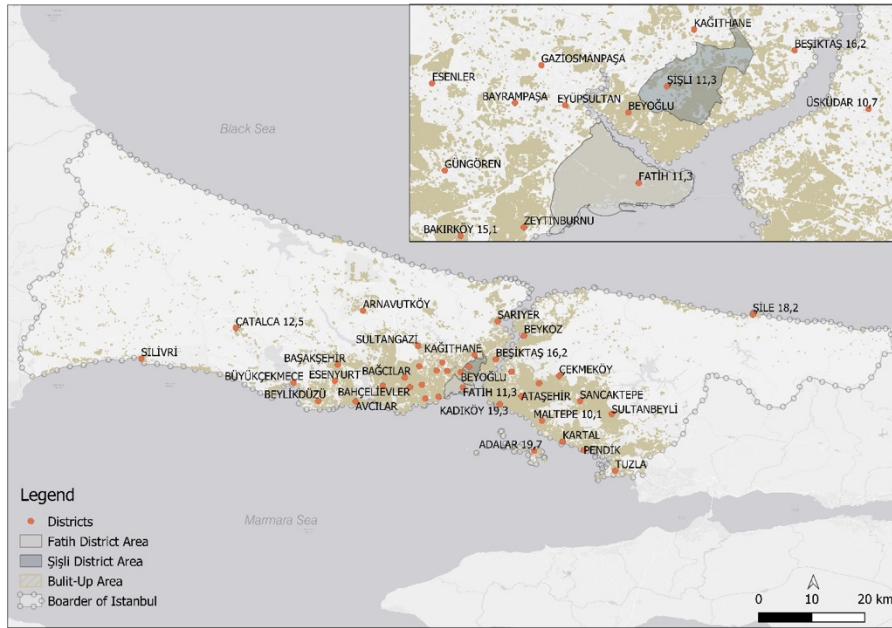
Figure 1. The districts of Istanbul and study areas are shown in the top right figure (prepared by the authors based on the data taken from TUIK, (2020))

Therefore, the one with the oldest historical site and district of Istanbul, Fatih district -well-known as Golden Horn- and its historical extension site Sişli district were chosen for this study. These two sites, as indicated in figure 1 (zoomed frame), are among the oldest districts in Istanbul.

Data Collection

The data used for the analysis was obtained through both quantitative and qualitative methods. The SS data used in QGIS was derived from OSM database, which contains all the road location information of land use and attributes about every geographic feature of cities (OSM, 2021). As can be seen in table 1 below, the objective conditions of the study areas were categorised into five features: health facilities, open green spaces, pharmacies, and basic needs (grocery, barber, shop, bakery etc.). These objective conditions were identified as the key dimensions to the life satisfaction of older adults in the neighbourhood.

Health facilities comprised both hospitals and family health centres. Accessibility to health services for the older people is essential because ageing comes with biological changes; therefore, health facilities are important urban features (Breyer et al., 2010; Frank and Engelke, 2001).

Open green spaces are the key design elements for socialising, physical activity, and engagement with the society. These are the spaces for the older people where they can be socially and physically active, spend time outside of the home and prevent themselves from isolation and loneliness (Astell-Burt et al., 2013; Kaczynski & Henderson, 2008; Wen et al., 2018).

Basic needs such as groceries, personal grooming, shopping areas, and post offices are primary activities of the daily routine of the older adults (Bayar & Türkoğlu, 2021; Gehl, 2011). The neighbourhood needs to deliver basic needs within walking distance to promote active ageing and the life satisfaction of older adults (Burns et al., 2012; Temelová & Dvořáková, 2012).

Pharmacies are especially important for older people because the frequency of prescriptions increases as people age and measuring blood pressure and glucose levels can be easily done in the pharmacies in Turkey. Accessing this facility is a comfort for older adults (Padeiro, 2018).

Religious facilities were considered gathering and socialising areas in Turkey. Many older adults gather and talk to each other, sit and sunbathe in the religious facilities' yards (Bayar & Türkoğlu, 2021); therefore, this urban facility is also important, especially where the older people do not have access to open green spaces (Biando, 2005).

These urban facilities were retrieved as location points and areas from OSM as layers (OSM, 2021).

Table.1 The description of the dataset used in objective conditions and subjective responses in the analysis method

The measurement of life satisfaction of older adults in the neighbourhood						
	Dimensions				Dimensions	
	OBJECTIVE CONDITIONS	Description and measurement	Data		SUBJECTIVE RESPONSES	Description and measurement	Data
Accessibility to the urban facilities	Health facilities	Measures the accessibility and availability of health facilities	(OSM, 2021)	The attractiveness of the neighbourhood	Assessment of accessibility	Measures how participants access to all objective conditions	Semi-structured in-depth interview
	Religious facilities	Measures accessibility and usability of religious facilities			Assessment of open green spaces	Measures both the usage and the design of open green spaces	
	Open green spaces	Measures accessibility and availability of open green spaces			Assessment of public transport	Measure the efficiency and the usage of public transport	
	Pharmacies	Measures accessibility and availability of open green spaces			Assessment of quality of the neighbourhood	Measures perceived the quality of the living environment	
Attachment to the neighbourhood						

The subjective responses were retrieved from face-to-face, semi-structured in-depth interviews. It was conducted in the summer of 2019 (table 1). The interview consisted of 35 questions that were categorised

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based on accessibility, sociability, attractiveness, and outdoor activities (Bayar & Türkoğlu, 2021). However, the questions were organised as interbedded to avoid overlap. The subjective responses aimed to reveal the assessments of accessibility, open green spaces, public transport, quality of the neighbourhood, and daily routine.

Assessment of accessibility was the key data in subjective responses. This dimension reveals how accessible health facilities, religious facilities, open green spaces, pharmacies, and other basic needs are from the older adults' perspective as the accessibility issue depends on physical and mental well-being (Iwarsson & Ståhl, 2003; Somenahalli & Shipton, 2013). The participants were asked 'Can you use public transportation easily? Is there anything you want to change? Do you easily get on and off the bus? 'also, they were asked to contribute to the research by explaining the area and answering the 'Do you think this area is walkable?' and Do you walk for your health? Can you find a bench to sit on or a place to rest and cover from the sun and wind?' questions

Assessment of the open green space measured both the usage and the design of the areas. Because ease of access and existence is not efficient enough to encourage older adults to visit open green spaces, the responses involved how older adults experience open green spaces and how conditions affect the usage of the areas. For example, due to low-quality designs and a lack of supporting design elements such as sitting areas and public toilets, older people may refrain from spending time in open green spaces (Gehl, 2011; Mahmood & Keating, 2012; Talen, 2010; Ward et al., 1986). This study asked the participants 'how often do you visit a park, is the green space in the living area walkable, safe and secure; also, what is the main reason for you to visit a park'.

Assessment of public transport measured the efficiency and the usage of public transport modes and one key question is whether or not they feel safe while using a mode of public transport. Older people may avoid using public transport for many reasons such as crowds, traffic, lack of available seats, and mental problems; thus, the existence of public space is not always reliable data (Broome et al., 2013; Grimaldi et al., 2016; Wong et al., 2017).

Assessment of the quality of the neighbourhood focused on the design of the environment as to whether it is supportive. The neighbourhood itself is the primary environment where urban features and design elements such as housing, public spaces, streets, and commercial areas are delivered for the people's experience. So, from lower scale to upper scale, a neighbourhood should provide a comprehensive and inclusive design to support ageing in place for the older people (Burns et al., 2012; Lager et al., 2016; van Dijk et al., 2015). Older people feel more attached to the living environment emotionally; therefore, the neighbourhood should support their needs in all stages of life (Gilleard et al., 2007; Jacobvitz et al., 2002; Wiles et al., 2009). The participants were questioned if they would prefer to live somewhere else or move to other parts of the city, how they carry out their daily routines such as shopping,

grocery, and personal grooming also if the facilities around the neighbourhood are sufficient enough to support their routine.

Assessment of daily routine focused on the daily needs of older adults such as shopping, banking, visiting neighbours, walking, sunbathing, and talking to friends etc. As older adults perform their daily routines within the walking distance in the neighbourhood, accessibility and allowance to practice their daily routines is a significant dimension of the life satisfaction of older adults (Bayar & Türkoğlu, 2021; Horgas et al., 1998). The key question for participants was that 'Do you feel like you need to change your habits because of the area?' which is related to another question 'how does the area affects your daily activities?'. These questions help us to understand how participants perform their daily routines in the urban environment.

Participant's profile

Participants in both sites differ in terms of income level, which is the key hidden aspect behind their life satisfaction. They were selected based on the researchers' personal network and their connections within the neighbourhood. Also, some of the participants were approached randomly while they were sitting in a park or mosque. The reason behind this method is that they refused to carry out an interview many times.

Table.2 Participant demographics

Area	Participants	Age	Gender	Type of income	The latest level of education
Fatih	1	74	Male	Retired	Secondary School
	2	70	Female	Housewife	Literate but uneducated
	3	72	Female	Housewife	Primary School
	4	73	Female	Widow's pension	Literate but uneducated
	5	73	Male	Retired	Secondary School
	6	96	Female	Retired	Primary School
	7	71	Female	Old age's pension	Literate but uneducated
	8	81	Male	Retired plumber	Secondary School
	9	74	Female	Retired	Primary School
	10	73	Female	Retired	Secondary School
Şişli	11	70	Male	Still working	Bachelor Degree
	12	71	Male	Still working	Highschool
	13	79	Female	Housewife	Primary School
	14	81	Female	Retired	Bachelor Degree
	15	83	Female	Retired	Bachelor Degree
	16	90	Male	Retired	Bachelor Degree
	17	85	Female	Retired	Highschool
	18	85	Female	Retired	Highschool
	19	81	Male	Retired	Bachelor Degree
	20	73	Male	Retired	Bachelor Degree

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Consequently, participants were selected according to their age, income level, and educational background (table 2). So, a total of 20 participants, with 10 participants from each site, were interviewed in depth. The total sample consisted of eight female and 12 male participants aged between 70 and 96 with varying educational backgrounds ranging from being uneducated to graduate degrees. Three participants were literate but uneducated. Eight of them had at least a secondary school degree. Nine of them had higher education degrees. The participants also showed diversity in the level of income such that 13 of them were retired while two participants were still in the workforce. Three female participants were with no income and lived with their husbands. One participant got a widow's benefit and one participant received an old age pension.

FINDINGS

The interview findings were analysed based on three aspects of the living environment, which are accessibility, attachment and attractiveness as addressed above. So, the related questions for each indicator of subjective evaluations were categorised under the topic of accessibility, attachment and attractiveness. The answers clarifying the life satisfaction of participants for each of these topics were explained in the following sections. Additionally, the accessibility to basic needs was also compared to interview findings.

Accessibility to urban facilities in the neighbourhood

The neighbourhood in Fatih district, accessibility is emphasised by older people as they said that they can perform their daily needs, such as shopping for groceries, visiting open spaces, and chatting with a neighbour within a walking distance. Participants signified that being able to reach basic needs without too much physical effort is the best way of making a living environment accessible. This also includes public transport stations being within walking distance as well. Fatih district provides easy access to their needs and several transportation options; therefore, they feel involved in city life and feel independent to spend time outside the home. They also pointed out that having a park or religious building nearby home is the best way of socialising, spending time or even sunbathing. Religious buildings' yards appear to be public spaces and older people spend relatively more time there than in parks. Getting to the health facilities and pharmacies easily whenever they need is indicated as a must-have for them since ageing results in biological health decline. They said that they choose to live in areas where health facilities are close. Even though walking is an advantage for them, the low urban quality is a disadvantage. They revealed that the broken pedestrian roads, ramps, poor lighting, lack of sitting areas, shelters to cover from sun and rain, and public toilets are discouraging them from walking and as well as performing outdoor activities. These findings led us to analyse urban networks to see how accessible the area itself and where the

mentioned urban facilities are located in the network system. Normalised integration (NAIN) map of the district in figure 2 reveals that the higher integration values are close to major roads and the periphery of the district is found to be segregated from the whole district.
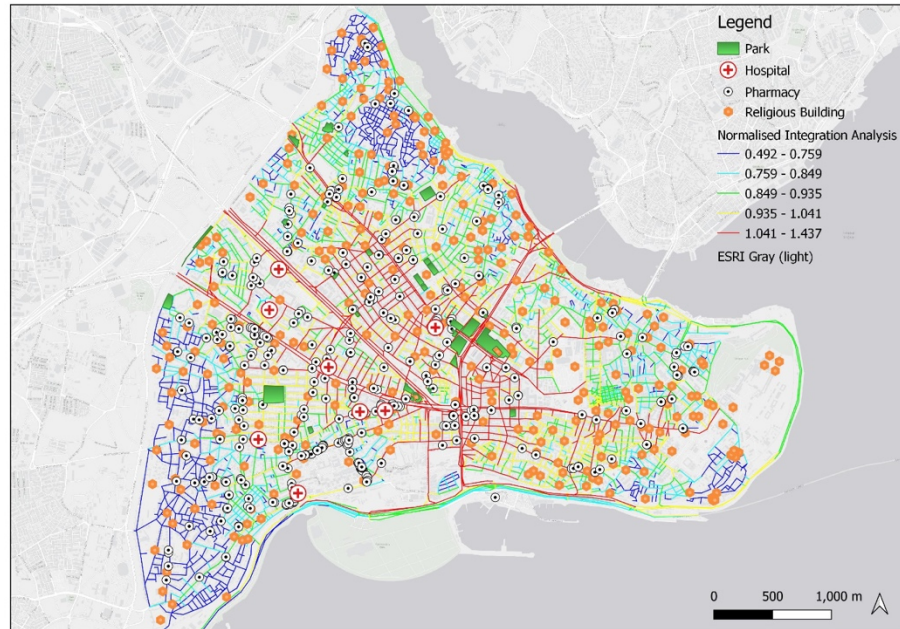
Figure 2. Normalised integration values of Fatih District in 400 m local scale (prepared by the authors)

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The lack of green urban spaces can be seen clearly in figure 2. But, notably, in terms of health facilities, religious facilities, and pharmacies, every street has access to them. The measurement of walking distance, which is 400 m, indicates that the places close to the major roads have better accessibility regarding the potential of multiple route choices, but the periphery of the district is neglected in terms of walkable accessibility to urban facilities.

The accessibility of Sişli district is described by the participants as delivering multiple choice of transport modes and walkability to daily needs; however, some physical environmental characteristics such as slopes and high pedestrian roads are obstacles for those who have declining health. Sişli district delivers various options for grocery, pharmacy, and personal grooming within walking distance. But all participants highlighted that the lack of open green spaces is the main problem. Although there is one urban park close to the centre of the district, participants said that they do not want to walk due to the slopes and narrow pedestrian roads. The area is surrounded by various health facilities and pharmacies; therefore, participants underlined this as the main reason for living in this particular district.

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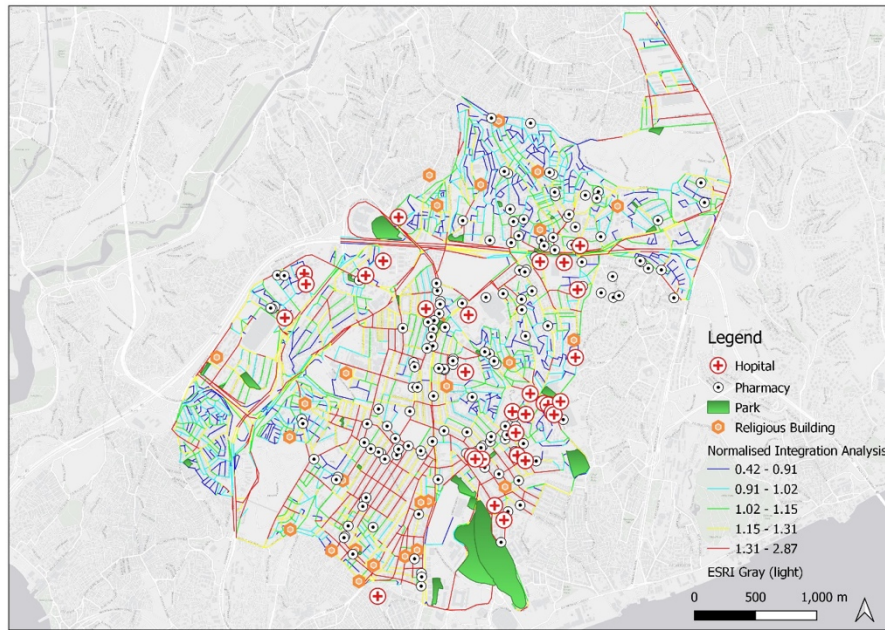
Figure 3. Normalised integration values of Şişli District in 400 m local scale (prepared by the authors)

The NAIN analysis shown in figure 3 demonstrates which streets are more integrated into the urban network. Major roads have the highest value but the streets within walking distance have lower values. Thus, although it depends on where they live, this can be interpreted that there are fewer potential movement choices and lower integrations to the urban facilities for older people. The streets that directly connect to the major roads are also the greatest but other streets shown in yellow are difficult to access. In line with the participants' reports on the ease of access to health facilities and pharmacies, these are located in the highest segmented network system. The lack of open green spaces can also be seen in figure 3 as participants pointed out. The urban park located in the south of the area serves the whole district, yet it is inaccessible due to the housing units and other major restrictions such as slopes, which is another obstacle for older residents in this area.

Attractiveness of the neighbourhood

In Fatih district, participants clearly indicated that they often avoid spending time at parks due to the lack of sitting areas and safety concerns caused by crowds. Instead of visiting parks, female participants prefer to meet at home and spend time with their neighbours. But they also book a table at the nearest restaurant to spend time with friends once a month or two. Male participants; on the other hand, enjoy chatting with friends while heading somewhere or on the way back home. All participants share the same opinion that sitting at a café or a restaurant when they feel tired of walking due to the lack of sitting areas is an extra cost they avoid. Uneven pedestrian roads and ramps are other problems for them in that they restrain them from spending time outside. Therefore, they do not define the district as deficient in terms of attractiveness.

In contrast, Sişli district is also a well-known attractive shopping area with luxury brands, cafés, restaurants, and a shopping mall; thus, the place is very crowded in all the seasons and days of the year. Therefore, although participants are able to walk to get their certain needs met, the crowdedness of the place makes pedestrian routes even more difficult to walk. They added that when they get tired of walking, there is no sitting area to take a rest so they must sit at a café or restaurant, which is an extra cost. But, those who have higher income levels accept this situation normally. Meeting friends and socialising usually take place in restaurants and cafés. In this area, none of the participants said that they spend time or gather at religious buildings. The participants with higher incomes indicated that their outdoor activities are not affected by the obstacles or the insufficiency of the environment because they can commute somewhere else whenever they need.

Attachment to the neighbourhood

Although the participants in Fatih district complained about the inadequate quality of the urban environment, all of them highlighted that they prefer to remain in the same neighbourhood as they feel emotionally attached to the place. When they were asked about the key reasons for living in the area, they indicated that the area is the centre of the city and they have access to several urban facilities easily and quickly. Secondly, all of their friends and neighbours are nearby and they don't want to leave them. Lastly, despite the low urban quality, they said that the place is their home and they can tolerate the disadvantages. Also, as long as they feel happy where they live, they feel satisfied with their life. Participants were also questioned about what they would change about their living environment. The answers were related to having a nice and safe park around their homes, being able to access housing options as they prefer to live in the same neighbourhood, and the environment becoming more attractive.

The results are similar to Fatih in Şişli district. The participants indicated that were born there and would die there. Despite the lower urban quality, the lack of open space, and the limitations in performing activities, they do not want to leave the area. They said that they would remain to live in the same neighbourhood as long as they have friends and family around even though they have the financial independence to move somewhere else.

DISCUSSION

Population ageing has been debated among different types of disciplines and excepted as an inevitable issue that all countries are going to face. The discussions on ageing involve today's older people as well as being prepared for future populations. The suitable policies combine social and environmental issues and deliver urban planning policies for age-friendly environments. The fundamental expectations, first of all, need to be considered to deliver age-friendly services such as basic needs

for daily activities, health facilities, and open green spaces (Woolrych, 2017). However, the goal is not only to create more age-friendly environments but also to enhance the life satisfaction of older people. Although there is a correlation between urban facilities and life satisfaction, this study provides a deeper understanding of the effects of the urban environment on the life satisfaction of older adults. The interview findings were compared to the street connectivity of the study areas.

Participants highlighted that the walkability of their neighbourhood to their daily needs is a major support to their lives. Accessing basic urban facilities supports their independence as well as their life satisfaction. SS analysis of the areas supported these findings. Street connectivity here can be understood as greater accessibility, shorter and alternative routes, walkability distances and directness to basic needs (Talavera-Garcia & Soria-Lara, 2015). Older people who have limitations on walking and live in less walkable areas tend to have less life satisfaction (Frijters et al., 2004). In line with this, the results of this study also suggest that accessibility within walking distance should be the first step to promoting the life satisfaction of older adults. However, participants in Sişli, who have higher income levels, indicated that even though they cannot walk to get certain needs, they have the financial ability to afford a taxi to access there. This also shows that income level is also associated with life satisfaction (Blanchflower & Oswald, 2004) and for those who have a lower, affordable public transport is fundamental for an age-friendly environment.

Accessibility to basic needs leads us to the physical enticing of the living environment, which is attractiveness. Many researchers have argued that the physical environment and urban natural amenities have a boosting effect on life satisfaction(Winters & Li, 2017; Zenker et al., 2013). The age-friendly environment is also expected to advocate for the life satisfaction of older people by providing a convenient urban design. However, supporting walkability is not limited to only providing needs and stores nearby, it also means designing pedestrian roads conveniently, adding sitting areas in the routes, providing public toilets, lighting the area, and providing shelter places for sun and rain that encourage older people walk on the streets (Bahrainy & Khosravi, 2013). Participants said that they avoid walking because pedestrian roads are too bumpy, there is no bench to sit on when they feel tired or it feels unsafe if it is too dark. Accessibility itself is one dimension; however, encouraging walking by delivering high-level urban design quality is also necessary.

This study also revealed that attachment is another major factor contributing to life satisfaction along with accessibility and attractiveness. Older people become more attached to the places they live in as they avoid changes in both social and environmental (Fausset et al., 2009). Participants highlighted that they wish to keep living in the same area because they have all they need nearby, they can access to hospitals easily, and they have neighbours and friends close whenever they need

them. So, accessibility to not only the goods and needs but also to neighbours and friends is found to be an essential dimension of attachment to the place. Because knowing that they have the independence to access to all these make them feel safe and at home and they feel more attached to the place. As living close to the social network and basic needs have strong effects on the life satisfaction of older people (Oswald et al., 2011), participants highlighted that they would move to another house if they can afford but they would never leave the neighbourhood. Additionally, the 'if they can afford' idea here raises another important concern. Some participants have the financial ability to move to a house that meets their indoor needs in later life adequately, but some participants also indicated that they would want to move to a house where it gets more sunshine or has lift access. Although some participants in Fatih said that they are satisfied with their lives, the underlying expression seems to be austerity. They are happy with the accessibility and they clearly expressed their fear of losing these opportunities. They also think that if they move somewhere else, they would definitely change their house but not the neighbourhood. As a consequence, this study underlines that the level of income strong influence on place attachment as well as the life satisfaction of older adults.

CONCLUSION

This study measured objective conditions and subjective responses that have an influence on the life satisfaction of older adults. The objective and subjective indicators were categorised into three dimensions: accessibility, attractiveness and attachment. These three dimensions were analysed using both quantitative and qualitative methods. The first method was using space syntax analysis, which helped to understand the street networks and connectedness of urban facilities.

Secondly, subjective responses were collected through semi-structured in-depth interviews with older adults. The results led us to discuss what urban planning practice ideally should be like and how urban policy should focus on promoting the life satisfaction of older people.

It is a fact that making changes in the built urban environment in especially metropolitan areas is challenging for many reasons. Therefore, this study suggests a bottom-up approach such that local governments should focus on locality first and seek to improve urban quality in the neighbourhoods. The urban planning practice should focus on delivering safe, aesthetic and supportive neighbourhoods such as providing sitting areas and public toilets, eliminating safety concerns, improving lighting and shelters for rain and sun, and advancing greenery. In addition, the basic needs of older people should be accessible within walking distance and the walkability of the urban environment should be supportive regarding the barrier-free pavement designs.

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While urban policies to improve the life satisfaction of older people are a must, older people should also find their voice in the process. Therefore, the political representation of older people should be secured during the process. They need to find room for raising concerns in all kinds of areas such as the inequality of income levels, urban facilities, public transportation, and health services.

To sum up, this study concludes that the life satisfaction of older people is linked to accessibility, which mainly means walkability to them. Walkability is encouraged by the attractiveness of the living environment and especially accessibility enhances attachment to the place. On top of all these, income level takes a back seat as an influencer to either enhance or hinder the life satisfaction of older people.

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Resume

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Research Article

Defining the Impacts of Historical Development Activities on Urban Heritage of İskenderun (Alexandretta)

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Abstract

İskenderun, also known as Alexandretta in antiquity, has long been a strategically significant port city in the Eastern Mediterranean thanks to its natural harbour. Due to its advantageous location, the settlement began to rapidly urbanize after the mid-19th century as a result of the impacts of Ottoman and later the French Mandate period development activities. This article focuses on defining the influences of historical development activities on the urban heritage of İskenderun by understanding and evaluating various efforts that lie behind the formation of the city as an important trade centre and port city connecting the Middle East, Asia Minor, and Europe. By doing so, the formation, development and transformation of the settlement are chronologically deciphered regarding its historical turning points: the mid-19th century Ottoman period, the beginning of the French Mandate period (1919), and the joining of İskenderun to the Republic of Türkiye (1939). Accordingly, the characteristics of the urban form, the ways these characteristics were transformed, and the problems and strategies encountered within different periods are decoded. This decoding employed a combined methodology, including historical interpretation and case study research methods. The results of the study reveal that İskenderun has experienced different solutions for problems of infrastructure within the different periods, as a reflection of different political understandings and public and social needs among those periods.

INTRODUCTION

İskenderun, also known as Alexandretta in antiquity, has been a strategically important Eastern Mediterranean port city since ancient times because of its natural harbour. Throughout history, the city was ruled by the Seleucid, the Romans, the Byzantines, the Umayyads, the Abbasids, the Hamdani State, the Byzantines, the Seljuks, the Crusaders, Mamluks, the Ottomans, the French Mandate, and the Turkish Republic, respectively (Demir, 2016). İskenderun is located between the Mediterranean Sea and Mount Amanos at the south-eastern edge of Türkiye. This location supports close trade activities through terrestrial and maritime routes with the Middle East, Asia Minor, and Europe. Although İskenderun has existed since ancient times, it gained mobility at the end of the 16th century as the port city of Aleppo. From the end of the 16th century on, it had a significant role in terms of trade activities, but it was not suitable for inhabitation due to its being surrounded by large areas of marsh (Çelebi, 1982). İskenderun existed as a transit spot on the way to Aleppo and did not witness proper settlement and urban development until the mid-19th century.

The mid-19th century was a turning point for İskenderun in terms of both commercial and urban development. Since the mid-19th century, the volume of Eastern Mediterranean trade has increased with the impact of the Industrial Revolution (Özveren, 1994), and the need to get raw materials from the Middle East to Europe has also increased. This emerging development in commercial activities made it necessary to intensify the work on the marsh problem of İskenderun that troubled traders. Thus, periodic and regional improvements were achieved in terms of the marshes. Furthermore, the Aleppo-İskenderun Road became safe as banditry activities ceased (Cevdet Paşa, 1986). With these developments, a rapid increase in settlement activities began. The works carried out at this time were important steps towards converting İskenderun from a transfer port into a developed port city.

The development of the city experienced another turning point in 1919. This was the beginning of the French Mandate, which continued until the annexation of İskenderun to the Republic of Türkiye in 1939. İskenderun witnessed intense construction activities during the French Mandate period. These construction activities not only embraced the introduction of different building styles to meet the newly raised needs of the city, but also planning decisions and implementations on an urban scale.

The above mentioned three turning points concerning the history of İskenderun are important stages that affect the urban form. For this reason, this study has been carried out over the period intervals determined by these turning points, which are:

• Formation of place: The period covering up to the mid-19th century

- Development of place: The period which included intense implementations for urbanization, from the mid-19th century to the beginning of the French Mandate period in 1919

- Transformation of place: The period beginning with the French Mandate period and ending with the joining of İskenderun to the Republic of Türkiye in 1939

In relation to these turning points, this study aims to answer the questions below:

1. How did the urban form develop and transformed from the mid-19th century to the end of the French Mandate period (1939)?

2. What are the effects of urban implementations of different periods on urban form, regarding the important turning points of İskenderun?

3. How did the urban activities carried out in each period affect the next period?

Although there are many academic studies on the İskenderun's port trade, there is no study investigating the urban history, and the transformation of the city form of İskenderun. Other Eastern Mediterranean port cities, on the other hand, have been the subject of various academic studies[1]. In this respect, the examination of İskenderun's urban form and how it was formed, developed, and transformed will be a contribution to the literature related to Eastern Mediterranean port cities.

On the other hand, the newly established Turkish State carried out intensive urban activities in all Anatolian cities following the establishment of the Republic. The prepared development plans were put into practice during the Early Republic period. In almost all urban and rural settlements, public buildings have been built according to master plans. Today, it is possible to talk about "Early Republican architecture" for every settlement within the borders of the Republic of Türkiye, while İskenderun falls outside of this generalization. It is crucial in this regard to record the urban implementations that Iskenderun went through in this period.

A combined methodology, including historical interpretation and case study research methods, is used to answer the research questions of the study. Archival maps and photos documenting İskenderun during a certain period are analysed. Written sources giving information on different aspects of the city, including the physical environment, are examined. The visual archival materials and the written sources are compared and correlated to decipher how the city was formed, developed, and transformed. Field surveys are carried out at different times in 2017 and 2018 to fill in the gaps in the information coming from archives and literature sources. These field surveys were also helpful for deciphering the remaining buildings and urban forms from the earlier periods.

[1] Some of these academic studies are: (Abdel Salam, 1995), (Bilsel, 2000), (Masters, 1999), (Ünlü, 2020), (Ünlü, 2013), (Yenişehirlioğlu et al., 2019), (Kihtir Öztürk, 2006).

There is very limited information about the city form of İskenderun until the mid-19th century, namely the "formation of place" in this article. For this reason, an attempt is made to depict the period using travellers' notes. A detailed analysis is made of the following periods thanks to the diversity of the sources. The urban activities carried out in these different periods are analysed within the context of infrastructure works, streets, the built environment, open public spaces, and transportation. Through comparison, the effects of different periods on urban development activities are realized.

The main sources utilized in this study are archive sources consisting of a rich collection of visual materials in the form of old maps, old photos, and aerial photos. The maps dating back to 1851 (Ferhat Paşa, 1851), and 1896 (Monsieur Charles, 1896) were obtained from the Directorate of State Archives Ottoman Archives. 1916 dated map was obtained from the National Library. 1928 dated 1/500 and 1/1000 scaled cadastral maps were received from the Hüseyin Kanbolat personal archive. Old photos were mainly obtained from the archives of Orlando Carlo Calumeno (Köker, 2014), Mehmet Mursaloğlu (Mursaloğlu, 2000), and the Levantine Heritage Foundation. French Mandate period aerial photographs were obtained from Kanbolat archive.

The information coming from archive documents is supported by written sources. The guidebook written by Paul Jacquot (Jacquot,1931), 1908 dated Aleppo yearbook, the notes of Piri Reis, Jean Babtiste Tavernier, Evliya Çelebi, and Şerafeddin Mağmumi describe the social and spatial characteristics of İskenderun at different periods.

Although there is a wide variety of sources obtained within the scope of this study, they carry different limitations and obstacles in different respects. Travellers' notes do not provide detailed information about the built environment. Although a wide collection of old photos was obtained, most of their dates are unknown. Information related to the names of the streets, buildings, and open public areas is missing on the Ottoman maps. The visual sources of the French Mandate period are richer.

After the introduction, the article focuses on the formation, development, and transformation periods of the city according to the influence of different periods' urban development activities, together with the effect of the presence of maritime trade. Finally, the influence of different periods' urban development activities is evaluated and discussed as a conclusion.

THE FORMATION OF PLACE (İSKENDERUN BEFORE THE MID-NINETEENTH CENTURY)

Eastern Mediterranean port cities and trade centres gained mobility in the 16th century. The reason for this was the commencement of the Ottoman Empire's rule of Baghdad and Basra in 1534-1535. Thus, transportation between the Eastern Mediterranean ports, the Euphrates River, and the Persian Gulf, which were already under Ottoman rule, started to operate regularly (Oğuzoğlu, 2009).

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Beirut, Tripoli and Latakia are the closest ports to İskenderun, providing transfers between the inner regions of Syria and Europe. The port of Latakia was unsuitable for the entry of large tonnage ships due to its sand-filled area (Issawi, 1988). Therefore, in terms of the areas they transfer, Beirut and Tripoli are the cities with which İskenderun competes. Alexandria provides transfers between Yemen, Africa, and the south of Egypt, and Europe (Seyyid, 2000). In the commercial relations between the cities of Jaffa and Haifa, the route between Jerusalem and Europe is effective (Carmel, 2011) (Figure 1).

Figure 1. Eastern Mediterranean cities and trade routes (revised by the authors from the original map at the T.R. Directorate of State Archive, Ottoman Archive, Haritalar (HRT.h.) Archive Record, Folder no: 379)

In the mid-16th century, transportation between the inner regions of Syria and Europe was provided mostly via the Tripoli Port. However, political conflicts and corruption at this port caused an increase in the value of İskenderun in the later part of the century (Grisswold, 2002). By 1590 Europeans were almost exclusively using İskenderun thanks to its sheltered harbour, proximity, and administrative dependence on Aleppo, which was open to foreigners with its large commercial buildings (Masters, 1999). Another reason why the İskenderun harbour was opened to international trade in this period was that Damascus, one of the favourite centres of Eastern trading, was not large enough for traders due to the increasing commercial activities in the Eastern Mediterranean region. Due to this increase, Aleppo rose as a commercial centre in a short time, thanks to the size and wealth of its market and caravan routes that were safer than those of Damascus (Sahillioğlu, 1979, as cited in Acıpınar, 2017).

The information about the urban form of İskenderun is limited to the narratives of the travellers in the 16th century. According to Çelebi's depiction, "all four sides of İskenderun are reeds and marshes" (Çelebi, 1982, p.15). Tavernier, on the other hand, talks about the diseases and the poor air quality brought about by the marshes as follows: "*the air of*

İskenderun is extremely bad, especially in summer. It is dangerous to come here in this season. Even if you get rid of death, you can't get rid of dangerous diseases" (Tavernier, 2006, p.165).

Despite the fact that all travellers have brought up the marsh issue, there had been no study for two centuries regarding a solution to this problem. The first proper work could only begin with the construction of the İbrahim Pasha Canal in 1832. Although this channel temporarily solved the problem, over time it was filled with soil and sand and could not provide a long-term solution (Ürkmez, 2012).

The insufficiency of the built environment conditions is another issue mentioned in the narratives. Piri Reis describes the city as "a ruined castle on a low ness" (Reis, 2013). Therefore, it can be said that at the beginning of the 16th century, İskenderun was a very secluded place. At the end of the century, due to the use of the port, the city was revived. According to Braudel: "*Since 1593, the journeys towards Venice are no longer from Tripoli, but from İskenderun, where the Venetians transferred their connections and other Christian boats came to follow them. The new pier does not know the old chicane. Although it has less favourable conditions, it is closer to Aleppo. However, at this pier, the lack of warehouses for stocks of goods is annoying for the Venetians, and more than them for the Marseilles*" (Braudel, 1989, p.381).

In the 17th century, the customs building, the storehouses, the consulates, and the taverns that performed services such as entertainment and accommodation to the crew of the ships were present in İskenderun (Çelebi, 1982). Consulates provided residential services to merchants because of the lack of hans and/or hotels. While there were just two consulates as of 1638, within ten years, that number increased to seven (Çelebi, 1982; Tavernier, 2006). The inhabitants of the city consisted of Franks and Rums. The Rums operated taverns that served merchants. It is understood from Tavernier's depiction of *"a city where the old houses of the Rums are stacked on top of each other"* that the locals continued their lives under poor conditions (Tavernier, 2006, p.165). It is evident from the travellers' notes that the built environment started to be formed entirely based on trade in this century.

Even though the travellers' notes are invaluable sources for understanding various aspects of the city, it is not possible to decipher the built environment from these sources. Although some buildings are mentioned by travellers, their location could not be interpreted.

DEVELOPMENT OF PLACE (OTTOMAN İSKENDERUN AFTER THE MID-NINETEENTH CENTURY)

Despite the global usage of the İskenderun harbour, the marshes enclosing it prevented the development of the city until the mid-19th century. Therefore, İskenderun could not go beyond being a commercial spot dependent on Aleppo (Masters, 1999). The fact that Aleppo had hosted trade houses open to foreigners on long-distance trade routes and had been an important accommodation point was another reason why

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İskenderun could not be a self-sufficient and independent port. In this sense, the roles of Beirut and İskenderun were different from each other. Beirut, which was the natural port of Damascus, had been able to establish its market area and mercantile establishment in relations with foreign states since the beginning of the 19th century by taking advantage of the fact that Damascus was a traditional city remaining distant from foreigners (Özveren, 1994).

Mağmumi, in the last quarter of the 19th century, explains the condition of İskenderun as follows: *"Those who saw İskenderun 20 years ago say that there is nothing but customs administration and 40-50 shacks built by the locals in the reeds and on four posts. Today, there is a regular neighbourhood with a few hundred tiled roofed houses"* (Mağmumi, 2011, p.238-239).

Between the years 1840 and 1914, with the impact of the Industrial Revolution, the volume of Eastern Mediterranean trade increased approximately nine times. At the end of the 19th century, the trade volume difference between Beirut and its rivals such as İskenderun and Tripoli gradually closed (Özveren, 1994). During this period, most of the agricultural products were transported from Aleppo to the Eastern Mediterranean by road. İskenderun is the port with the most advantageous position among its competitors in terms of distance (Beşirli, 2004b).

In light of these developments, İskenderun entered a period of rapid urban development from the mid-19th century on. Tanzimat regulations have been effective in the rapid development activities in the city. Tanzimat regulations were the beginning of a modernization movement, implemented not only in İskenderun but also in most of the Eastern Mediterranean port cities. Foreign merchants' goals for the smooth operation of trade and their emphasis on the urban environment have been influential in the rapid modernization of port cities (Yenişehirlioğlu et al., 1995). Opening wide streets and docks, removing narrow streets and culs-de-sac, establishing grid-planned and street layouts, and the use of fire-resistant materials such as stone were among the most common of the new regulations (Özcan, 2006). The coexistence of people with different religious and ethnic origins was another factor that affected urban identity. 1908 dated Aleppo Province yearbook shows that İskenderun consisted of Muslims, Rums, Armenians, Assyrians, Maronites, Latins, and Jews (Eroğlu et al., 2012).

The feature that distinguishes İskenderun from other port cities is its marshy areas. Although it has many features of urban form in common with other port cities, it is seen that developments such as railway and modern port construction took place later due to the marsh problem.

Marsh drying works gained intensity after the mid-19th century. Many officers were assigned by the Grand Vizier to solve the marsh problem (Ürkmez, 2012). Among these, Ferhat Pasha (assigned in 1851) and Monsieur Sharl (assigned in 1896) come forward because of the maps they drew (T.R. Directorate of State Archive, Ottoman Archive, İ.DH.

Archive Record, Folder no: 244, File no: 14880; ŞD. Archive Record, Folder no: 2234, File no: 27) (Figure 2). However, as before, the attempts of these officers could not deliver a permanent solution to the problem.

The following notes from Mağmumi towards the end of the 19th-century prove the insolvency of the biggest problem of the city: *"The weather is heavy, humid, and hot in summer, as İskenderun was who are unable to escape and desperately remain in the town are distinguished by the waxy hue of their skin colour. Although the marsh area is started to fill for a few years, a technical method is not used. So, twenty years cannot be finished at this rate. Up to now, only the streets of the town could be filled and tiled. One cubic meter of land costs three kurus. And it is told that at some points, two or three cubic meters of soil was filled up"* (Mağmumi, 2011, p.240).

To accelerate the soil and stone filling works of marshy areas, it was decided to build a narrow-gauge railway line in 1894. For this purpose, 24 iron wagons and 2500-meter iron rails were built. In 1896 a "Marsh Commission" was established by Monsieur Sharl. This commission drew a detailed map and brought forward a proposal (Figure 2). Building a 2300-meter length, 1.80-meter height set, opening new channels, and adding 20 wagons and 500-meter rails to the narrow-gauge railway line were proposed (Ürkmez, 2012).

Figure 2. A. The marsh area in 1851 dated map (revised by the authors from the original 1851 map retrieved from Ferhat Paşa, 1851) B. The marshes and the collectors in 1896 (Revised by the authors from the original 1896 map retrieved from Monsieur Charles, 1896) C. The narrow-gauge railway line (Levantine heritage, 2018)

According to the 1908 Aleppo yearbook, some marshes were dried thanks to the works of the Marsh Commission, and the air of the city recovered (Eroğlu et al., 2012). However, three years later, on June 27, 1911, Hüseyin Kamil Bey, Governor of Aleppo, stated in his report that years of work and money spent did nothing but raise the marshy ground by one or two meters. Due to the lack of a regular plan and calculations in the works, the marshes could not be drained (T.R. Directorate of State Archive, Ottoman Archive, DH.İD. Archive Record, Folder no:44, File no:30 as cited in Sandalcı, 2005).

Although years of studies did not provide an exact solution for the
marshes, periodic improvements contributed to the development of the
urban fabric. These improvements made the city relatively liveable.
Looking at the 1851 map, the street patterns could not be deciphered
completely, but it can be said that the city consisted of streets that were
located irregularly without a main axis. Cul de sacs between the marsh
areas existed. Streets in the north direction, near the sea, are not shown
on the map (Figure 3).

Figure 3. Left: Streets in the 1851 dated maps (Revised by the authors from the original 1851 map retrieved from Ferhat Paşa, 1851) Right: Streets in the 1896 dated maps (Revised by the authors from the original 1896 map retrieved from Monsieur Charles, 1896)

The 1896 dated map shows that streets were spread on a much larger
area after 45 years. The grid system consisting of several streets
perpendicular to and a few streets parallel to the sea and the beltways
bordering the city were built. One of the two beltways bordering the city
was connected to the Aleppo Road, and the other was connected to
Pınarbaşı, the distribution point of drinking water (Figure 3).

The built-up area on the 1851 map is in the region where the organic
pattern is located on the map of 1896. The street pattern in this region is
mainly composed of culs-de-sac. At the end of the 19th century, besides
the organic pattern in which Ottoman influences are seen, there is the
formation of a grid pattern.

Many changes can be observed in the built-up areas in relation to the
change of street pattern from 1851 to the 1896. There was an increase in
the variety of buildings. Comparing the 1851 and the 1896 dated maps, it
is seen that the built environment doubled in 45 years[2] (figure 4).

While there are 13 monumental buildings according to the 1851 dated
map, 29 monumental buildings have been identified on the 1916 dated
map (Figure 5). The location of the customs office, old ruined Indian Han,
Rum Church, Mihail Elyan Han, British Consulate, quarantine building,
and ruined castle did not change over the years. The 1908 dated Aleppo
yearbook gives information about the buildings in İskenderun (Eroğlu et
al., 2012). From the buildings mentioned here, the location of a
government office, a military barracks, two mosques, four churches, a

[2] It is known that a great earthquake happened in the İskenderun region in 1872. However, due to the inadequacy of written and visual sources, the effects of the earthquake on the city could not be understood. This earthquake damaged two out of three of the structures in Antakya, which is 55 km away from İskenderun (Demir, 2016).

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hospital, a warehouse, two of the 21 coffeehouses, one of the four restaurants, two of the five liquorice factories, one of the two baths, and one of the six hotels have been deciphered.

The location of the six primary schools (Sıbyan) could not be detected. However, schools connected to churches are observed. The region where the hans and shops are located were identified with the help of old photographs, but only the name of three of the 17 hans are known. Although consular buildings, the École des Frères (School of the Brothers), post office, the Syria Lebanon Bank, and customs buildings are not mentioned in the yearbook, looking at the maps and photos reveals that these buildings also existed (Figure 5).
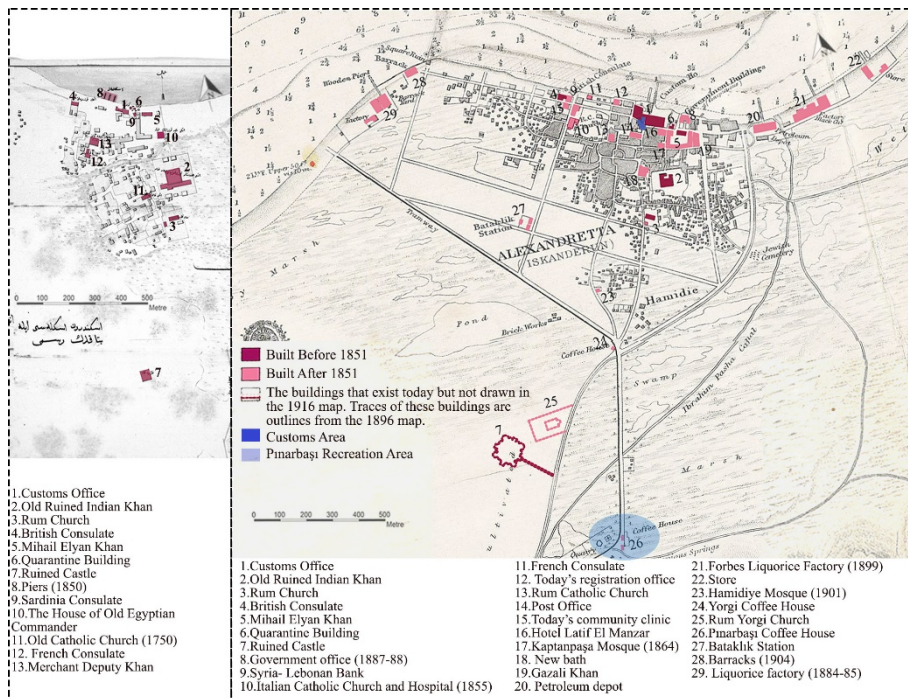
The photographs of deciphered Ottoman period buildings are diagrammed chronologically. Looking at this scheme and the photo showing the coastline (Figure 6), it is possible to get an idea about the increasing number and variety of buildings after the mid-19th century.

Figure 6. A. Monumental buildings and public open areas of the Ottoman Period (Prepared by the authors, 2020) B. The silhouette of the Alexandretta (Prepared by the authors on the photograph retrieved from Hatay Metropolitan Municipality, 2016)

Typologies such as government office, bank, and post office are the types of buildings formed after the Tanzimat. Stone material, which became common after the implementation of the Tanzimat regulations, was also used extensively in the monumental buildings of İskenderun. Similar structures were built in other Eastern Mediterranean port cities such as Beirut, Haifa, Jaffa, Alexandria, and İzmir under the influence of the modernization movement (Ünlü, 2020).

Among the residential buildings of the Ottoman period, the "huğ" house typology, is remarkable. Huğ is a traditional housing type seen in Çukurova and the Eastern Mediterranean region. It is built with timber,

reeds, and mud (Tokay, 2004). There are also examples of traditional Ottoman period houses located in the organic pattern.

Public open places such as parks and squares were not designed in the Ottoman period. Open public areas were composed of the customs area and the Pınarbaşı recreation area. The customs area was located at the intersection of the streets behind the customs building, where the materials to pass through customs were gathered. This area constituted a meaningful place with the bazaar that consisted of stores and the hans (figure 5).

Since İskenderun is a port city, one of the most significant factors in its commercial relations is transportation. Accordingly, works on road, rail, and sea transportation were carried out. Until the railway was built in 1913, road transportation was the only way to deliver raw materials from the inner regions of Syria to İskenderun. Therefore, the safety and quality of the road were important to traders. The completion of the İskenderun-Aleppo highway in 1866 (Tuncel, 2000) and the rescuing of the region from banditry activities in the same year provided vitality in trade (Yurt Encyclopaedia, 1982). However, the commercial volume of Beirut increased again due to Beirut- Aleppo railway built in 1910 (Beşirli, 2004a). The commercial activities of İskenderun were badly affected by the construction of the Beirut- Aleppo railway.

With the impact of the Industrial Revolution, the British, Germans, and French carried out many railway projects in the Ottoman lands in the 19th century. In 1903, in connection with the Konya-Baghdad-Basra project on the Baghdad railway line, the Ottoman State gave the Germans the privilege of establishing a branch line from Toprakkale to İskenderun. However, engineering problems due to difficulty in tunnelling in the Amanos Mountains and lack of funding delayed the construction of the Toprakkale-İskenderun line. More importantly, Britain, France, and Russia made the construction of the line difficult by creating political obstacles intended to protect their interests in the region. For these reasons, the construction was barely started by 21 March 1911 and was finished on 1 November, 1913 (Beşirli, 2004b). With the construction of the İskenderun-Toprakkale line, it was aimed to eliminate the commercial difference between Beirut and İskenderun. However, with the outbreak of the First World War, this expectation could not be met in the Ottoman period.

Although the construction date of the railway buildings is not certain, it is believed that they were built by the Germans in the same period as the railway line, due to the similarities they show to those built by the Germans in nearby stations like Yenice and Zeytinli (Şenyiğit, 2002). Just after its construction, the Toprakkale-İskenderun branch line was bombed and damaged many times during the First World War (Beşirli, 2004b).

Raw materials coming from the inner regions of Syria were transferred from İskenderun to Europe by sea, but there was no state-owned pier to ease the transportation of the goods to and from the ships

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in 1850. Various modest piers were constructed, but none of them could last long (Ürkmez, 2012). The government then privileged a construction and operation concession to a German company named Haydarpaşa Port Company for the construction of a new modern port. However, this again could not be achieved due to the First World War. Nothing was built other than the pier where small marine vessels could dock (Darkot, 1977).

TRANSFORMATION OF PLACE (İSKENDERUN DURING THE FRENCH MANDATE PERIOD)

After the First World War, today's Syria, Lebanon, and Hatay region came under the French Mandate. This region was as important to the French as Istanbul and the Straits. It is in a position that the French navy could easily reach (Yorulmaz, 1998). It is the region where all kinds of opportunities were available in terms of supplying the raw materials needed by the French for the industrialization process. That is why, after İskenderun was placed under French control, it experienced significant changes not only in its political environment but also in its cultural life and physical sphere. The French carried out intensive urban activities in İskenderun, such as opening new streets, designing new open areas, constructing monumental and residential buildings, carrying out infrastructure works, and improving transformation facilities during their governance for about 20 years.

To solve the marsh problem, the Public Works Technical Service was established in the Mandate period (Aslanoğlu, 2002). A detailed project was prepared in 1928 and implemented until 1931. The first intervention carried out was to dry the water coming from Pınarbaşı and its surroundings. For this purpose, besides filling the marshes, trees such as eucalyptus, acacia, and plane that absorb water were planted. Main and secondary reinforced concrete canals were built (Açıkgöz, 2008) (Figure 7).

As a result of these efforts, İskenderun became a sterilized city in 1931 and 400,000 cubic meters of the area were dried. The inner parts of the city were almost completely dried. Malaria cases declined steadily (Jacquot, 1931). In addition to the solution of the marsh problem, works on electricity, water and infrastructure systems were conducted in the first decade of the Mandate. Conducting other infrastructure works together with marsh drying works also achieved success (Açıkgöz, 2008).
 Looking at the 1928 map, it is understood that new boulevards were opened, and existing roads were extended and widened to improve the street pattern. Cayla Boulevard was built on the coast parallel to the seashore, right after the beginning of the Mandate (Aslanoğlu, 2002). Streets running perpendicular from Cayla Boulevard to Phare and Naher Streets on the city periphery, and parallel streets to Cayla Boulevard, form the grid street pattern. Grid pattern streets were left unfinished in some places due to lack of time and budget. Cayla Boulevard and its parallel Marechal Foch and Beauregard Streets, and Hamidiye and Eglise

Streets which run perpendicular to those, are the most important avenues where public buildings were concentrated (Figures 7).
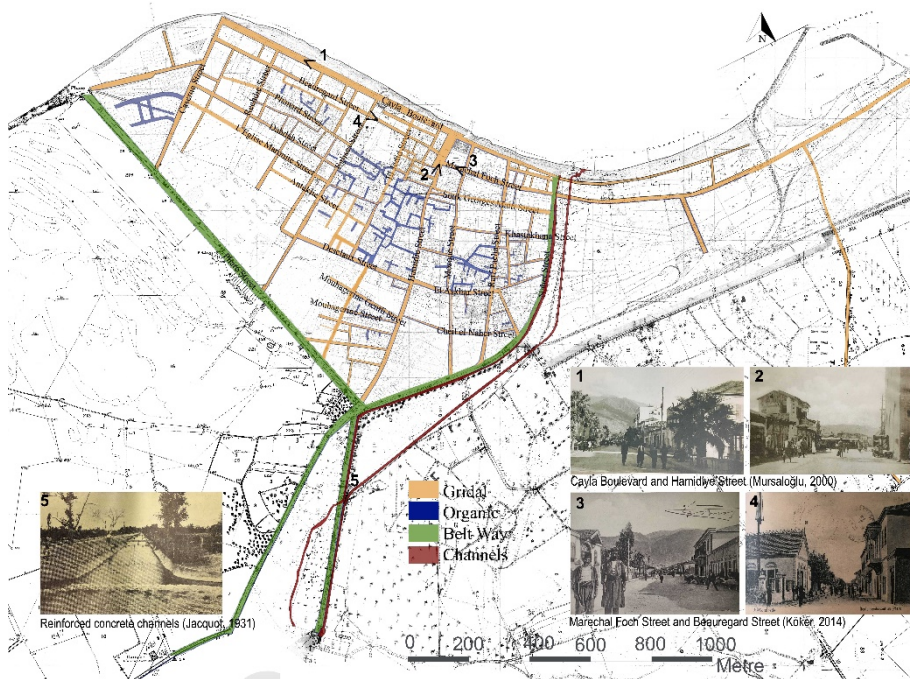
Figure 7. The map and photographs that shows the streets and channels of the city in the French Mandate period (Revised by the authors from the original 1928 map retrieved from Kanbolat archive)

The 1931 tourism guide contains information about the buildings in the city (Jacquot, 1931). Five of six hotels; three of nine restaurants; the government office; palace of justice; a new hospital; one of two baths; a synagogue; two mosques; one of three police commissions; the town hall; customs office; post office; French, British, Italian, and Iranian Consulates; chamber of commerce; two liquorice factories; and one electricity factory mentioned in this guide were detected on the cadastral map dated 1928. The number of churches recorded as six in the guide is ten on the 1928 map. The Russian Consulate, the Central Bank, and the Italian Hospital, whose names are written on the 1928 map, are not registered in the guide. The location of the Consulates of Belgium, Norway, Spain, Germany, the Netherlands, and the USA; two flower factories; two ice factories; exchange offices; one photographer's shop; one bookstore; one newspaper printing house; and one Syrian gendarmerie company could not be determined on the 1928 map (Figure 8).

Three different types of Mandate period houses are detected. The two-story villa type asymmetrical residences on Cayla Boulevard are one of the types. Buildings with neoclassical features, whose ground floor is used for commercial functions and the upper floor for residential functions, constitute another housing type. Finally, symmetrical structures with single-story, retracted entrances, rectangular jambs, and back gardens are also French-era structures.

1. Government Office
2. Palace of Justice
3. Civil Registry Office
4. Kaptanpaşa Mosque
5. Rum Orhodox Church
5-a. Rum Orhodox School
6. Italian Catholic Church
6-a. Italian Catholic School
6-b. Italian Catholic Hospital
7. French Consulate
8. Post Office
9. British Consulate
10. Hotel Syrie
11. French Police Station
12. Hotel Elyan
13. Gazali Khan
14. Municipality
15. Rum Catholic Church
16. Hamidiye Mosque
17. Syrie- Lebona Bank
18. New Bath
19. Todays' Community Clinic
20. Rechdie School
21. Licorice Factory
22. Electricity Factory
23. Pinarbaşı Coffee House
24. Petroleum Depot
25. Licorice Factory
26. Storage
27. Barracks
28. Rum Yorgi Church
29. Hopital Nouvelle (New Hospital)
30. Italian Consulate
31. Des Seours School
32. Maronite Church
33. Chaldean Church
34. Syrian Catholic Church
35. Armenian Orthodox Church
36. Synagogue
37. Rum School
38. Italian School
39. American School and Church
40. "De Letat" School
41. "Des Freres" School and Church
42. Beach Club
43. Saray Restaurant
44. Russian Consulate
45. Iran Consulate
46. Chamber of Commerce
47. Hotel Sarraf
48. Slaughterhouse
49. Military hospital
50. Station buildings
51. Stores
52. Lighthouse
53. Port Structures
54. Central Bank
55. Ankara Palas Hotel

Figure 8. Monumental building and public open areas in 1928 dated French Mandate period map (Revised by the authors from the original 1928 map retrieved from Kanbolat archive)

It is not possible to generalize the characteristics of the buildings of the Mandate period. According to Açıkgöz, the most important reason for this is probably that there was no comprehensive planning in İskenderun as in Algeria and Morocco, which were under the French Mandate in that period. Instead, work was carried out in pieces (Açıkgöz, 2008). Reflections of this condition can be read from the monumental structures. Many buildings with different architectural styles were built. While some of the buildings have local influences such as courtyards, crown doors, and mosaic coverings, some of them feature the characteristics of neoclassical architecture with their Palladian windows, pediments, and jambs (Figure9).

In the 1931 tourism guide, it is mentioned that a plan was made to improve the city. It is stated that 1200 meters long, 25 meters wide Boulevard was opened; the courthouse, police station, prison, and quarantine buildings were built; and a large hospital had just been completed. Also, the construction of the power plant, public works atelier, customs buildings and reinforced concrete canals were mentioned (Jacquot, 1931, p.67). As a result of reviewing the written and visual sources, no other information could be found about the scope, details, and drawings of this plan. This situation gave rise to the possibility that the aforementioned plan might not be very comprehensive, as Açıkgöz stated.

Public open spaces were built at both ends of Hamidiye Street in the Mandate period. Following the demolition of the customs building and the buildings to the west of the customs building in 1924 (Aslanoğlu, 2002), a square, and adjacent to it a public garden, were built here. The

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square was formed by the expansion of the customs area behind the destroyed customs building, towards the sea. Its name was designated as Gouraud Place, after the French Commissioner Gouraud. In the following years, new structures such as the palace of justice, the chamber of commerce, and the Beach Club were built surrounding the square (Figure 9). Another public garden was at the intersection of Hamidiye Street with El Naher and Phare Streets (Figure 8).

Figure 9. Monumental buildings of the Mandate period (revised by the authors on the photograph retrieved from Hatay Metropolitan Municipality, 2016)

Apart from these public open spaces, it is known from the written sources that there was a new square opened in 1937. This square was named after High Commissioner Pierre Durieux (Açıkgöz, 2008). However, no other information was available regarding the location and planning features of the square.

Besides the construction of new buildings and public open spaces, regulations were made to improve the transportation routes to the city and thus to develop trade. One of them was the construction of the modern port project that could not be built due to the First World War. For this purpose, in May 1921, the İskenderun port concession was transferred to the Mandate administration. Emergency works such as the renovation of the dock and the construction of the railway from the train station to the port were completed. Later, new buildings, hangars (with a capacity of 4000 square meters), and a lighthouse were built at the

entrance point of the dock, and the 200 meters long quay strip lit up
(Figure 8) (Açıkgöz, 2008).

In addition to the construction of the port, works were carried out on
the highway and railway. While the Antakya-İskenderun Road was
rebuilt during the Mandate period between 1922 and 1923, The Aleppo-
İskenderun Road and İskenderun's railway which was damaged during
the First World War were repaired. The İskenderun-Suveydiye road was
built to allow travellers to travel together with stopovers (Açıkgöz, 2008).

EVALUATION AS A CONCLUSION

It is possible to discuss how the urban form has changed and how
different periods' urban practices have impacted the İskenderun city's
form as a result of the analysis carried out. The conclusions of the study
can be summarised as follows:

• Despite all efforts during the Ottoman period, the marsh problem
could not be solved permanently. The work done provided recovery for
only a few years. Despite this, the periodic improvements provided by the
works carried out in this period paved the way for the construction of
new buildings and streets for the refinement of the urban form. The lack
of a permanent solution and the effort and money spent to solve this
problem have caused urban development to progress more slowly than
other port cities in the Eastern Mediterranean. With the solution to the
marsh problem during the Mandate period, the construction works have
progressed more quickly and safely.

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Figure 10. Transformation of the
streets (Prepared by the authors,
2020)

The streets forming the grid pattern seen on the map of 1896 were extended and widened during the Mandate. Many new streets were built running perpendicular to each other. The organic street pattern where the city was first formed was largely preserved both during the late Ottoman and Mandate periods. The grid plan streets built as an effect of the Tanzimat regulations during the Ottoman period facilitated the rapid expansion of this texture during the Mandate period.

The streets could not be completed due to insufficient time and budget in the French Mandate period, showing that the French shaped their urban activities in hopes of being permanently present in İskenderun (Figure 10).

• Considering the criteria such as the designing of the built environment and the functional positioning of the buildings in the Ottoman and French Mandate periods, it can be said that the most important change between the two periods was the growth of the city in the east because of the construction of the modern port and railroad. Other functions continued to exist at different scales in approximately the same areas during both periods. The change in regime and the increasing population raised the need for administrative, health, education, and residential buildings during the French Mandate period. To meet these needs many buildings were designed such as the palace of justice, the chamber of commerce, a new hospital, and the "Des Sources" school. The number of houses was increased, and they spread to a wider area. Villa-type stone houses on the beach, single-story stone buildings, and two-story neoclassical buildings were added to the Ottoman period huğ houses and two-story Ottoman house typologies. The diversity of people from different nations led to an increase in the diversity and number of religious structures (Figure 11).
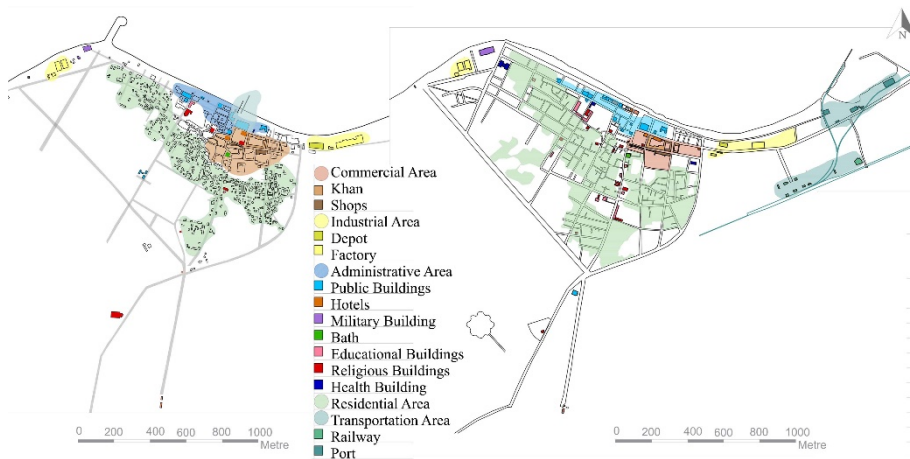
Figure 11. Functional distribution of the Ottoman and Mandate period buildings (Prepared by the authors, 2020)

The continuity of monumental buildings has been at a high rate. Twenty-one of the 55 monumental buildings that existed during the Mandate and whose location is known were built during the Ottoman period. It is observed that only four Ottoman period monumental buildings were destroyed. These are the customs building, marsh station,

quarantine building, and Yorgi Coffeehouse. Mihail Elyan Han and the post office changed their functions and were converted to hotels. Although the government office was built in the Ottoman period, it was renovated, and additions were made during the French Mandate period.

The previous period's buildings are either preserved or functioned with needed uses during the Mandate period. This attempt reveals that the public works of the Mandate period did not aim to erase the traces and remains of earlier eras, but rather to articulate the existing city form as a core for the addition of new urban forms and buildings. İskenderun is a city that developed during the modernization movement brought by the Tanzimat regulations. In this respect, it can be said that İskenderun did not have a typical Ottoman city form before the Mandate period and this might be the reason for keeping it.

•   There is an apparent difference between the two periods in terms of constructing public open spaces. Public open spaces, which consisted of a recreation spot and customs space in the Ottoman period, were replaced by squares and public gardens during the Mandate period. The rare implementation of open spaces during the Ottoman period means that the Tanzimat regulations related to public open spaces were not implemented in İskenderun. For this reason, new squares and public gardens were built during the Mandate period as a reflection of modernisation.

•   The foundations of road and rail transportation were laid in the Ottoman period, and the existing roads were repaired and improved in the Mandate period. The modern port, whose negotiations were initiated in the Ottoman period, could not be built. Rather, it was built during the French Mandate period. The construction of the station area outside the city during the Ottoman period also affected the urban form in the following period. For this reason, port facilities were built outside the city, close to the station area. This situation caused the transformation of the urban form in a way that it started to be established and developed around the pier. This new port location has had a positive effect on the security of goods. However, in the city that existed and developed as a port city, the relocation of the port and customs building outside the settlement negatively affected the relationship with other commercial structures benefiting from the port, such as the hans and the stores in the bazaar region.

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Impact of Sustainability Transition in Moroccan Cities' Identity: The Case of Benguerir

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Abstract

Whether internationally or in Morocco, the construction industry is one of the world's most energy-consuming industries. Nationally, this sector is estimated to account for 33% of total energy consumption. In addition, the construction industry is one of the highest producers of GHG emissions. For these reasons, Morocco has taken steps to reduce the sector's impact on the economy and the environment. That's why the green sustainable cities trend has started in the last decade. Globalization trends and efforts to keep the concept of sustainability alive in a concrete city have brought along many conflicting choices. Moroccan cities are known for their strong identities due to the long process of shaping these cities throughout history. But new sustainability trends seem to introduce new colors that can strip them of their identity. This article is a research paper for the arid climate city of Benguerir, located in the South, one of the green cities of Morocco. Green represents a challenging context for implementing sustainability. This study reveals the different parameters of sustainability in cities, how important urban identity is, and how it can be perceived and discusses the transition and identity changes of cities. The case study exemplifies the Moroccan context, the reason behind the need for Moroccan green cities, the efforts of the government, and the problems green Moroccan cities may face when trying to preserve their identity. Benguerir is an example that has achieved various sustainability parameters and represents the policies of Moroccan green cities. The city can also represent upcoming challenges for cities in a similar context.

INTRODUCTION

The term sustainability derives from the word "sustain". It was first mentioned in the field of forestry, with growing forest segments in Europe becoming harmful to the system and increasing concerns about forest regeneration. The term then was introduced as a "sustaining method for forestry" towards the end of the nineteenth century (Wheeler & Beatley, 2014). Since then, the word had been integrated into several fields. The concept has long been glued to the "green term" and environment field. One of the earliest pieces of literature mentioning it was by Ebenezer Howard, in which the author described the problem of the spread of industrial cities in contrast to farming fields. The book "Garden Cities of To-morrow" had been a reference for urban designers and planners (Howard, 1898). It also inspired fantasies about the integration of gardens into every corner of the city and created the excessive garden suburbs that spread across American cities. Mumford had been vocalizing about the same problem of the scary spread of the cities' size and population with no breathing space (Mumford, 1938). The growth of the cities was not the only problem, the growth was uncontrollable with many compacted buildings disregarding the dweller's own interests. After the Second World War, the fight between nature and human seems to not subside yet, (Leopold, 1949). Until the sixties, it was not realized that cities should emphasize the relationship between buildings and users. The cities should no longer be economic boosters but also a place of belonging and living. Small-sized neighborhoods with streets that encourage pedestrian usage were actually more favourable (Jacobs, 1961). Another scholarly work that made a sensation in the seventies was the optimistic approach of Ian L. McHarg on living in harmony with nature as he proposed in "Design with Nature" (McHarg, 2014).

It appears that the concept of sustainability had since then shifted from the simple integration of nature and greenery to the design to go beyond it. This shift could be clearly stated in the book "Limits to Growth". It was a quantitative study that put sustainability in the mainstream again. It started all the current problems with the overgrowing economy while disregarding the limitations of the resources, the excessive population growth, and the wide gap between rich and poor (Meadows, Meadows, Randers, & W., 1972). "Sustainability […] speaks of the greatest change in human thought and behaviour for 3000 years" (Nhamo & Mjimba, 2019). The authors have actually marked by this expression a turning point in human history. It is no longer a matter of surviving by any means but a matter to survive globally. Thus, new models for economy and development were needed after the predicted failure of past growth. New measures for development should be introduced, so that these new measures take into consideration the human well-being factor. The progress was finally glued to an overall approach that took world's sustainability into account (Daly, 2014). The oppressing climate change and its consequences had also played a big role in catching international concern to the dilemma between economic progress and

decline of human, which led to the launching of the United Nations Governmental panel in 1987 (World Commission on Environment and Development, 1987). Sustainability since then has been taken seriously by the United Nations and the committed countries. Rio Declaration had set 27 principles to take into account as well as the famous eight United Nations Millennium Development Goals (The Rio Declaration on Environment and Development, 1992).

The committed nations of 125 countries are obliged to give a five-year report on their progress. Despite the progress made, the continuing efforts are still lacking to save the world. The cities had decided to join the inclination especially construction sector consumed the most after transportation (International Energy Agency, 2019). Over the years, the trend of sustainability had been even more reinforced and prominent which had made the term lose its vitality. The claim has been long to seek the best balance between the natural and the manmade, as some of the extremists would find that the return to the starting point of evolution is a must (Campbell, 1996). However, sustainability, as a term, is about moving forward for a better future. In the following years, the eight-millennium goals had been revised into 17 Sustainable Development Goals, which were more global and targeted the pressing matters of the world (United Nations, 2015).

Sustainability is now globally accepted as fulfilling the needs of the present without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987). Therefore, green sustainable cities are cities that can compensate the needs of their citizens while having the ability to provide the same for future generations (McGeough, Newman, & Wrobel, 2004). According to (Hald, 2009), a green city is a city that provides an acceptable standard of living for its human occupants without depleting the ecosystems and biochemical cycles on which it depends.

In summary, this paper aims to trace Moroccan cities' identity and sustainability transition. It would first discuss green cities and sustainability parameters of literature, then introduces cities' identity parameters. Finally, the paper represents a study case; Benguerir Moroccan green city to discuss its sustainability transition and identity.

GREEN SUSTAINABLE CITIES, PRINCIPLES, AND HISTORY

Sustainability in general embodies different aspects that developed into different approaches undertaking social, economic, and environmental aspects. The intersection of these approaches as well as the constant management of them would make a green sustainable city. As sustainability means "changed development measures", nowadays "the three Es": economic development, environment quality, and equitable society are the pillars of any successful green sustainable city (Doug & Wrobel, 2004). The integration of the economic and environmental aspects to development was due to the anticipated decline of the economy after all energy is used and pollution accumulated (Morrisey, 1999). Therefore, an acceptable standard of living does

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include the social and economic, and environmental aspects of the city that provide such standards (Hadi, 2008).

As more cities are willing to integrate sustainability, various standards to measure sustainability were made for international uniformity. Those standards measure the city's performance from a citizen's point of view, as well as its vulnerability to future impacts, and its' adaptation capability. Since sustainability cannot be implemented for a short time efficiently, the assurance of the durability of the principles implemented should also be guaranteed by the measures. According to ethnographic research conducted to investigate the experience of citizens in different cities, four different city clusters could be defined: Balanced Innovators, Post-industrial Opportunists, Evolutionary Cities, and Fast-growing Megacities (ARCADIS, Design and Consultancy for Natural and Built Assets, 2018). The clusters actually reflect the behaviors of the city thus explaining their index rating and the results of the measures. For instance, Istanbul as well as our case study, Benguerir are evolutionary cities. They are quickly developed and change constantly. People's involvement in these cities is limited, thus it makes them perform inadequately in such index.

A few models for sustainable green cities were developed such as McGeough, Newman, and Wrobel's (2004) model which classified the parameters into Natural Systems, Land Use Systems, Mobility Systems, Energy Systems, Environmental Management Systems, Building Systems, and Governance Systems. These systems were translated into more practical parameters to be analysed by urban designers and architects later on.

Table 1. Sustainability parameters for green cities in literature, source: *(Rharbi, 2023)*.

Author	(Wheeler & Beatley, 2014)	(McGeough, Newman, & Wrobel, 2004)	(Fraker, 2013)
Urban Design And Function	*	*	
Environmental Planning	*		*
Sustainable Energy, Resources	*	*	*
Social Equity	*	*	*
Environmental Justice	*		
Economic Development	*	*	
Land Use Optimization		*	
Transportation	*		*
Food System and Health.	*		
Material Use	*		*
Water			*
Waste			*

As the above table shows, common parameters can be highlighted as following:

Social Equity: The city should be able to provide an infrastructure for all mix, and opportunities for all, be it immigrants, middle class, or poor. The

social aspect is essential, therefore social equity is considered an important point for the quality of life in the cities (Pacione, 2003).

Sustainable Energy and resources: Sustainability, essentially embodies immediate impact of the construction on the environment, thus any measure that could minimize the greenhouse gases is primordial. Limitations to energy consumption for cooling and heating needs are imposed by kWh/m2 yearly depending on the building usage. The calculation methods could differ according to the simulation software used, as well as the occupant behavior could play a role in changing the expected consumption. In order to answer those needs, sustainable green cities should provide a clean resource that would at least partially cover a part of the demand, such as solar panels, it also refers to self-energy production by integrating green energy resources: Solar, wind, etc…

Materials: Even though it was not considered as a primordial parameter by some researchers, however following our study, construction materials should be as local as possible to prevent transportation fees and energy waste, the longevity of materials is important as well as their life cycle.

Environmental Planning: Integration of nature in the best way possible, the greenery should be planned where to be put, and how to be used, it is not just for aesthetic purposes only.

Urban Design and Function/ Land Use: It is the most crucial parameter that generally determines the choices made to integrate sustainability and the city's identity. To do so, the involvement of citizens in urban design choices is essential. There should be a place for people, that ensures mixed-use for a wider range of the society to settle down, diversity of form and functions as well as well management for the community (Yeang, 2000)

CITY IDENTITY

Identity is a wide concept that cannot fit one dimension. It can hold various meanings depending on the context used. The identity of a person could have signified the name age and maybe security number. It also could mean the culture, history, memory, or simply the sense of belonging (Heidari, 2016). One cannot define identity without context, which is why Berger said: Identity is "socially bestowed, socially transformed" (Berger, 1963). Lynch classified identity into two categories such as the sense of recognition and the emotional aspect (Lynch, 1960). The sense of recognition is the sense of belonging, the ability to recognize a group, space, an environment and predict it. The second category is the bound that is created by the sense of recognition. For Castells, identity is seen as a process and not a fixed definition (Castells, 1997). It is a process to identify, recognize, and get attached to it.

For instance, identity can be given or defined. The new city's identity is essentially premade on the marketed image; however, this instance can be changed according to citizens' interactions with the city. The sense of place planned by means of architecture can strengthen the local identity (Yeang, 2000).

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Table 2. City architectural identity parameters and patterns, source: (Rharbi, 2023)

Identity characteristics	Definition	Pattern		
Spatial Optimization	City general organization and planning design principles (Ex: circular city; Al falah project Dubai; Grid City; New York; Organic City: Medina of Fez)	Circular City	Grid City (Mass in voids)	Organic city (Voids in mass)
Semantic Organization	Signs, perceptions, and experiences that keep the community's identity	-		
General Design Principles	Forms used to organize the urban space such as parcels distribution	Closed parcel	Semi-open parcel	Continuous parcel
Shapes and Forms	Buildings' forms and shapes	Courtyarded building		Multi-storied one-block building
Materials	The material used for which aims, such as opacity, transparency, local materials…	-		
Relationship with Context	The physical relationship of buildings with their surroundings: Physical one, visual one by using transparency, uniform color or design…	Physical relationship		Visual relationship

A city's identity specifically can be attributed to several features such as religion), language, climate, topography, and landscape these attributions actually create a unique environment that is then linked to the people. How they interact with it is what creates the identity of the individuals, (Oktay & Bala, 2015). It is then a mutual relationship where the city gives, people take, and they give back. To understand how architecture can manifest the identity, Torabi and Brahman had identified the main characteristics on which we will base our research in Table 2 (Torabi & Brahman, 2013).

TRANSITION AND IDENTITY

Transition or any form of transformation in architecture is essential for continuity (Chris, 1997). The case is that architecture needs to keep up with time. To ensure that, various elements need to change be it architecture styles, forms that reflect how we live our lives, etc. If identity ensures the continuity and the link between architecture and people, then we can conclude that transition holistically should not conflict with identity.

Architectural transitions usually try to consolidate, reorganize or revitalize the history in an attempt to keep the identity (Akkurt, 2012).

The aim is to keep the memory as it is what makes people realize their identity (Tran, 2010). The architectural transition may state "a new identity" or continue "an existing one", that is why it is important to know the context of implication, its' past and present, and try to develop new opportunities for new architectural narratives that would contribute to the development of the place (Bruzzone & Borghi, 2013).

According to world urbanization prospects back in 2014, the urbanization rate is the fastest and is estimated to increase especially in developing countries around the world. The African continent is not an exception to these changes. This fast rate has various implications such as the demographic growth not matching the economic growth of the country leading to internal migration to the cities for better opportunities. This leads to a housing shortage and thus shows itself as a catalyst for fast urbanization. It is also caused by the fast economic growth, implying a fast market change, and the need for new infrastructure, and new lifestyle, as it is experienced in many of the Gulf countries. Regardless of the reason from which the fast urbanization stems, it is also known that it is not only an expansion of urban footprint but also a spatial transformation of the society and therefore represents a cultural evolution (Wheeler & Beatley, 2014). In a way, urbanization itself is a transition in many fields.

MOROCCAN CONTEXT
Moroccan cities' identity

It is widely known that Moroccan cities have a long history from pre-Romans, Roman, Amazigh, Arabic Conquest, Portuguese, French, and Spanish Colonization, both post-war, and post-dependency. The cities have unique characteristics and strong identities displayed architecturally by materials, geometry, urban texture and hierarchy… Each period has distinct characteristics adding to the existing identity of another layer. The current state of Moroccan cities is the overlaying of strong identities impacting each period and coming together. Unfortunately, the dominant narrative of the Middle East or North Africa region, Morocco as included had for long ignored these aspects and only focused on the "narrative of the underdeveloped" as if the identity of these cities is the state of underdevelopment. The Moroccan cities had been, for centuries even before colonization, in constant development and self-creation, thus way before modernism. The impact of colonization had only contributed to the continuation of the development (Elsheshtawy, 2004).

Most of the imperial cities have distinct features: walled cities or fortresses for protection reasons. The overall organization is growing organically with the growth of the city around a center. The growth is spatially around mosques with the presence of necessities such as fountains, schools, or high education institutions called "madrassa". The houses were spatially inspired by the Andalusian courtyard houses typical for the region of Arab cities, and Amazigh "Ksours" or fortified villages that are known for their geometrical shapes and clay use. Overall,

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the cities had strong characteristics influenced by the culture and the climate needs, (Escher & Petermann, 2001), (Figure 1).
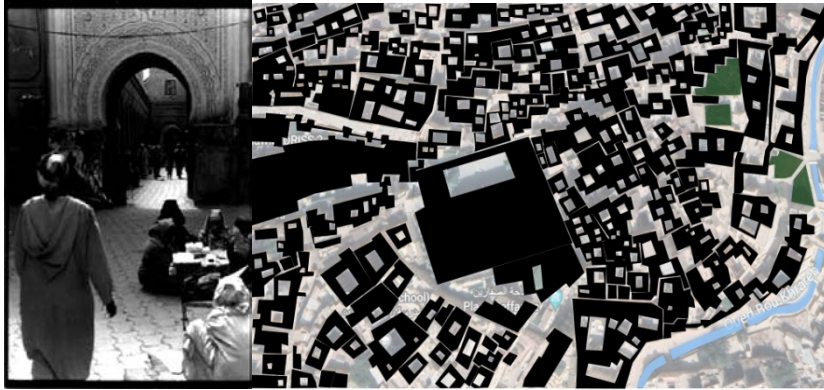
Figure 1. Left: Old Medina Compositions: Narrow streets, (Esher& Petermenn, 2001). Right: Fez city old town mass and void, Authors

With the start of colonization, city centers had shifted from the traditional center of the walled cities to the exterior of the cities (Ezeddine, 1984). The new French center that they called "Ville nouvelle" was planned by foreign architects and urbanists, French in particular. The cities were built with French design principles as possible to familiarize with the French people accommodated in the new city center. The big boulevard ended with the train station or the city councils, the central post, and hotels laying on the side of the boulevard, then the residential apartments and villas were planned behind it. The post-French colonization had a significant impact on shaping Moroccan cities. One of the reasons behind it is the need of bridging the old historical parts of the town with the new settlements created by the radical changes. However, Post-colonization Moroccan architects were mostly graduates of French schools. Thus, the French style dominated the so-called Moroccan post-colonial architecture. The years between the 1980s and 2000 were marked by economic problems and intense drought leading the agricultural country to lose its youth population from rural areas to urban areas. The consequences were fast urbanization, slums, and unshaded cities with problematic neighborhoods that showed intense social, and economic segregation (El Otmani, 2018). This period is also marked by the resettlement of the Medina dwellers. The economic crisis affected the dwellers of the old town, making it harder, for families, to take care of the old historical houses. Another reason for the shifting of the dwellers from Medina to the "new center" was the work opportunities for the younger generations created in the newer parts of the city as well as the augmented proximity and accessibility.

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Table 3. Architectural identity characteristics of Moroccan cities through time. Source: developed from *(Rharbi, 2023)*

Time Frame	Spatial Organization	Semantic Organization	General design Principal	Formal Approach	Building Materials	Relation with the existing context
Imperial Period 1100-1600	Organic growth. Voids in mass	"Privacy" reflected in society and buildings	Walled cities or fortresses	Vernacular architecture	Clay, stone, wood	Related
Colonization period 1912-1956	Strong hierarchy, Mass in voids	"Oppression" by introducing bigger forms, massiveness	Foreign Aesthetic, Purist Approach,	Art décor, Modernism	Concrete	No relation
Post Colonization 1960-2000	Semi-structured planning, Mass in voids	French dependency by reflecting the same shapes	Simple and functional	Modernism, Deconstructivism	Concrete	No relation

After 2004, intensive development programs were undertaken to bridge the different parts of cities and to minimize the gap between these differences. The country's politics has made it clear that sustainable development is the only solution for the country, unlike other countries in the MENA (Middle East and North African countries) region that do not have Gas or Oil. As reflected, more slums have been eliminated by the intensive redevelopment of segregated areas of the city, especially after 2010. (Dahir n°1-10-200 dated 23 moharrem 1432 (December 29, 2010) promulgating the Finance Act n° 43-10 for the budgetary year 2011, 2010). In addition to new urbanization acts, another phenomenon had begun, particularly with the country's efforts to sustain and promote the tourism industry. After that, foreign-accommodated communities had formed in the old Medina such as artists or retired Europeans might easily afford to maintain the city's historical areas (Escher, 2016).

Table 3 shows that pre-colonial, colonial, and post-colonial Moroccan cities all have distinct identities. The initial period is characterized by vernacular architecture. The second period exhibits the modernist movement in a colonial environment. The final period is characterized by a return to vernacular architecture while preserving the French legacy.

Law and regulations that framed sustainability in Morocco

As it is assessed so far, a general policy was implemented in various fields framing sustainability in order to boost the development of the country. In urbanization sectors, different actions were taken as shown in Table 4. Within the frame of regulations, a thermal regulation was, for the first time, implemented to minimize the energy consumption in the building sectors.

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Table 4. Moroccan Government efforts for sustainable cities

Years	Actions
2004	"Cities without slums" Program
2010	ADEREE: Development Agency of Renewable Energies and Energy Efficiency
2011	Zenata Sustainable City: CDG development, Call for expressions of interest, New City of Zenata
2012	Benguerir Green City project: Launched by OCP Group
2016	AMEE: Moroccan Agency for Energy Efficiency
2016	Eco-Projects: Djemaa neighbourhood, Gueliz neighbourhood by BET International "Territorio y CUIDaD"
2017	Referential for sustainable town planning
2018	RTCM: Implementation of Moroccan Thermal regulations of construction by the Decree No. 2-13-874
2020	Eco-City Benslimane: Ministry of Development, town planning, housing and city policy; Promotion of an ecocity in Benslimane

BENGUERIR CITY

Benguerir city is not an imperial city. The settlement there had been mostly due to the military presence in the region. The city is 50km from Marrakech, one of the oldest imperial cities of Morocco. The development of the city was only due to the necessity of the growth of the phosphate mining industry nearby.

In 2012, "Office Cherifien for Phosphate", more known as OCP (Moroccan state-owned phosphate mining company) had the idea to stylize the city of Benguerir. Their new vision was to create "a green city" that is centered on research, thus creating a research hub. Their focus point was to create a university that would help start and boost the city (SADV (Société d'Aménagement et de Development Vert, OCP), 2012). The city aims to hold 91000 dwellers. The initial phase had been achieved containing; Education Quarter: Excellency High School, phase I of the Mohammed VI Polytechnic University; Tech Park zone including Data Center, Innovation Incubator, Green Park Energy Center, Green Smart Houses Park with Solar Decathlon 2018 prototype houses; Residential Quarters: Research villas neighbourhood "Villas Chercheurs", Marguerite villas neighbourhood. The old and original part of the city that was the initial settlement, had continued its growth, especially with the economic boost of the green city and the increased job opportunities. New neighbourhoods are still built in the North part of the city. Accompanying this growth, the continuation of the green city of Benguerir is in the South direction (Figure 2).
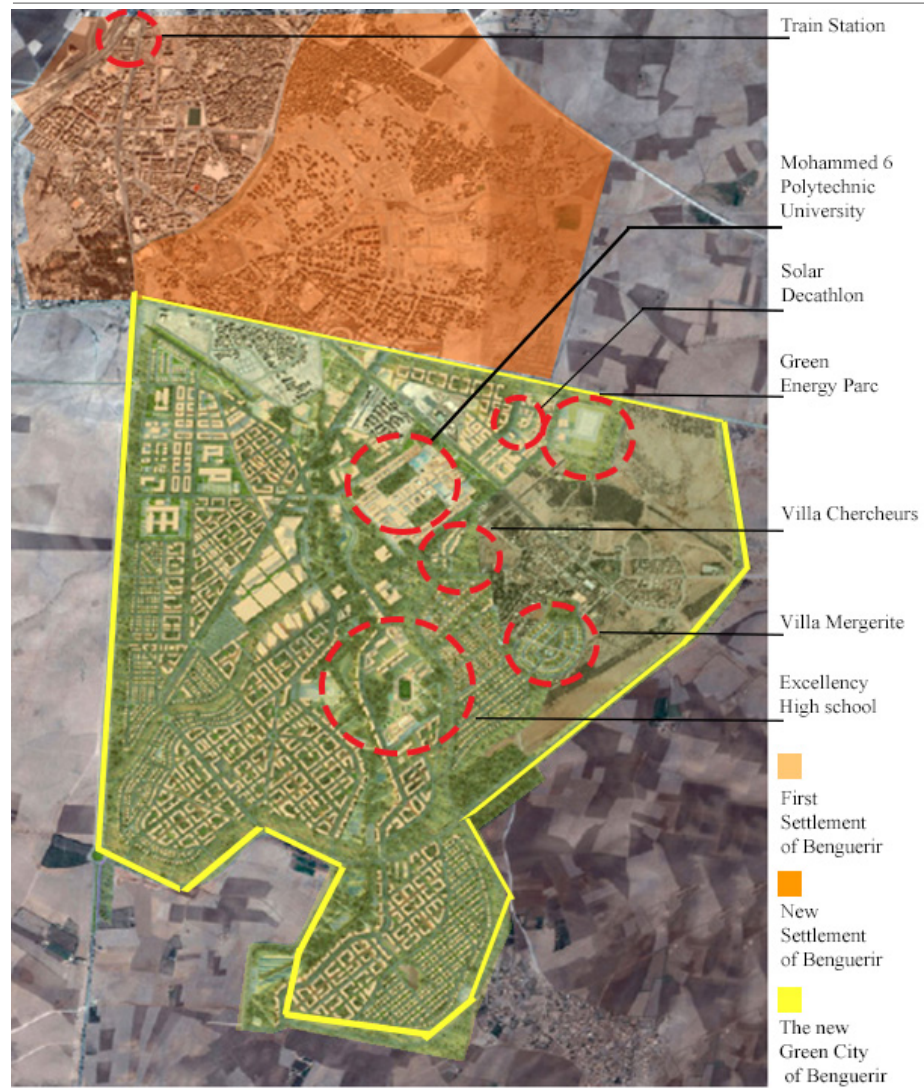
Figure 2. Benguerir City and two examples of the existing city and the new green city, Densities and Urban Forms Referential, Urbanism and Territory Ministry, 2016

Benguerir Context

Benguerir is situated at the south of Morocco with dominant semi-arid climate. It has long months of dry summer, where the temperature reaches its highest point in July, and a short cold season (Figure 3). The region was known for use of earthen materials especially clay for housing in order to offer comfort inside the building. However, with years of quick urbanization and the concrete domination, the buildings of that region lost their thermal efficiency as concrete do not have the same thermal masses and insulation capacity as the Clay.
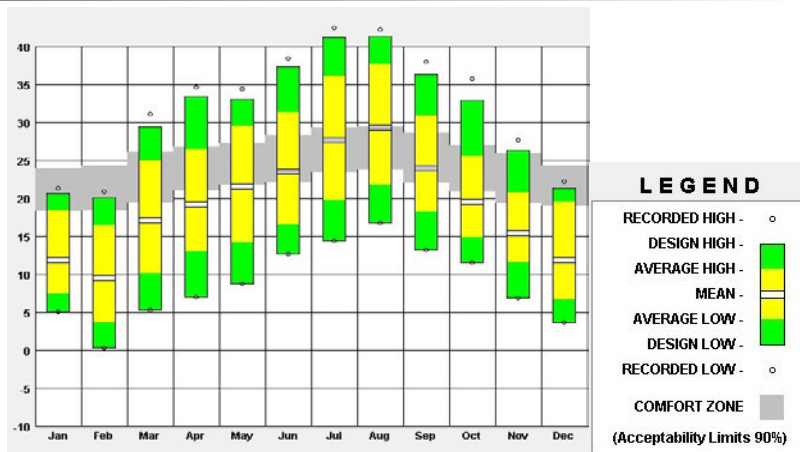
Figure 3. Temperature range of Benguerir using Climate Consultant Software.

Despite the transition from clay to concrete, the government attempted to re-establish the region's identity, particularly in Marrakech, which is known as the "Red Pearl" due to its ochre colour. However, by enforcing this colour on all buildings, the efforts remained purely ornamental. This dark paint on the concrete, on the other hand, has less reflection and hence holds more heat.

Benguerir green city had targeted the issues in residential areas especially and tried to adopt more adequate solutions that would create sustainable and green buildings. One of the executed projects is "Villas des chercheurs" (Researchers Villas) in the Moulay Rachid neighborhood which was also mostly funded by OCP Company. The project was to create residential villas that use mostly passive solutions in order to minimize energy usage. The villas are built in the traditional approach with courtyards, stone and clay materials, and domes for the living spaces (Figure 4).

Figure 4. Left: Villas Marguerite; Right: Researcher villas. Gated neighborhoods, Benguerir Green City, Morocco, 2021, Noussaiba Rharbi.

The heat is stored during summertime with the natural cooling effect from the wind tower system installed on the roof of each villa. It is a simple chamber with captors and a plastic cover to maximize the heat stored. Then the system is linked to a packed bed that is layered underground the building with stones that retain the heat for the winter months. In the winter, temperature captors would activate the system to release the heat through the house if needed (Singh, R.P.Saini, & J.S.Saini, 2010). In summer, the thermal mass of the thick walls delays the heat access until nighttime when it is colder, and some heat would not harm. Other projects were designed with the same targets such as reducing energy usage, renewable energy integration, and spatially holding on to

the identity of the region. Even with bigger projects such as the Polytechnic University campus, the main targets were still present such as the usage of local building methods and typology.

Benguerir City Challenges

Benguerir City is a Moroccan paradigm for green, sustainable towns. It serves as an initial Moroccan step for other towns and construction businesses to follow in the government's new experimentation with sustainability and renewable energies. In terms of the previously established sustainability metrics, the city attempted to touch each parameter in a variety of ways. As demonstrated in Table 5, social components are implemented by improving the city's living conditions, particularly with limited resources such as agricultural and water supply issues. The city's initial boost is the establishment of the campus, which may have a domino effect in attracting researchers, as well as the establishment of other facilities such as incubators surrounding the university.

Table 5. "Sustainability Cities", parameters and ways of implementation in Benguerir City, by authors

Sustainability Principles	Measures Taken	Ways of implementation
Social	Better living conditions Gender Equality	• Generation of job Opportunities, the attraction of students, investors, and companies to settle. • Cooperative boosts through the university
Environmental	Energy reduction CO2 footprint reduction	• Passive solution implementation • Usage of renewable energy, Planting trees zones • Implement LEED certification for building
Economic	Create Job opportunities	• Construction jobs • University staff • Innovation incubators • Local Tourism • Green energy sector new jobs

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The city was consciously planned and constructed, meaning that it aims to reduce its energy consumption by providing autonomous solutions for the generation of energy such as photovoltaic integrations to provide electricity as well as passive solutions to provide cooling such as evaporative systems or packed bed systems for heating. Co2 footprint was taken into consideration by planting olive trees to minimize the footprint of the students. The general economy was boosted by the constant generation of new job opportunities. In the phase of construction: The use of local earthen materials generated jobs for extractors, craftsmanship, and site workers. The phase after construction generated constant jobs inside the university: janitors, service providers such as delivery and taxis, professors, researchers, and sports instructors for the users outside of the campus. In addition to the new job

opportunities, new buildings such as the new headquarters were built. Especially the hospital project, and OCP headquarters would generate more income for the region.

Table 6. Parameters of Identity of Residential Architecture in Benguerir City: comparison of the old settlement and Green City, by authors.

	Spatial Organization	Semantic Organization	General design Principal	Shape and Form	Building Materials	Relationship with the context
Benguerir old settlement (1920 and after)	Planned organization, City center around the train station and marketplace (Souk), Mass in voids	No specific semantic organization	2 to 4 floors of typical low-cost social housing	Volumetric box type	Concrete, masonry	Regulated façade color: ochre
Benguerir Green City (2012 and after)	Grid System, Planned organization, City center around University Campus. Mass in voids	Reflection of the Old Moroccan, Medina (old city) typology	Residential villas inspired by traditional Moroccan Design, 2 floors.	Courtyard type,	Stone, Clay,	Harmonious in itself within the gated neighborhoods, Lack of bond with the old and new settlement of Benguerir.
New Settlement around Benguerir Green City (2012 and after)	Planned organization, No defined center, Spontaneous solutions in parcel blocks	No specific semantic organization	2 to 4 floors of typical low-cost social housing, Mixed-use (commercial and residential)	Volumetric box type	Concrete, Ochre colored exteriors	Regulated façade color: ochre, Cubist facades in harmony with university buildings,

In relation to the objectives of the new development, the city has a concise and precise narrative on what to expect, the strategy to promote it, and ways to implement it. However, sustainability is not only a matter of technical implementations. Sustainability, as discussed before, is the ability to sustain and maintain. It has three important pillars: Economic; social, and environmental. However, maintaining history, tradition, and identity are also an important element of sustainability. It does not matter if the green-sustainable city of Benguerir is new or a development of the existing city. The new implementations should be delivered in a way aligning with the existing ones.

Benguerir city is at the same time, an opportunity thanks to its strategic position in the commerce and economy axis of Benguerir-Casablanca, and a challenging city since the settlement did not have a distinct and recorded deep history, especially before phosphate discovery in the region. The challenge is reflected in the existing part of the city as the dominating architectural type is a simple economic two-story apartment with commercial space on the entrance floor. The whole design is painted in Ochre color according to the urbanization laws of the

region. The paint in a way does maintain the unity and the language of the city as a whole. However, it does not serve anything beyond it.

Identity, according to Lynch, is a sense of recognition as well as an emotional component. The social level of the people varies from one side of the city to the other in both portions of the city, indicating a noticeable division. The historic section of the city is made up of rural entrants to the city, which means that no emotional link could be formed with the new settlement. In general, the lack of space expressing the uniqueness of the place had made it more difficult to recognize the city and establish any sense of recognition. Normal inhabitants in the green city portion include OCP researchers and engineers. They are generally newcomers to town and have no emotional attachment to it. However, the city itself with the presence of a distinguished university campus and neighborhood had created a sense of recognition.

The city has the challenge to eliminate the social segregation and physical segregation made by the gated communities widely spread in the green city sections. The homogeneity of the existing and new sections should start by creating at least a distinct feature to create a sense of recognition. The city is still new and thus has a limited history in order to offer an emotional bond. As one city can still hold many architectural styles, the problem is that each settlement does not hold any identity even on its own. Even if the sustainable green cities concept is exported from Western countries. It was adapted to the Moroccan context in each part of the project. But the overall general aspect does not merge well. The university campus stands by itself with its own boundaries. The residential gated cities hold their own boundaries. The layering of the green city and existing settlement could not blend for one main reason: The urban planning of the city did not take into consideration the identity and features of Moroccan urban planning to complete the image.

DISCUSSION AND CONCLUSION

As discussed before, Moroccan sustainable green cities are still a long way in order to become a model for the African cities. A big amount of sustainability concepts and examples come from the Western world, which conflicts with the context and the physical environment of Morocco. The country is going for an imported challenge since it does not propose solutions to develop with its own resources. Unlike the majority of the MENA region countries, it does not have any oil or gas resource for a direct striking development as is witnessed in the Gulf region. Thus, the current policies are toward sustainable development in all fields to have a lasting development with the natural resources available: sun, wind, and a long coastline.

Benguerir is at the same time the first example of a Green sustainable city in Morocco, the first city developed around as a research hub, and even the first city to introduce LEED certification for its' buildings in Morocco. In a way, it has put a milestone for the upcoming Moroccan green and sustainable cities. However, it is still in its first phase with more than three-phase to construct. The city should learn from the problems

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that it is facing for better development. One of its biggest challenges would be unifying the architectural identity of the existing sections of the city and its new developing sections. Architectural language reflects the culture and identity of the citizens through familiar forms. Architectural unification means cutting out the segregation represented physically in the city plans and psychological segregation between the habitants of the different parts of the city.

The city is a model of a sustainable transition from a mining town to a Moroccan model of a Green sustainable city. There are different challenges observed in the sustainable transition of Benguerir:

Identity rupture: The city of Benguerir did not develop as a big city in the first place, it is a small town for miners. The presence of such a large state company has pushed the city into new transitions in order to follow the social movement and the development of the country. However, while it planned to be the country's first example of such a sustainable transition, it failed to create a continuation of the old city. The rupture in identity in the claim of sustainable identity is illustrated in the social, physical and psychological separation of urban planning and architecture, as shown in Table 6.

Sustainability as an "estranged identity": Giving a new identity to a place for the development of the revival of a place is not necessarily harming the identity of the place, (Bruzzone & Borghi, 2013). The project of Benguerir Sustainable City is developed by the motivation of creating a "new cities" image in Morocco. The existence of the new green city besides the old town had created the estrangement factor. Moroccans can still adapt to the new city over time, but the old dwellers would always regard it as a foreign element in their city.

The green city has managed to achieve certain sustainability points. Each parameter of sustainability was implemented in the green city as follows:

Social Equity: The city was promoted as a sustainable transition to the old miner city to make it a research hub and green development, it was also promoting new jobs opportunity and balanced integration of all social categories. In reality, the city is still struggling with the integration of old parts, the job opportunities are limited and often unbalanced and thus creating a gap between the old settlers and the new ones.

Sustainable Energy and Resources: The city has two Silver LEED-certified buildings on the university campus, and the neighbourhood projects are often integrating new passive solutions as well. The green sustainable city is actually achieving its set goals, however, the growth of the old part of the city does not follow up these goals.

Materials: The promotion of earth materials is observed as an achieved goal, especially in the "Villa Chercheur"s project. Continuous research for better clay usage was also carried out in Solar Decathlon houses. These materials do not only provide sustainability and longevity to the project, but it is a continuation of the identity representation of the place. On the contrary, the concrete and low efficient masonry used in

new constructions at the old part is hindering the general development of the place.

Environmental Planning: Integration of nature is taken as the plantation of olive trees field to minimize the carbon footprint of the city. There are no general guides that promote the integration of nature and greenery apart from the trees on sidewalks. The city in different phases does not claim any parks and other greenery. The university campus, which is covering the biggest part of the new city, includes very few fields of olive trees. It seems that the struggle to maintain this kind of greenery in a semi-arid context hinders various greenery planning. Thus, the question of green identity should be questioned in such context.

Urban Design and Function/ Land Use: The green city of Benguerir is solely using the land of the state, and the construction is also conducted by the state company OCP. There is little diversity in the mixture as the settlers in the green city part are usually the engineers, researchers in the firm, and the university. The functions promoted do not include much space for the miners and other workers. The same is noticed in the housing projects launched in that area as well.

Sustainability parameters were implemented especially in the university campus. The upcoming phases of the city would achieve other sustainability goals.

The sustainability transition in the African context in general, or in the case of Morocco, as a concept in itself is a challenge. The theory of many of its parameters can be easily found in local Moroccan architecture. However, economic and social burdens may prevent such a rapid transition from happening. Identity is about time; it builds up and grows over time. The Moroccan example represents a transition with a methodology: a return to the local solution and matching it with technology. The vernacular architecture ensures the continuity of the identity and the technology ensures the sustainability of the countable practice. This method is debatable in terms of success and social analysis after years of experimentation. Therefore, the Moroccan experience is too early to accept the sustainability transition as effective or not.

ACKNOWLEDGMENT

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Resume

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Generative Facade Elements Recommendation for Diyarbakır Traditional U Plan Type Residences

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Abstract

Genetic algorithm (GA) are based on the continuation of fitter ones' lives considering the natural evolution. Data are coded as genes in the genetic algorithms. Optimal solutions can be achieved through the methods of crossing and mutation performed on these coded genes. Facade elements of the buildings with an architectural design in this study are independent of sustainability-related concerns, suggesting a great issue for the new buildings to be constructed in the traditional pattern. Accordingly, using the genetic algorithm method, proposals were presented for the new door and window typologies with genetic fitness for the architectural designing process of the buildings to be constructed in Suriçi Region, Diyarbakır, Turkey. Shape grammar, fractal and genetic algorithm, three generative designing systems, were used as the methods. Utilizing the genetic algorithm method, a field study was performed for the proposal of new door and window typologies with the fitness value. The field study was assessed through the plans and facade analyses regarding six Diyarbakır traditional houses with U plan type in Suriçi region of Diyarbakır. An identity card was created for the plan and facade data of the buildings and transferred to the table. Then, the door and window typologies of the exterior facade elements of each examined building were crossed within themselves with the GA method. As a result of the crossover, alternative joinery typologies with a total of 31 windows and 53 different door typologies with compatibility values were produced. Thus, the sustainability of the data of traditional joinery typologies for use in contemporary houses has been ensured. In conclusion, optimal alternative typologies were presented in regard to every chopping typology assessed with the genetic algorithm method. It is thought that this study should be a method that can be used in the production of exterior joinery typologies of contemporary houses to be built in many different cities of our country, especially in the historical texture. Thus, by using the GA method for the production of exterior joinery typologies of contemporary houses to be built in the region, different designers will be able to obtain various designs compatible with the traditional architectural texture while preserving their originality.

INTRODUCTION

Generative designing systems reflect the automation-related features of computers. This study aims to examine the relationships between generative designs and offer a generative designing method where different systems are collectively used. With the development of technology, different digital methods have been used to perform architectural shaping. Shape grammar and genetic algorithms (GA), two generative approaches, were used in the present study.

GA is a fitness method based on the natural selection principles. John Holland set the basic principles of GA [Emel & Taşkın ,2002]. GA are based on the continuation of fitter ones' lives considering the natural evolution. Data are coded as genes in GA. Optimal solutions can be achieved through the methods of crossing and mutation performed on these coded genes. Many relevant studies have been performed after setting the main principles regarding GA. This method has been improved thus far and used in many fields covering manufacturing, plant layout, scheduling problems, construction technologies, optimization, vehicle routing, job planning, architecture and soon.

In the prepared study, alternative door and window typologies with genetic fitness value were produced by using genetic algorithm method and shape grammar method. For this purpose, Suriçi region of Diyarbakır was selected as the study setting as it intensely hosted traditional houses of Diyarbakır. The chopping clearances have not reached the present day as the traditional buildings in the area were significantly damaged and even collapsed. Therefore, the study was limited with six Diyarbakır traditional houses with U plan type considering the chopping types of restitution and restoration projects regarding the buildings studied. Contemporary alternative door and window typologies will be produced in line with the data of traditional authentic chopping styles for the buildings to be constructed in the region.

Many buildings with an architectural design have facade elements that have no association with sustainability-related concerns, which is a great issue for architectural housing within the traditional texture. Furthermore, the fact that such issue regarding the traditional texture has not been examined through a scientific method such as GA was regarded as the problem of the study.

Accordingly, using the genetic algorithm method, the purpose was to prepare new door and window typologies with genetic fitness for the architectural designing process of the buildings to be constructed in Suriçi Region, Diyarbakır, Turkey. The contribution of GAs that are also used as an optimization tool to designing will also be discussed. This method offers an opportunity to everybody so that they can pass down their traits to the following generations.

Making correct decisions in the first stages of architectural designing is critical for the alternative door and window typology examples regarding the buildings to be constructed in the region.

MATERIAL AND METOD

GA and shape grammar were used as the methods in the study. Initially, the concepts of generative systems, shape grammars and GA were explained. Then, traditional Diyarbakır houses in Suriçi region, and their facades were assessed.

Rule sets were defined through shape grammar whereas fitness functions were set through the genetic algorithm. Utilizing the genetic algorithm method, a field study was performed for the proposal of new door and window typologies with the fitness value.

The field study was assessed through the plans and facade analyses regarding six Diyarbakır traditional houses with U plan type in Suriçi region of Diyarbakır. The traditional Diyarbakır houses with U plan type were coded in the field study. Moreover, facade chopping types in plans were internally grouped. This grouping activity included door and window chopping types.

The sizes of top windows, the architectural elements on facades, were measured and a module was set to form the rule set of shapes constituting the facades. In the process of determining the module, many facades of Diyarbakır traditional houses were examined. It was observed that the facades have joinery openings that can grow and shrink with the combination of small modules. It was determined that the smallest opening in the facades of Diyarbakır traditional houses belongs to the skylight. The size of the module was selected as 40 x 45 cm due to the fact that a skylight module measuring 40 x 45 cm is generally used in these facades. An 8x8 grid plane was formed in two dimensions as the pre-set module was reproduced and combined.

This plane was determined considering the height of a floor in traditional Diyarbakır houses. Heights of floors in these houses varied between and 3.20 meters. Since the number of modules meeting this floor height is 8 pieces, an 8x8 gridal plane has been preferred.

There are certain parameters to be set before proceeding with processing algorithms. The parameters were determined by reference to the external view of the joinery openings of Diyarbakır traditional houses. There were six parameters affecting the facade design, and they are as follows:

- transparent surface (0),
- openable transparent surface (1),
- non-transparent wall surface (2),
- non-transparent openable wooden surface (3),
- non-transparent openable wooden surface (3a),
- non-transparent fixed wooden surface (4).

Genotypes and phenotypes of chopping typologies were formed in line with the parameters determined above. Fitness value of every chopping typology was defined, crossed and mutated. The new typologies obtained at the end of crossing should be within these fitness values. However, there is no such obligation for the mutated typologies. Certain coding procedures were performed for the fitness value. These are as follows;

x: Number of modules reflecting the parameters in the genotype of chopping typology

y: Number of modules in the genotype of chopping typology

z: Fitness value typology

z: x / y

Building-specific details were conveyed by using the identity cards formed for every building in the last step. The authentic chopping typologies that were examined later were conveyed through the sections present in the building. Therefore, the chopping typologies examined in the study were clearly reflected. Finally, optimal alternative typologies were presented in regard to every chopping typology assessed with the genetic algorithm method.

Generative System Approach

The concept of "generative" is defined as the capacity of revealing anything or showing the source of creativity [Fischer & Herr, 2001]. Furthermore, the concept of generative designing is explained as the method where the designer is interested in the process rather than the output, and generative designing system can be considered as the system supporting the users in the operations. The generativity level of the system is determined based on whether the designer can generate creative products or improve their perception toward designing [Fischer & Herr, 2001].

With the developing technology, the importance of creative designing methodologies becomes clearer. Generative designing overcomes and avoids the monotonous structure of products offered through computers. Two main generative designing systems constitute the conceptual background of the study. Traits of these generative systems will be explained and compared within the study.

Shape Grammar

Introduced by Chomsky in 1970s, the concept of grammar was studied by George Stiny and James Gibs in a manner to define the rule-based structure of grammar formalism describing the generation systems with an algorithmic structure. With the algorithm, the solution of an already-present problem is formulated [Aksoy, 2001]. The main purpose here is not to minimize designing to the formula level, but to generate new alternatives with the pre-set rules. With these rules, the architectural language can be re-interpreted and different outputs can be achieved.

Designers can generate various compositions utilizing the shapes, rules and procedures within the shape sets. Different outputs can be achieved with certain actions to be performed on shapes. New shapes can be found with Boolean operations such as the total, difference or intersection of shapes, Euclid conversions or parametric changes (Figure 1).

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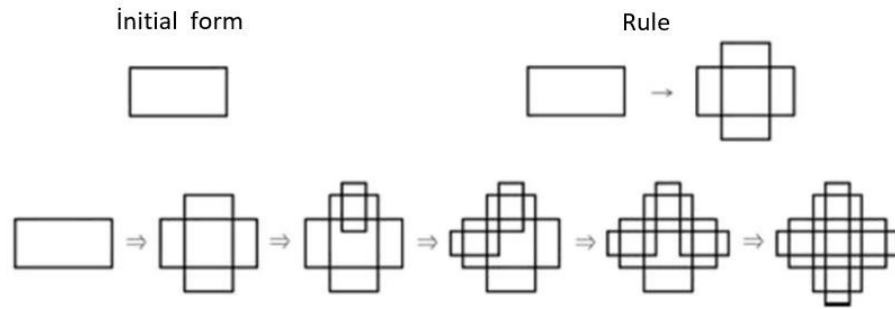
Shape grammars are accepted in different artistic disciplines, particularly architecture, and used to represent and understand different designing languages and styles and to create original designs. The purpose of designs created with the shape grammar includes;

- creating totally authentic designing languages,
- modeling the transformation in already-present designing languages,
- analyzing designing languages,
- forming another designing language using already-present designing languages
- creating new designing language using existing design languages [Karakoyun, 2010].

Fractal

The concept of fractal, which was introduced in 1975 by Beneoit B. Mandelbrot, a Polish mathematician, examines the shapes that repeat themselves but shrink for a limitless period of time, the parts that constitute an object, or the entire component object.

Although the fractal approach is used in different disciplines such as mathematics, geometry, chemistry or physics, fractal setups have been used in different manners within the discipline of architecture. It is safe to state that a building has similar details in its different sections ranging from its mass to the smallest indoor element. The shapes that are present within fractals may provide new alternatives resembling the initial shapes. The same result emerges no matter how many times the relevant procedure is repeated.

This study presented an approach that could guide the efforts of designing by generating new alternatives that could ensure the sustainability of architectural language through the fractal dimension of this language. It is believed that the occupancy-clearance ratio detected on the facades of traditional buildings through the fractal method is at a certain level, and that this level is important for the sustainability of architectural language. Accordingly, a holistic study of the algorithms based on the generative systems was presented as a proposal for the production of new chopping typologies with sizes similar to this ratio.

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Genetic Algorithm

GAs serve as a method of searching and optimizing that uti lizes genetics as the source of inspiration and acts with natural selection principles. GAs are some of the sub-concepts of evolutionary architectural approach. Based on Darwin's principle that the best survives, it mimics the biological processes in nature. The ideas that those that can adapt to their environment can maintain their lineage or that superior people can be raised and parented by parents with superior characteristics resulted in the belief that the crossing method which is used in various manners would provide a better solution to the complicated problems [Vural, 2005]. This belief has been intensively used in the solutions of complicated problems such as form creation and function analyses. GAs scientifically provide a solution to most of the relevant problems and they help improve designers' creativity and explore richer designing fields. Fractal systems yield the same shapes with the initial system, and different shapes from the same family are generated through different reproduction procedures within this formation method. Accordingly, different alternatives resembling the initial shape can be generated with the collective use of generative systems such as shape grammar, fractals and GA.

The first publication related to this concept was presented by Bagley in 1967 [Goldberg,1989]. However, the first studies in this scope were performed in 1975 by John Holland, a psychology and computer science expert at Michigan University [Holland,1975]. Processing steps of GAs are respectively as follows;

- performing selection,
- formation of the first population,
- performing crossing,
- performing mutation,
- calculating the fitness function,
- formation of the new generation and completion of the cycle.

Coding the solutions: The initial condition for developing GA is to formulate and define every person through codes.

Formation of the first population: a solution group with all possibilities is presented. Calculation of the fitness value: Fitness value should be set to reach the desired result for the solution. The population is assessed based on the fitness value. Therefore, all people in the relevant generation are approximated to the fitness function value. People who do not fit this value in the solution group are eliminated. Furthermore, higher fitness value in the solution group increases the potential of reproduction, living and transferring to the following generations [Yeniay, 2001].

Selection: People with the fitness value are selected and gathered in the matching pool [Fığlalı & Engin 2002].

Crossing: The procedure of crossing can be defined as the creation of a change in people's gene combinations from a certain point and

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creation of new people (Figure 2).
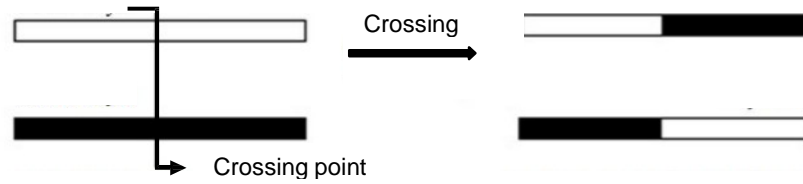
Mutation: This is the procedure performed to increase genetic variation and/or to prote ct the current variety [Braysy,2001]. With this procedure, new chromosomes are obtained from the already-present ones. If the current gene variety does not have all required data, then the desired solutions can be found through mutation.

Formation of the new generation and completion of the cycle: After repeating the cycle in the desired rate, the populations of the people meeting the fitness value are formed and the cycle is completed.

GAs utilize the terminology used for natural evolution. Two different concepts are used to perform the definitions regarding people: genotype and phenotype (Figure 3).
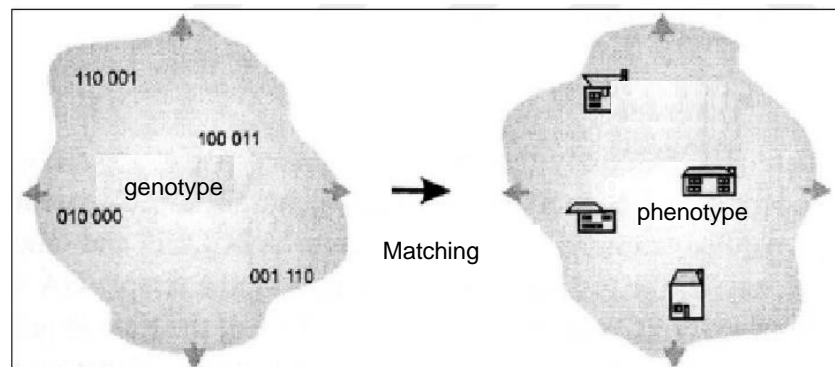
Genotype: Genes of a person determine that person's genetic traits, meaning his/her genotype [Güngör,2010]. Genetic changes occur through the genotype. Phenotype, on the other hand, is the manifestation of genotype. Coding certain traits such as hair color or eye color as genes is a form of genotype in genetics, but manifestation of these traits as blue eye or yellow hair is called phenotype [Çalışır,2015]. The procedures performed while forming new generations during the operation of GA are called genetic operators. Thanks to these operators, the solution range is expanded and more suitable solutions are found [Akpınar,2009]. These are parameter coding, fitness value calculation, formation of the initial population, selection, crossing, mutation and stopping operators. Numbers or letters can be used for coding but people generally perform coding using the indexes with 0 and 1 [Vural, 2005]. Coding methods, on the other hand, differ according to the problem that needs to be solved. In the present study, genotype encodings were expressed with numbers.

Diyarbakır and Its Facade Traits

The city of Diyarbakır is one of the important cities that reflects the cultural heritage values left by the important civilizations that reigned in this era, such as its monumental buildings, traditional residences, and castle (Figure 4-5); the city also reflects these assets in the current time. Walls, inns, baths, fountains, mosques, churches, mosques, pavilions and traditional houses, all of which are present in the traditional texture of Diyarbakır, hold a significant place in the architectural formation of the city.

Traditional houses, one of the most important building groups of Suriçi, face their atria in an inward manner, rather than an outward form, based on the factors of benefiting or deviating from the sun seasonally.

It is clear that

- seasonal factors,
- socio-cultural factors,
- topographic factors,
- materials,
- economic structure,
- and walls have an effect on the architectural shapes of houses.

The plan schema of traditional Diyarbakır houses consisted of atrium in the middle and other spatial units surrounding the atria. The aforenoted houses had I, L, U plans with internal atria based on the masses around the atria (Figure 6).
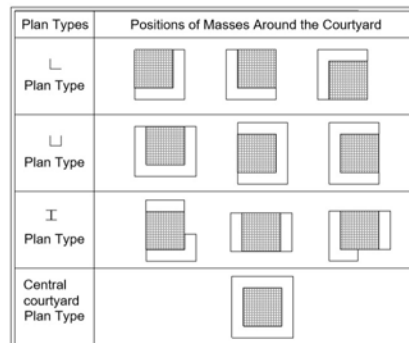
Figure 6. Traditional Diyarbakır houses, location of seasonal masses (Gökçe Salık ,2022)

The lives led within spaces as well as the characteristics of these spaces can be understood from the external facade of traditional Diyarbakır houses. Facades were shaped by their directions and differed from one another. This difference could be seen in the size, number and

shape of the clearance of facades.

Reflecting the idea of privacy, Diyarbakır houses had an introverted lifestyle, and clearances increased in the internal facades facing the atria. There was also intense ornamentation. The external facade architecture facing the street did not have much clearance, and the two storey buildings had small clearances on the facades. The architectural elements shaping the facades of Diyarbakır houses are ordered as follows (Figure 7):

- Windows
- Doors
- Iwan
- Cantilevers
- Atria
- Roof-eaves
- Ornaments-materials.

Figure 7. Traditional Diyarbakır houses, (Gökçe Salık ,2022)

In traditional Diyarbakir houses, the window and door opening is one of the most important architectural elements affecting the facade. While the number of windows increases according to the size of the spaces, there are increases and decreases in size according to the direction it is located. Windows are divided into three categories as central windows, top windows and basement windows. In traditional Diyarbakir houses, the doors are divided into 3 categories as a location; these are; they are a door to the courtyard, the doors to the basement, and the doors to the rooms. there are differences in door sizes, depending on its location (Table 1).

Table 1. Central window types of traditional Diyarbakır houses (Gökçe Salık ,2022)

| Central window types of traditional Diyarbakır houses |
| Top windows of traditional Diyarbakır houses |
| Door types of traditional Diyarbakır houses |

FINDINGS

The presence of spaces oriented towards three different facades in U-plan type Diyarbakır traditional houses can contribute to the formation of different facades. For this purpose, this study provided general information about the traditional Diyarbakır houses with U plan typology in Suriçi region of Diyarbakır. Moreover, analyses were performed for the door and window typologies present within the facades of these houses. In the last stage, shape grammar and genetic algorithm method were used for the generation of new typology.

Formation of Generative Facade Elements in Traditional Diyarbakır Houses

Plan types and facade clearances of every traditional house in this study were analyzed initially. Certain significant needs that would guide the designers and architects in implementing the rules for new door and window typologies were determined through GA and shape rules. Six chopping typologies of traditional Diyarbakır houses with U plan, the restitution and restoration projects of which were accessed, were analyzed in this study. In the table below, window Chopping typologies of U-plan type Diyarbakir traditional houses are shown (Figure 8).
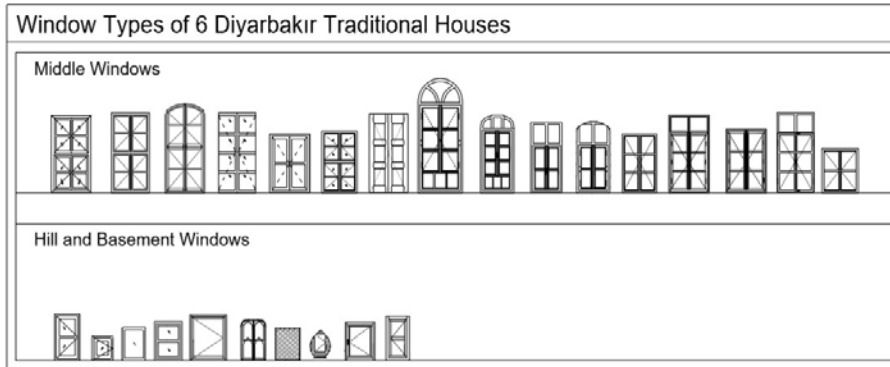
Figure 8. Windows Chopping types of traditional Diyarbakır houses with U plan (Gökçe Salık, 2022)

In the table below, doors Chopping typologies of U-plan type Diyarbakir traditional houses are shown (Figure 9).
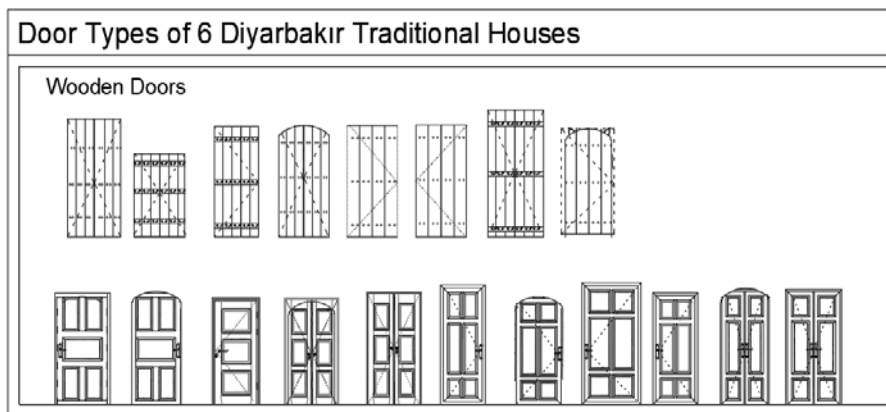
Figure 9. Doors Chopping types of traditional Diyarbakır houses with U plan (Gökçe Salık, 2022)

Typological studies were carried out through the specified joinery openings, and the door and window openings located on the facade were revealed with concrete data. The examined facade openings are abstracted with the determined top window module (40 x 45 cm). In determining the created grammatical language, the dictionary elements included in the following way were used (Figure 10).
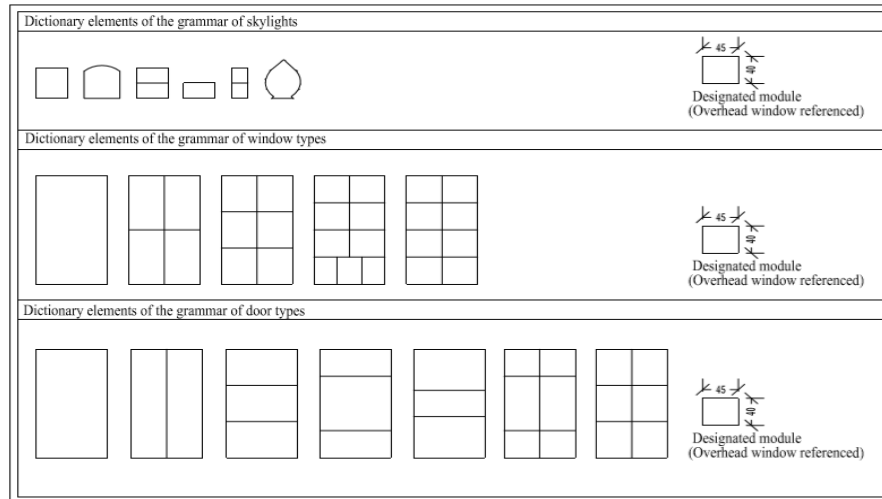
Figure 10. Lexical elements of grammar (Gökçe Salık ,2022)

A grid system was prepared as a base to be used in two dimensions to perform facade analysis and generation for the traditional houses. The sizes of top windows, the architectural elements on facades, were measured and a module was set to form the rule set of shapes constituting the facades. The size of the module is 40 x 45 cm. This with the module, 8x8 grid was formed to create the shape repertory. This grid was determined considering the height of a floor in traditional Diyarbakır houses. The important point here is whether the shape code generated through shape grammar is accepted as genotype.

The change experienced in the parameters defined in the stage of processing the genetic algorithm affects the solution-related duration as well as the cluster hosting the solution and people's choices.
Accordingly, there were six parameters affecting the facade design, and they are
as follows:

- transparent surface (0),
- openable transparent surface (1),
- non-transparent wall surface (2),
- non-transparent openable wooden surface (3),
- non-transparent openable wooden surface (3a),
- non-transparent fixed wooden surface (4).

The fitness values were determined in line with the following criteria;

• In every crossed window within every house type; x transparent

surface (0) and at least z unit square of these non-transparent surfaces being an openable transparent surface (1), y non- transparent surface (2),

- For doors belonging to each type of housing; x non-transparent opening wooden surfaces (3), and at least y unit squares of these non-transparent opening wooden surfaces must be a non-transparent opening wooden surface (3a), or z unit squares must be a non-transparent fixed wooden surface (4).

Every chopping typology of these houses is crossed and mutated in a binary form. The new typologies obtained at the end of crossing should be within these fitness values. However, there is no such obligation for the mutated typologies. The fitness value range is reflected as follows.

x: Number of modules reflecting the parameters in the genotype of chopping typology

y: Number of modules in the genotype of chopping typology

z: Fitness value

z: x / y

As windows with a width of 90 cm were generally used on the chopping typologies of traditional Diyarbakır houses, the width size was set as 90 cm for the moderate-size windows produced through alternative window production. Regarding the doors, as doors with a width of 90 cm and height of

200 cm were frequently used within the indoor areas of traditional Diyarbakır houses, a standard size of 90-200 cm was preferred as the indoor door size.

Facade Analysis of U-Type Traditional Diyarbakır Houses with Genetic Algorithm

The geometrical ratios of the facades on traditional buildings that had a specific architectural language were examined, and an approach that was based on the generative system which could guide the generation of new designs was proposed. The authentic architectural language of the traditional building facades within the historical texture was defined through shape grammar and fractal geometry. the light of the data presented above, genetic algorithm method was utilized to generate facade typology for new buildings to be constructed within the historical area, and different door and window facade chopping typologies with values similar to those obtained through fractals were formed. Furthermore, shape grammar, fractal and genetic algorithm methods were collectively used to present proposals in line with the algorithm operation principle.

Building data of six Diyarbakır traditional houses with U type were conveyed, and facade analysis was performed using the genetic algorithm method. An identity card showing the data of every house was formed and tabulated. The algorithm flow chart of the activity is presented below (Figure 11).

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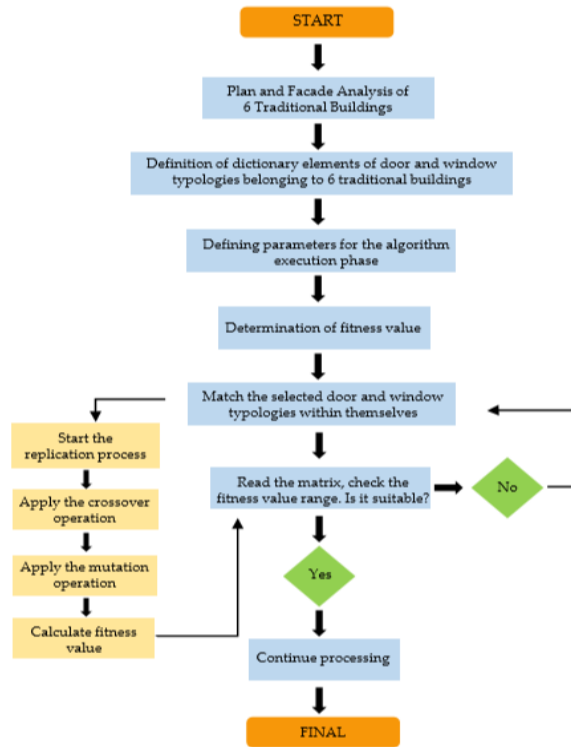
Figure 11. Algorithm schema (Gökçe Salık ,2022)
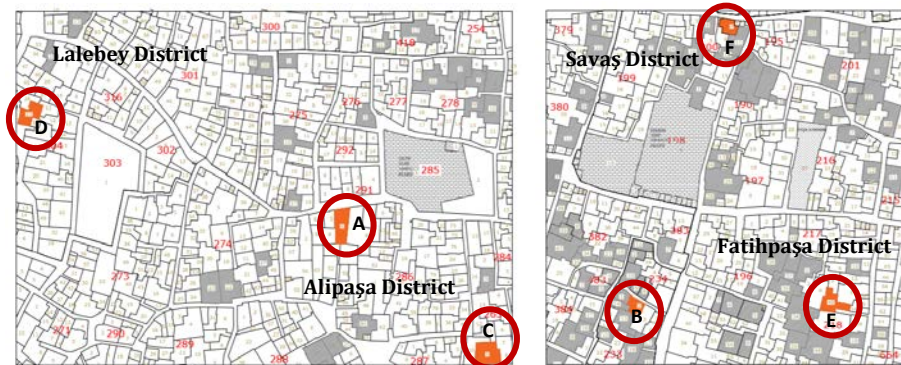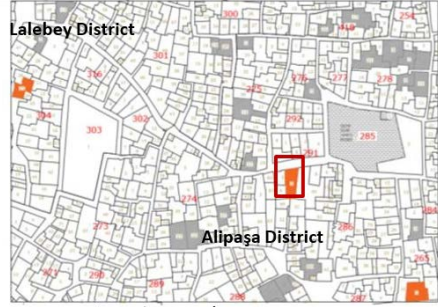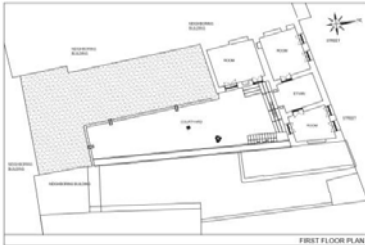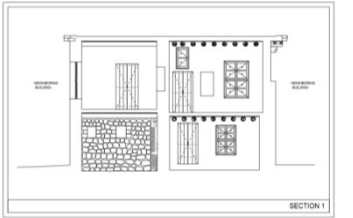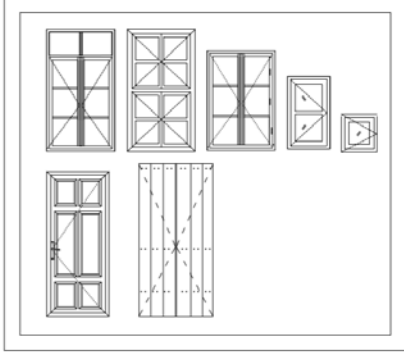
Figure 12. The houses examined in Diyarbakır Suriçi Region (Gökçe Salık ,2022)

As population was selected out of an already-present design, the facade element typologies were considered as the optimum value and fitness range was set later. Door and window typologies of every building generated through GA are present below.

Identity information of the building A are as follows (Table 2).

Table 2. Identity information of the building A

	ADDRESS: BLOCK OF BUILDINGS/PARCEL 286-6
BUILDING INFORMATION	 Location on the map
IMAGES	 Images
PLANS	 Ground floor plan First floor plan
SECTIONS	 Section 1 Section 2 Examined frame types

Five window and two door typologies were examined. These typologies were transferred to the grid base and coded based on the pre-set parameters. Windows and doors among the pre-selected chopping

typologies were randomly selected, crossed and mutated. As a result of crossing, new typologies with fitness value were obtained. In conclusion, 10 new window typologies and 4 new wooden door typologies were obtained with the crossover with GA.

10 new window typologies produced by the genetic algorithm method are shown in the figure below (Table 3).

Table 3. Window typologies generated through GA method (Gökçe Salık ,2022)
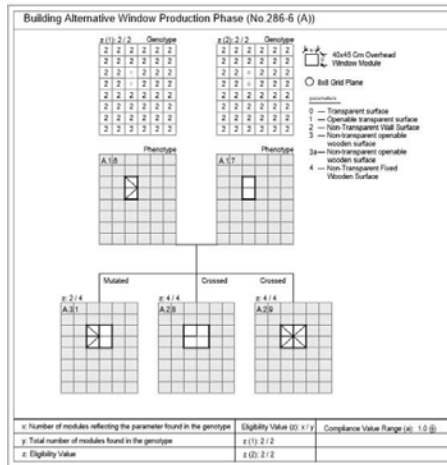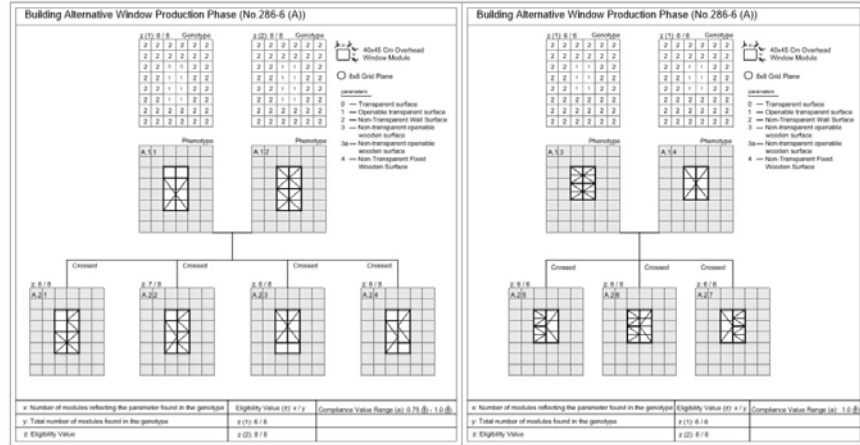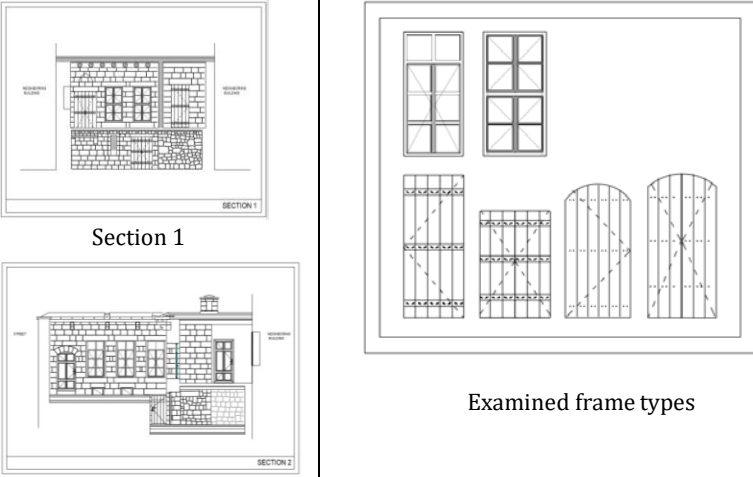
4 new wooden door typologies produced by the genetic algorithm method are shown in the figure below (Table 4).

Table 4. Wooden door typologies generated through GA method (Gökçe Salık ,2022)

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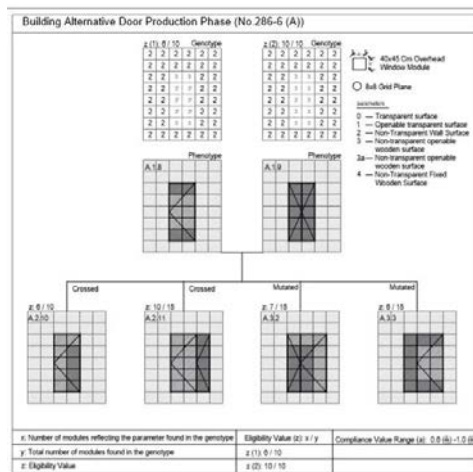
Identity information of the building B are as follows (Table 5).

Table 5. Identity information of the building B

	ADDRESS: BLOCK OF BUILDINGS/PARCEL 233-2
BUILDING INFORMATION	 Location on the map
IMAGES	 Images
PLANS	 Basement floor plan Ground floor plan First floor plan
SECTIONS	 Section 1 Section 2 Examined frame types

Two window and four door typologies were examined. These

typologies were transferred to the grid base and coded based on the pre-set parameters. Windows and doors among the pre-selected chopping typologies were randomly selected, crossed and mutated. As a result of crossing, new typologies with fitness value were obtained. In conclusion, 4 new window typologies and 8 new wooden door typologies were obtained with the crossover with GA.

4 new window typologies produced by the genetic algorithm method are shown in the figure below (Table 6).

Table 6. Window typologies generated through GA method (Gökçe Salık ,2022)
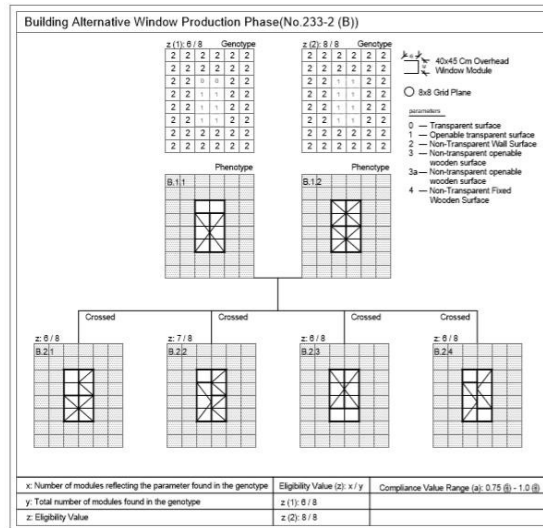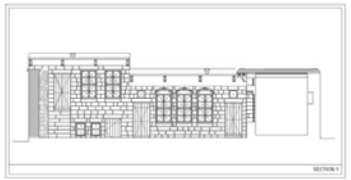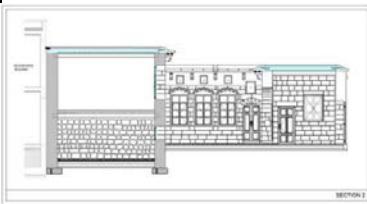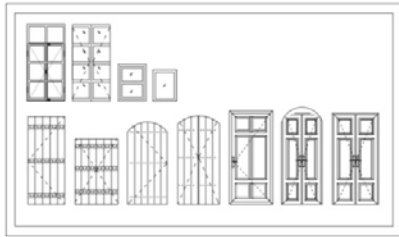
8 new wooden door typologies produced by the genetic algorithm method are shown in the figure below (Table 7).

Table 7. Wooden door typologies generated through GA method (Gökçe Salık ,2022)
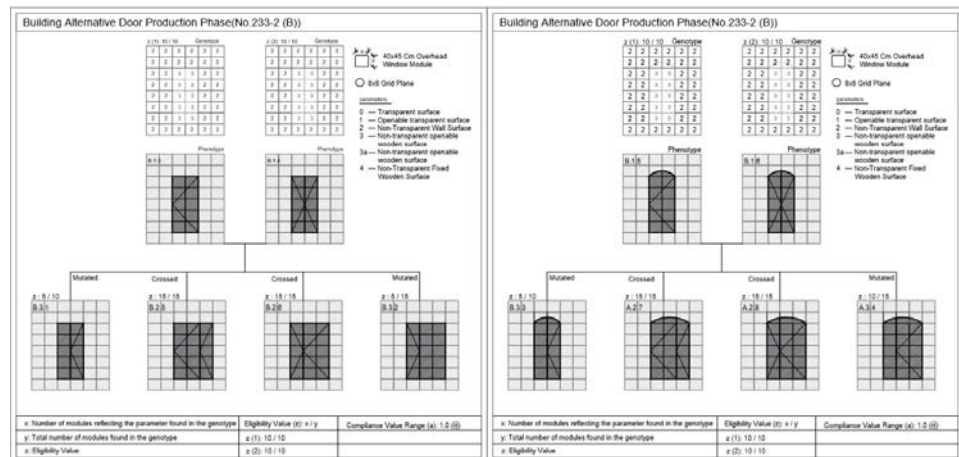
Identity information of the building C are as follows (Table 8).

Table 8. Identity information of the building C

	ADDRESS: BLOCK OF BUILDINGS/PARCEL 233-2
BUILDING INFORMATION	 Location on the map
IMAGES	 Images
PLANS	 Basement floor plan Ground floor plan
SECTION	 Section 1 Section 2 Examined frame types

Four window and ten door typologies were examined. These typologies were transferred to the grid base and coded based on the pre-set parameters. Windows and doors among the pre-selected chopping typologies were randomly selected, crossed and mutated. As a result of crossing, new typologies with fitness value were obtained. In conclusion, 9 new window typologies and 22 new wooden door typologies were obtained with the crossover with GA.

22 new wooden door typologies produced by the genetic algorithm method are shown in the figure below (Table 9).

Table 9. Wooden door typologies generated through GA method (Gökçe Salık ,2022)

9 new window typologies produced by the genetic algorithm method are shown in the figure below (Table 10).

Table 10. Window typologies generated through GAmethod (Gökçe Salık ,2022)
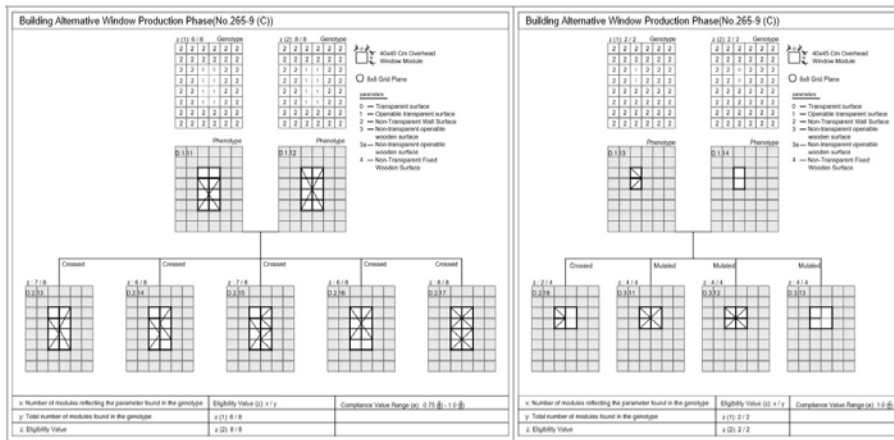
Identity information of the building D are as follows (Table 11).

Table 11. Identity information of the building D

	ADDRESS: BLOCK OF BUILDINGS/PARCEL 304-25	
BUILDING INFORMATION	Location on the map	
IMAGES	Images	
PLANS	Ground floor plan	First floor plan

SECTIONS	Section 1
	Section 2
	Examined frame types

Two window and three door typologies were examined. These typologies were transferred to the grid base and coded based on the pre-set parameters. Windows and doors among the pre-selected chopping typologies were randomly selected, crossed and mutated. As a result of crossing, new typologies with fitness value were obtained. In conclusion, 3 new window typologies and 12 new wooden door typologies were obtained with the crossover with GA.

3 new window typologies produced by the genetic algorithm method are shown in the figure below (Table 12).

Table 12. Window typologies generated through GA method (Gökçe Salık ,2022)
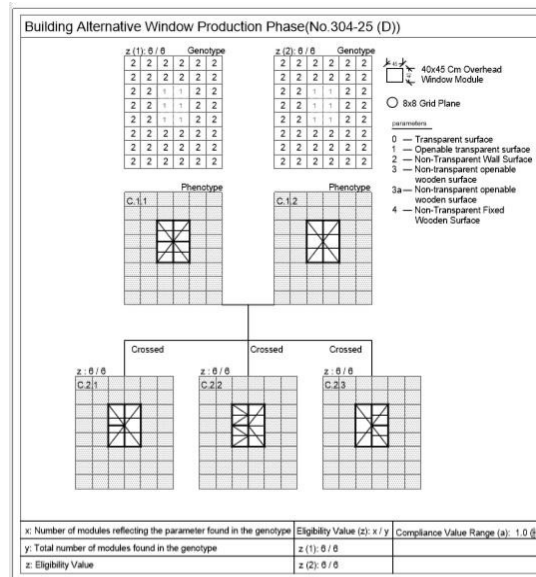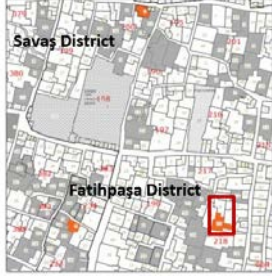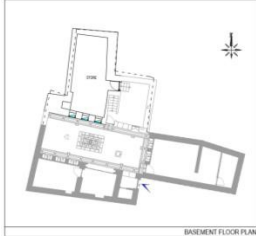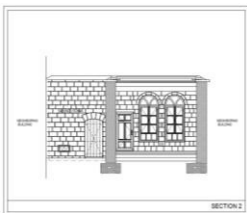
12 new wooden door typologies produced by the genetic algorithm method are shown in the figure below (Table 13).

Table 13. Wooden door typologies generated through GA method (Gökçe Salık ,2022)
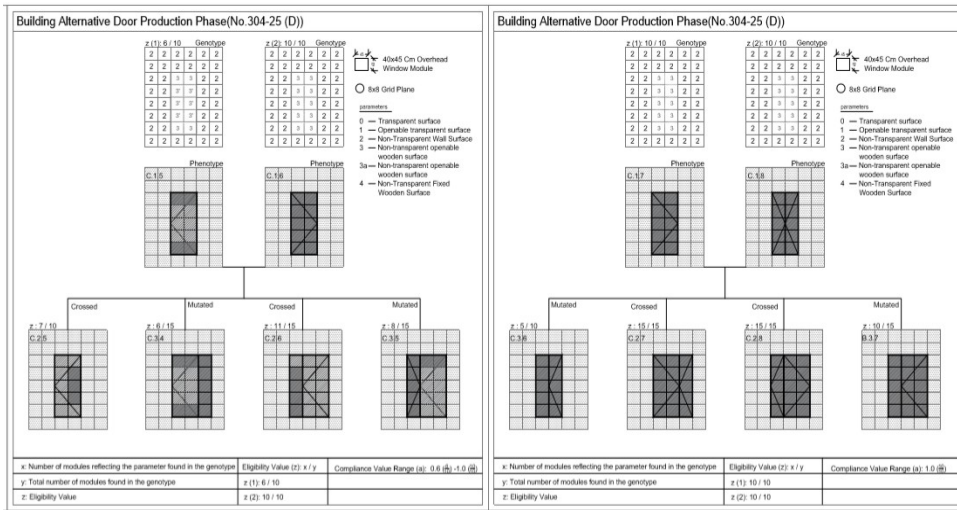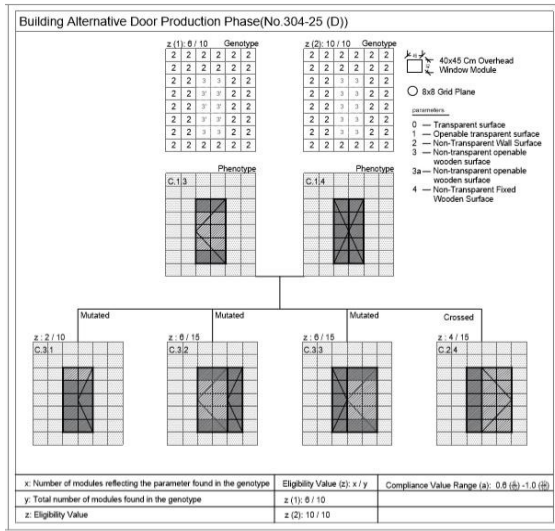
Identity information of the building E are as follows (Table 14).

Table 14. Identity information of the building E

	ADDRESS: BLOCK OF BUILDINGS/PARCEL 233-2		
BUILDING INFORMATION	Location on the map		
IMAGES	Images		
PLANS	Basement floor plan	Ground floor plan	First floor plan
SECTIONS	Section 1 Section 2	Examined frame types	

Six window and three door typologies were examined. These typologies were transferred to the grid base and coded based on the pre-set parameters. Windows and doors among the pre-selected chopping typologies were randomly selected, crossed and mutated. As a result of crossing, new typologies with fitness value were obtained. In conclusion, 14 new window typologies and 10 new wooden door typologies were obtained with the crossover with GA.

10 new wooden door typologies produced by the genetic algorithm method are shown in the figure below (Table 15).

Table 15. Wooden door typologies generated through GA method (Gökçe Salık ,2022)
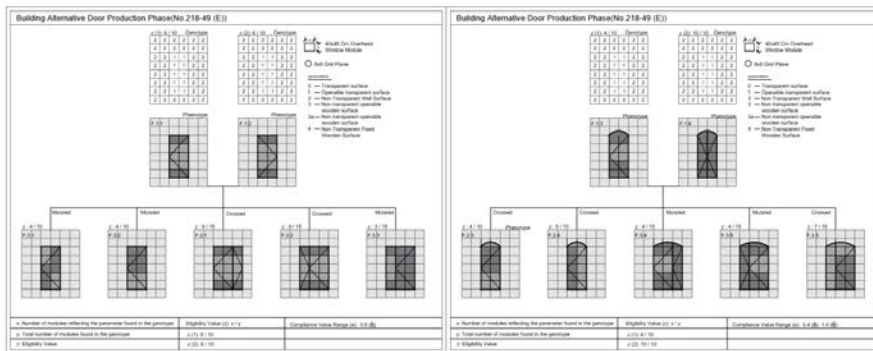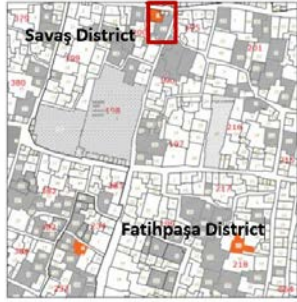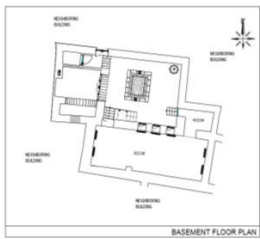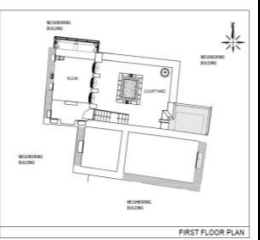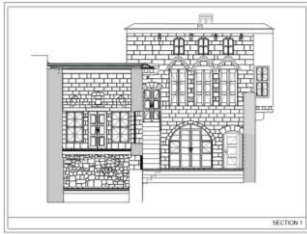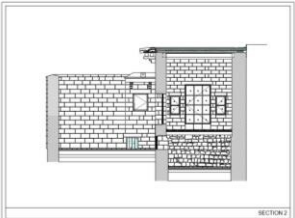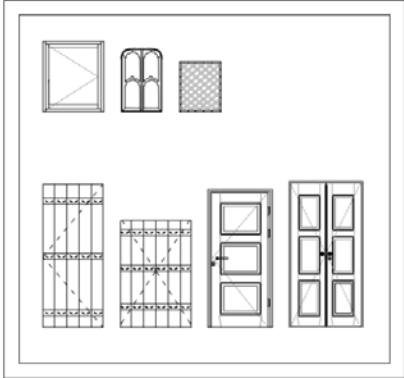
14 new window typologies produced by the genetic algorithm method are shown in the figure below (Table 16).

Table 16. Window typologies generated through GA method (**Gökçe** Salık ,2022)
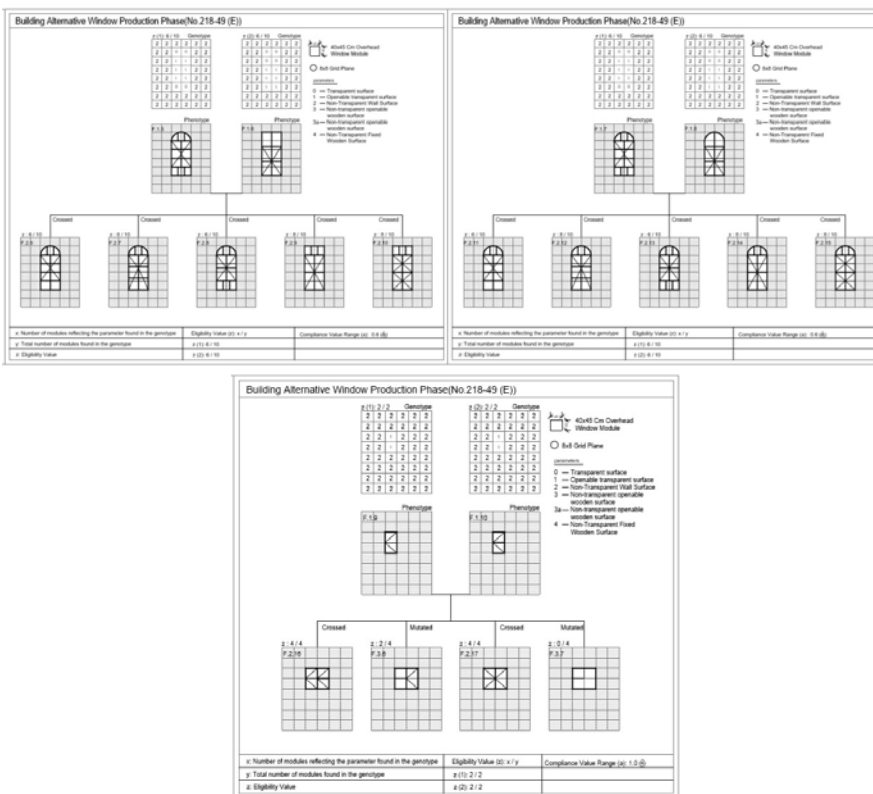
Identity information of the building F are as follows (Table 17).

Table 17. Identity information of the building F

	ADDRESS: BLOCK OF BUILDINGS/PARCEL 233-2
BUILDING INFORMATION	 Location on the map
IMAGES	 Images
PLANS	 Basement floor plan　　Ground floor plan　　First floor plan
SECTIONS	 Section 1 Section 2　　Examined frame types

Three window and four door typologies were examined. These typologies were transferred to the grid base and coded based on the pre-

set parameters. Windows and doors among the pre-selected chopping typologies were randomly selected, crossed and mutated. As a result of crossing, new typologies with fitness value were obtained. In conclusion, 10 new window typologies and 12 new wooden door typologies were obtained with the crossover with GA.

10 new window typologies produced by the genetic algorithm method are shown in the figure below (Table 18).

Table 18. Window typologies generated through GA method (Gökçe Salık ,2022)
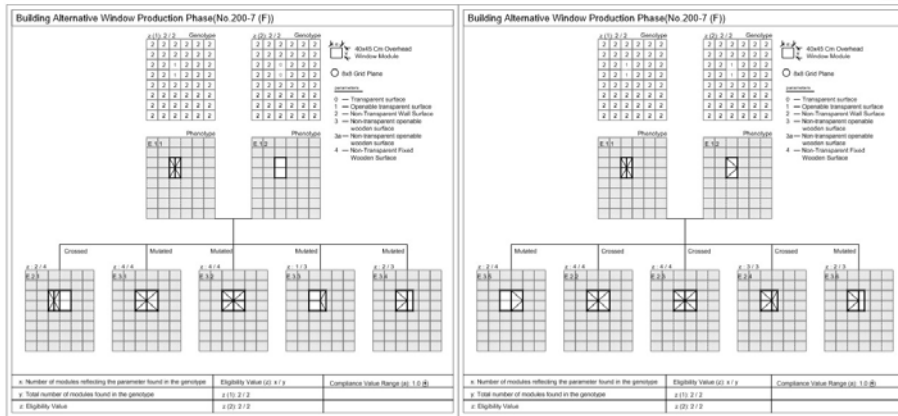
12 new wooden door typologies produced by the genetic algorithm method are shown in the figure below (Table 19).

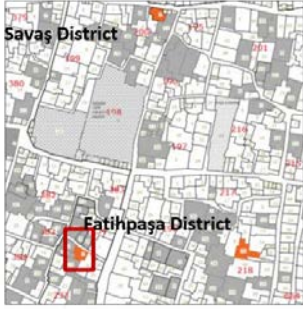**Table 19.** Wooden door typologies generated through GA method (Gökçe Salık ,2022)

Building Alternative Door Production Phase(No.200-7 (F))
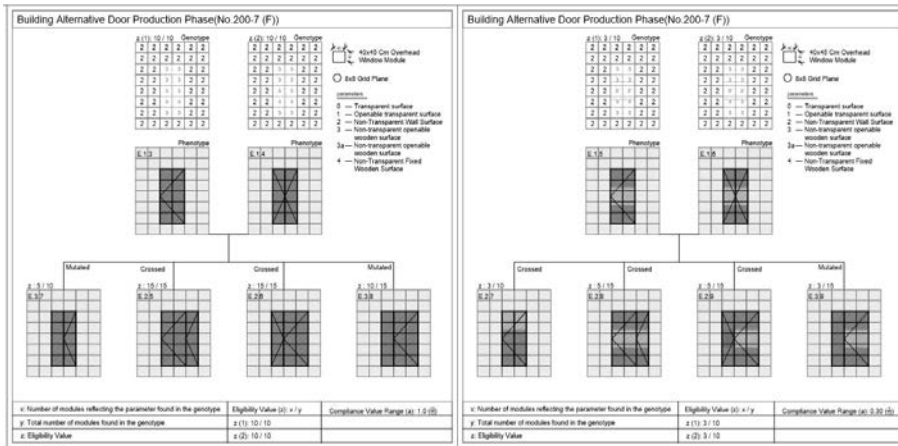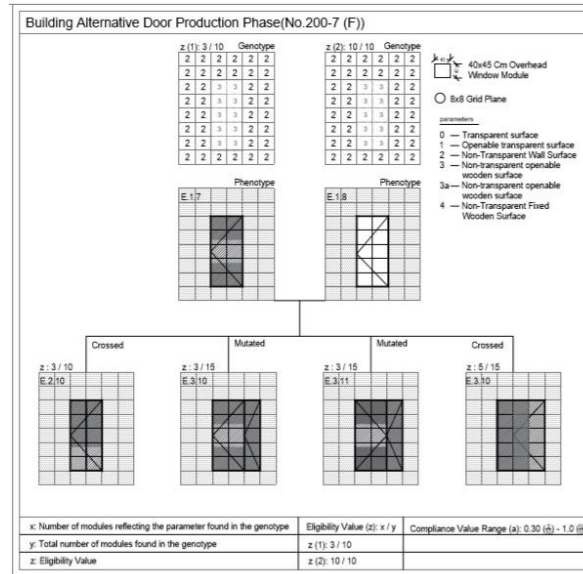
As a result of assessments, 31 window and 53 door types associated with door and window typologies were found. With this study, which was analyzed with the GA method specific to Diyarbakır traditional houses, it was concluded that many joinery typologies compatible with the traditional architectural language can be produced. It is thought that this method can be applied to traditional houses in different climatic regions.

CONCLUSIONS AND RECOMMENDATIONS

Evolutionary information processing method has been popular in designing. It is one of the promising computer-assisted designing methods in the present time. GAs, one of evolutionary designing systems, utilize evolutionary process for the existing problem and reach a solution. Relevant studies that take too long with the traditional methods can be completed in a short time with genetic algorithm. Performing the actions of selecting, crossing and mutating, GAs aim to reach the best solution in every step of any problem. Although they do not promise selecting the best solution at all times, optimal solutions can be achieved for these problems in a short period of time.

With GA, designers will be able to consider the necessities of architectural designing that they aim to obtain in the end. Through the necessities and limitations brought by the outputs, the range of solutions can be narrowed, and the process will be maintained with the most suitable solutions.
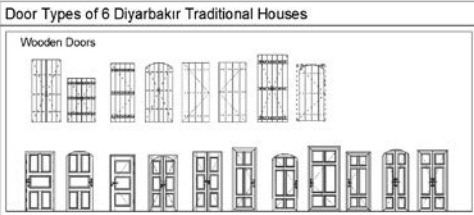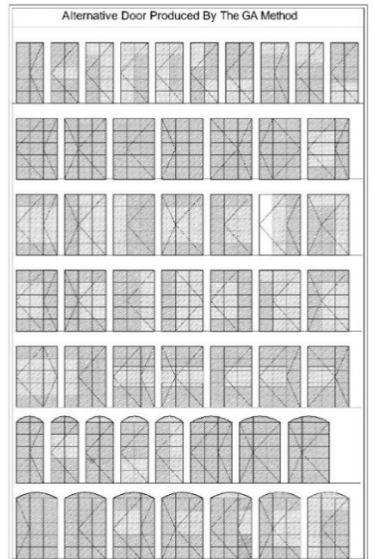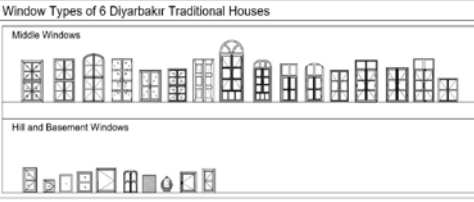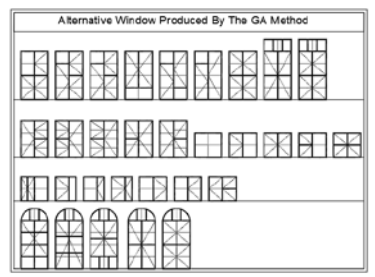
After analyzing the characteristics of generative designing systems, an integrated generative designing system whose genetic algorithms and shape grammar were to be used at different stages was presented in the study. However, a model study was prepared to understand how GA can be used in architectural designs. Assessments were performed through the door and window typologies facing the atria of traditional Diyarbakır houses with U plan. Rules and fitness functions were set for the selected chopping typologies, and different door and window

typologies were presented for the buildings.

Within the scope of the study, the door and window typologies of the facade elements of 6 U-plan type traditional houses were examined. There are 26 different door typologies and 19 different window typologies belonging to 6 U-plan type traditional houses examined. As a result of crossover and mutation processes using the GA method, 53 different door and 31 different window typologies with fitness values

were produced. Thus, local data will be transferred to new housing designs by using alternative typologies on the doors and windows of the new U-plan type houses to be designed especially in the traditional residential area. It will also be useful for generating alternative facade typologies. The comparative data of the doors and windows produced as a result of GA and the original door and window typologies of traditional houses are shown in the table below (Table 20).

Table 20. Door and window typologies of 6 U-plan type traditional houses and Alternative door and window produced with the GA method (Gökçe Salık ,2022)

Door and window typologies of 6 U-plan type traditional houses	Door and window typologies produced by GA method
Door typologies of 6 U-plan type traditional houses	Door typologies produced by GA method
Window typologies of 6 U-plan type traditional houses	Window typologies produced by GA method

Based on the data found in this study; These are as follows;

- designers are believed to improve further as their perceptions of computer-based generative systems are changed and as they start to consider computers as design generators.

- efforts were made to reveal the contribution of using GAs as an optimization tool to designing.

- this study will help present the results regarding the facade typologies to be designed and planned in future.

- this method will be used for the formation of facade typologies with different architectural shapes in future studies.

- considering the criteria such as fitness function, the method can be used in the buildings with complicated relationship systems.

- ensuring the optimal conditions of evolutionary process, or generation, will help achieve results with higher quality.

Data indicated that GAs should be used frequently and efficiently in architectural designing procedures. Furthermore, it is recommended that this method be used for the formation of facade typologies on the houses in different climate zones. The current use of the present typologies will be revealed in line with the certain criteria, and the traditional architectural language will be sustained.

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URL-2 1909- View from Suriçi
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Resume

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Poetic Emergence and Insight from the Trace of the "Line": A Reading on Carlo Scarpa's Castelvecchio Museum Drawings

Hande Asar* iD

Abstract

This study aims to trace the line and to conduct a discussion about poetics as it arises from the trace or drawing of that line. The study, therefore, considers the act of drawing as a thinking practice and explores the dynamic relationship between "line", "the act of drawing", and "drawing" through sketches. This study is based on the qualitative research method that discusses the conceptual relationship between language and poetry. This relationship is crossed with not-language and not-poetry and is explained through the approach of "poetic emergence" and "poetic insight". A sample analysis is made through the concepts of "dream, image, and affectivity", which are generated from this approach. The study's sample group is the selected sketches of Carlo Scarpa's Castelvecchio Museum. These sketches have been evaluated using the content analysis technique. The tracking of the line reveals a personal journey that includes the image, dream, and affectivity. Although Scarpa's dialogue with the designer of the Castelvecchio Museum sketches has ended, their dialogue with its observer continues. At the end of the sketches' reading, one makes inferences on emotions. These emotions, which derive from an ambiguous world of dreams and images, have created moments of "poetic emergence", while poetic emergence and its moments of emergence have created the "poetic understanding", which is personally internalized. Since the moments of poetic emergence and understanding arose from each other, they have not been revealed themselves in a specific order, but in a reticulated cycle flowing into each other. Subjecting the study to a subjective evaluation process has created limitations in the context of the content of the qualitative research method. The study, which unfolds over the poetics, is valuable as it discusses the intangible dimensions of architecture through the line standing at the intersection of the material and the immaterial.

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INTRODUCTION

In the architectural design process, thinking takes place through actions. One can evaluate many actions such as reading, discussing, drawing, making models, etcetera, as thinking practices. One of these actions, the "act of drawing", is one of the primary practices that ensures the visibility of the thoughts at every stage of the architectural design process. This practice opens up an area for the discussion of the relationship between the designer-subject and the "line". Thus, *the "line" becomes a part of the journey created in the design process* (Klee, 1961), the "act of drawing" turns into the intellectual process itself, and the emerging "drawing" gives visibility to this process. The relationship between *line*, *the act of drawing,* and *drawing* creates a dynamic range. This dynamism is discussed through "sketches" within the scope of the study.

It is possible to make inferences from the "line" character that makes up the sketches, just like handwriting. For example, while the lines drawn on top of each other evoke the decision-making phase in the process, shaky lines that do not complete each other indicate that the process is still open to thinking. In this context, one can state that the "act of drawing" co-occurs with various cognitive processes, the perception of space, and the decision-making stages in the design process. Therefore, one says that it would be mind-opening to discuss the triggering factors of the act of drawing together with the designer-subject. However, it is also possible to make other inferences without this interaction. In this context, the relationship between the line and *the act of drawing* is evaluated through "spatial seekings". This study, conducted from such a perspective, is constructed through the reading made by the observer-subject. Then, a discussion is carried out through sketches in which the relationship between *line, the act of drawing*, and *drawing* becomes visible. This relationship creates a new cycle that reveals "moments of becoming" and "states of being". In the study, the concept of "becoming" is used to express the moments when spatial searches are still ongoing, and the concept of "being" is used to express the moments when that search begins to gain visibility. So, one can say that the relationship that the designer-subject establishes with the line at the moment of action includes "moments of becoming". The moments when *the act of drawing* ends and the line becomes visible on paper create the "state of being". Then, the moments when the observer-subject tries to read that drawing again reveal the "moments of becoming". Therefore, in situations where the being still allows the becoming, where the line is still making a dialogue, the observer-subject can dream via the line. Thus, each observer-subject can dream differently and experience different emotions. The line begins to become a thing that can establish a dialogue with both the designer and the observer-subject and reveal the imaginary. The dialogue established through drawing and dreaming reveals the poetics in the traces of the line.

Poetics is about how things come together and is essential because it unleashes creative imagination. According to Watten, poetics is neither poetry nor language (Watten, 2006, p.349). So, it can be associated with things that create **affectivity** by mediating the triggering of the imaginary. Due to the structural and semantic duality of the language, these things find expression in a relationality that increases its discussion area with its negative version. This relationality emerges in the simultaneity between "language" and "not-language". In this sense, while language refers to a formally structured narrative, not-language means the thing(s) that derive(s) from language, but cannot be fully explained through that language. Besides, not-language describes intermediate situations in which we cannot agree on whether that thing is a language or not. The emergence of not-language can be thought of through the relationship between "becoming" and "being," which emerges in the designer-subject's or observer-subject's action situations. One discusses this relationship in the study through affectivity, which includes the dual structure of language but is also revealed independently of this duality. The affectivity created by the language paves the way for poetics to be revealed. This revealing happens through language when the designer-subject uses it as a means of expression while imagining the line and telling a story with it.

Since the study aims to discuss poetics by tracing the *line,* the relationality that Watten (2006) points out and which expands the language discussion with poetry is utilized. Poetry, born from a linguistic approach, has structural and semantic content. Besides creating harmony with the way words come together, poetry also reveals the emotions beyond those words or statements. This range of affectivity, which is subject to change both personally and temporally, allows for the expression of poetry with not-poetry, which is its negative version. The relationship established by the juxtaposition of words in poetry is discussed in this study by bringing the "lines" side by side. Thus, to open the poetics discussion, both language and poetry are explained through architectural sketches within the context of their structural and semantic contents.

The *language* and *poetry* concepts having similarities are expanded with the not-language and not-poetry concepts. A conceptual diagram (Fig.1) is established by crossing the four concepts with each other through the utilization of the relational perspective of Krauss's "expanded field theory" (1979) and Watten's "poetics diagram" (2006) (which is an adaptation of the Klein square used in *Sculpture in the Expanded Field*). In this context, one can first discuss the relationship between language and poetry, expressed as "poetic emergence", to describe the moments in which the imaginary is triggered through the dialogue established in the "cycle of being and becoming". There is an intuitive understanding here, and this understanding includes traces of the moments of dialogue established by the designer-subject with the line. The observer-subject can read these traces through his/her

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viewpoint/personal experience. This situation can be thought of as akin to each reader reproducing that text in their imagination while reading a literary text. At such moments, while the observer-subject tries to understand the designer-subject's world through the line, the line that turns into a finished drawing is also revived, creates images, and becomes a "becoming". As both language and poetry, line transcends its structural areas and creates worlds of personalized meaning according to its audience. Thus, language reveals itself in not-language and poetry in not-poetry. The relationship created between not-language and not-poetry through line establishes a dialogue in the "cycle of becoming and being". Through this dialogue, emotions and moments of internalization begin to appear. These moments of internalization are expressed as "poetic insight" in the study.
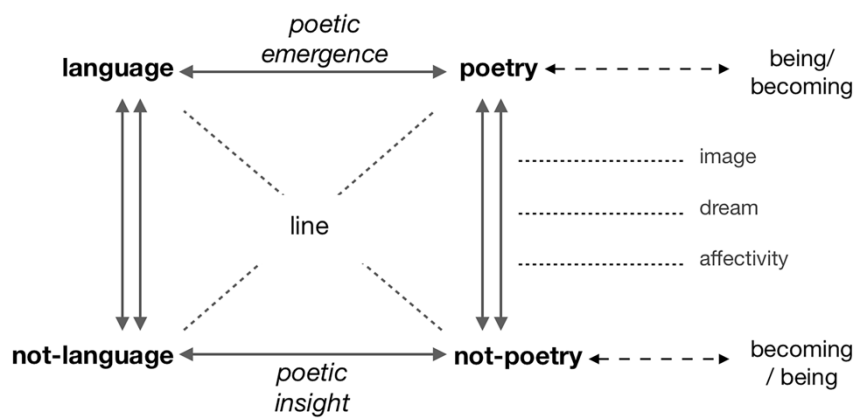
Figure 1. The structure of the research.
(The conceptual diagram is established by utilizing Krauss's "expanded field theory" (1979) and Watten's (2006) "poetics diagram".)

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As a result, the trace of the line is discussed in the study through architectural sketches by concepts arising from the relationship of language, not-language, poetry, and not-poetry. These concepts are the **image** revived with/through the line, the **dream** that forms the focal point of the poetry debate, and the **affectivity** concepts that emerge in the cycle of being-becoming or becoming-being. The revelations mentioned above and the conceptual relationship form the structure of the study (Fig.1).

In the context of the conceptual structure in question, the discussion is conducted through the sketches of the Castelvecchio Museum renovation project, one of Carlo Scarpa's best-known designs. Since Scarpa is an architect, who expertly brings together architectural elements and works by producing many sketches, the sketches can be utilized as a sample that can expand the discussion area of the study. The understanding of detail, which we often encounter in Scarpa's sketches and which is an expression of how two things come together, is discussed as a factor that reveals poetics. The approach of the detail is evaluated on different scales. In this context, tracing the immaterial thing through the material thing also mediates the visibility of the relationship between poetic emergence and poetic insight. It becomes a part of the journey towards the person's inner world. Therefore, this study is valuable as it

discusses the intangible dimensions of architecture through the line standing at the intersection of the material and the immaterial.

THINKING AND DREAMING FROM THE TRACE OF THE *LINE*

In order to be able to discuss the "act of the line" through the finished drawing, that drawing should still be able to tell the observer something and offer openness to rethinking together with it. While drawing exists with the world of thought and the image of the designer-subject/the **"hand that draws"** (Bal, 2021), it also moves towards the world of thought of the observer-subject/ the **eye that dreams,** so that dreams can be made both *with the line* and *through the line.* The drawing of the dreamed thing and the dream of the drawing create possibilities for different worlds and stories. In such a case, how can the "line" be traced?

The imaginary thing created with/through the *line* needs an expression/narrative where it can be told and conveyed on the one hand and an area of influence to reveal the affectivity. Within the scope of the study, the expression/narrative mentioned is discussed over "language" and "poetry". One unfolds the language discussion through sketches where the dynamic relationship between *line*, *the act of drawing,* and *drawing* becomes visible. Language is discussed juxtaposed with not-language since lines construct something and are constructed through something. Here, not-language refers to what is formed by the *line* but is not visible in the *line itself,* but is rather implicit in it. A similar approach is also valid for "poetry", in which the domain of the imaginary is discussed. Poetry is considered together with not-poetry. On the other hand, not-poetry refers to the sphere of influence that creates the poetic situation but is implicit in the poem and varies for each reader. Thus, one discusses the line in the context of the transitive relationship between language, not-language, poetry, and not-poetry.

The relational situation created by the areas of positivity and the conflict created by the areas of negativity expand the discussion for the imaginary thing that consists of the *line*/ trace of the *line.* One discusses the *line* over the imaginary world of the reading eye, not the imaginary world of the *hand that draws.* Thus, the *line* becomes a trigger that reveals different dreams.

The triggering situation mentioned above is revealed through language because the line is one of the primary elements that make up the architectural representation techniques that establish a dialogue between the designer and the designed thing. The line that establishes the relationship between language and not-language is *one of the languages used by architecture* (Yücel, 1999) (Yücel exemplifies these languages as drawing, written, and computer languages). This kind of language approach allows one to be in the act of thinking/designing with or through the line. "Language is accepted as a system of audible and sometimes written signs that individuals use to express their feelings and thoughts and communicate with each other (Vardar, 1998, as cited in Gürer & Yücel, 2005)." Therefore, language is necessary to be able to "tell"

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something or "communicate" with something. The content or scope of the thing being told/communicated may vary. In this case, language begins to diversify and turns into a means of expression that allows thoughts to be revealed. In this context, "language and thought constantly affect each other, language supports thought, and thought supports, develops and strengthens language (Vardar, 1998, as cited in Gürer & Yücel, 2005)." One can mention a similar approach for architectural thought. Yücel says that many thinkers have established a relationship between architecture and language in the context of language and meaning. He also states that architecture has a linguistic content and exchange with language (Yücel, 1999). The linguistic content in question is discussed in the study through "sketches on the visual graphic language's line from the abstract to the concrete (Porter, 1979, as cited in Gürer & Yücel, 2005)." Sketches, in which the primary state of the *line* becomes visible in the architectural design process, have a world of meaning outside of that of the instrumental drawing. For this reason, they allow us to **dream** with/through the line beyond the qualities of "telling and communicating".

Man Ray says that "(…) if it is something I cannot photograph, like a dream or a subconscious impulse, I have to resort to drawing or painting (As cited in Belardi, 2014, p.41)." Based on this quote, Belardi explains that the words "dreaming and drawing" (p.41) are similar both phonetically and in terms of harmony between the two. The aforementioned similarity can be discussed over the performative synchronicities of the words. Namely, in the context of architectural design, the act of dreaming usually begins with sketches, where the first thoughts appear. *Sketching (free-hand drawings) is one of the methods of giving form and expression to one's thoughts* (Edwards, 2008, p.1). Just at the stage of creation, *dreaming* and *drawing* emerge in a simultaneous cycle, and thinking takes place through these two main actions. The sketch also *guides the designer to transform the images that appear in the mind and creates the memory of the ongoing design process* (Arıdağ & Uraz, 2006, as cited in Kandemir & Küçükersen, 2019). At this point, appearing or already existing ambiguous **images** begin to trigger the actions of "dreaming and drawing". Since we do not know whether the *line* on the paper or the thought in our mind is formed first, the acts of (thinking), dreaming, and drawing do not establish a priority-recency relationship through *the hand and line relationship.* What happens there are momentary developments and simultaneous revelations. Thus, it can be said that the original sameness of the words *dreaming and thinking* manifests itself in action. Line, a product of actionality, reveals its own language. That is why it is important "… to grasp the sketch freeing it from the burden of fidelity to a particular image. The sketch is not a compositional plane in which the visual substitutes for the verbal: it is not the illustration of the line, but itself (Altınışık, 2020)." The sketches, which come into existence as the *line itself,* are handled in the oscillation of "becoming and being" within the study's scope. Thus, a journey is

embarked on from the trace of the *line* towards the poetic one. In this context, the relationship established with language begins to be established with poetry. Just as the language discussion is handled together with the concept of not-language, the not-poetry concept is utilized to open the poetry discussion, which has a linguistic content. The discussion is conducted over "poetics," which includes the relationship between language- not-language and poetry- not-poetry, but can be independent of both.

Things that contain poetry qualities are considered poetics. According to Pierre-Jean Jouve, poetry is "a soul inaugurating a form" and the soul is "supreme power" (as cited in Bachelard, 1958/1994). Based on this, Bachelard states that it is necessary to follow two phenomenological lines of analysis that go from the "outpourings of the mind and towards the profundities of the soul" (p. xxiii) to reveal the spiritual effect of poetry. On the way to the richness of the mind, images emerge by "setting in motion the entire linguistic mechanism" (p. xxiii); on the other way to the depths of the soul, emotions that give the "poetic image's quality of inter-subjectivity" (p. xxiv) are revealed. At this point, which focuses on the structural side of language and poetry, one expresses the reveals as **poetic emergence.** In the moments when these two paths come into contact with each other, the ambiguous images and emotions that come to life begin to be internalized. At such a moment, the focus is on the semantic side of language and poetry, this time, and the relationship between not-language and not-poetry forms the **poetic insight.** Bachelard (1958/1994) expresses the aforementioned internalization situation as follows:

> (…) The image offered us by reading the poem now becomes really our own. It takes root in us. It has been given to us by another, but we begin to have the impression that we could have created it, that we should have created it. It becomes a new being in our language, expressing us by making us what it expresses; in other words, it is at once a becoming of expression, and a becoming of our being (…) (p. xxiii).

From this point of view, in the study, poetry finds expression as a form of *emergence* and *insight* that creates blurred images and affectivity. In this case, how can the poetics discussion, which is expressed structurally and semantically through moments of emergence and insight, be conducted? First of all, one can say that the personal bond established between the imaginary and the emotional reveals imaginary moments through dialogue. These imaginary moments occur differently for both the designer and observer-subject. While the dream of the designer-subject prepares the environment for "poetic emergence", the dream of the observer-subject, the moments of internalization, allow for "poetic insight". These moments, which can also be expressed as an intuitive understanding, are the things that create **affectivity**. When one considers poetics in the context of architectural design thought and thinking

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practices, one can say that poetics emerges in "the act of drawing" through the "hand that draws" and in "the line itself" through the "eye that dreams". In this context, one can take the croissant narrative and its orthographic drawing by Enric Miralles and Eva Prats (1991) as an example. The croissant's orthographic projection makes the croissant's layered relationships, form, and construction technique visible. We can begin to remember the taste it leaves on our palate when this projection is combined with the croissant's image that comes to life in our mind. Therefore, the drawing or narrative does not give knowledge about the croissant's taste. However, when we begin to trace the line that represents it, the revealed things emerge in the poetic in a range that is neither language nor poetry.

A similar situation applies to the kitchen drawings accompanying Serdar Köknar's (2020) "kitchen diaries" article. A drawing, which finds expression in the actions in the kitchen, reveals the movement in the space and allows us to dream about it and write a story. Thus, by following the line, we can visualize images of the kitchen's atmosphere and establish an affectivity connection. At these moments, one can mention space's poetic emergence and insight. Therefore, when we begin to accept the *line* as a creative intent, the trace of the line becomes traceable and begins to offer a research environment. In such moments, the expression "traveling with the line" mentioned by Klee comes to life.

The *line* that emerges from the designer subject's *hand that draws* and *eye that dreams* contains a state of "becoming" at the moment of emergence. On the other hand, the *line* becomes "being" only when it is integrated with the paper and becomes physically present on the paper. When the *line* has finished its dialogue with its designer, it establishes another dialogue with its observer, and returns to the "becoming" state again. The state of "becoming" here is essential in order that the *line* might be traced. Since at the point where it starts to trigger something in the line observer, it can turn into something performative again, and that is when the journey with the *line* begins. Thus, the "blind spot between the drawing and its object (Evans, 1997, p.182)," which is perceived as a negative statement at first glance, opens up a discussion area where the line can be traced when it fails to turn into a "translation (Evans, 1997, p.181)" with/through the *line.* Since the blind spot mentioned cannot reveal the same thing/perception for every observer, it creates a potential discussion area. The blind spot between the drawing and its object turns into an open source that can be transformed every time by the object's viewpoint.

As can be seen from Evans' approach, the croissant and kitchen drawing samples, we witness the emergence of the poetic as "the trace left in the imagination" and "the thing that cannot fall into words-lines-physical reality". In this context, the *line* is the primary narrative of *poetic emergence* because it has a content that both affects the *hand that draws* and the *eye that dreams* and is affected by them. When the *poetic emergence* begins to internalize and connect with the *eye that dreams*,

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poetic insight occurs. "According to Bruno, understanding cannot exist without imagination (as cited in Avanoğlu, 2021, p.45)." In this context, the owner of the "eye that dreams" is the person who can visualize the lines and the images they create in their imagination, reach their emotions, and dream with them. The distinction between whether that person is a designer or an observer-subject disappears at such moments, and different dreams emerge.

In the study, one uses the "dream/ing" concept to express the moments in the intersection of imagination and reality, where there is poetic emergence or insight. However, dreaming does not mean immersing in dreamland or being in a state of sleep. In Bachelard's (1958/1994) words:

> (…) when it is a question of poetic revery, of revery that derives pleasure not only from itself, but also prepares poetic pleasure for other souls, one realizes that one is no longer drifting into somnolence. The mind is able to relax, but in poetic revery the soul keeps watch, with no tension, calmed and active (…) (pp. xxi-xxii).

This wakefulness provides an environment for the juxtaposition of things and the emergence of the poetic. Dreams constructed with/through the "line" create a new image and emotion for each subject during each dream. At such moments, the *line* comes into being in the relationship between language and not-language, or poetry and not-poetry. For this relationship, the *line* must be "grasped by pleasure" (Akın, 2021). This insight is handled in the poetic context and finds its response in the moments that create affectivity.

As a result, the relationship between language, not-language, poetry, and not-poetry is discussed over the **image, dream,** and **affectivity** concepts derived from these concepts. The poetic emergence and insight are explained with a selected architectural example. The sample group in question consists of a few sketches of Carlo Scarpa's Castelvecchio museum. As it is known, Carlo Scarpa is one of the names that skillfully brings together architectural elements and works on sketches. The Castelvecchio Museum is one of his best-known buildings. The way of juxtaposition, which forms the basis of the poetic debate, becomes visible in Scarpa's sketches through his "insight of detail". The idea of detail, which constitutes an essential part of spatial understanding, is crucial because it is related to the juxtaposition of two things. The poetic one is fed precisely from such relational situations. In the study, not only Scarpa's detail sketches but also his understanding of detail is pursued. For that reason, his different scaled sketches are handled. Moreover, spatial images are sought from the traces of the details in these sketches. The detail drawing shows how a unit brick is repeated to form a surface, and at times how an architectural element is used in conjunction with another element. Thus, a detail-in-detail approach is adopted. The detail sketches are often considered an invisible element that establishes all spatial relations; however, it is discussed as one of the things that reveal

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the poetry of the design. The discussion of poetic emergence and insight with/through Scarpa's sketches is conducted by utilizing the content analysis technique.

POETIC EMERGENCE AND INSIGHT THROUGH SCARPA'S SKETCHES

Scarpa believes that "people should express themselves by using the areas that modern rational thought leaves out as unnecessary (Scarpa, 2001a)." Therefore, "it is possible to see his architecture as an art of discovery based on mastery of materials and details (Güzer, 2001)." One can trace these discoveries through Scarpa's sketches with/through the *line* that created them. Readings made on these sketches, which indicate the dialogue established with dream and *line*, are carried out in the relationship established with the designed thing and spatial searches.

Drawing for Scarpa, according to Erman, is an environment in which the conceptual elements of the building and its tangible elements, such as materials and construction techniques, are integrated so that the designed thing might be seen and developed (Erman, 2001). The integrated/relational view mentioned ensures that both the structural and semantic expressions of the *line* as a language are revealed.

In this context, "drawing is not just a means of expression for Scarpa, it is almost a research environment, an art environment that is sometimes so expressive as to compete with what is being done (Güzer, 2001)." Beyond being a representation technique, the fact that Scarpa's *lines/drawings* compete with the physical reality of the thing represented is a sign of the poetry of the drawing. In this context, Scarpa states that "an expressive form can turn into poetry (Scarpa, 2001a)." At this point, an expressive form can be thought of as a relationality that can trigger something/or create affectivity in both the designer's and the observer's world. This relationality is a phenomenon utilized in the study to conduct the discussion of *poetic emergence* and *poetic insight.* Scarpa's sketches of the Castelvecchio Museum are used as an example in the discussion. The details in the sketches has been utilized for poetics discussion. One can say that the concept of detail expresses *the way two things come together.* The detail is handled through sketches of different scales and the contents of the sketches. Thus, in Tafuri's words, Scarpa's "personal codes" (as cited in Güzer, 2001) are tried to be deciphered.

Castelvecchio, located in Verona, Italy, was converted from a military barracks into a museum between 1924 and 1926. Between 1956 and 1973, it was restored in three stages by Scarpa (Scarpa, 2001b). Scarpa undertook restoration projects in general, and the Castelvecchio Museum is one of Scarpa's best-known works. Köksal (2002) states that the multiplicity of sketches/drawings made by Scarpa for a single statue bearer in the Castelvecchio Museum forms an essential part of his discourse. According to him, Scarpa realizes the work from detail to whole, like a medieval master, but with his created language (Köksal, 2002). The personal language emphasized here is essential as it paves the way for discussing the concept of "poetics" in the study. Therefore, this

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language, personalized by Scarpa, is discussed through the concepts of "image, dream, and affectivity" that create the expressions "poetic emergence" and "poetic insight" by tracing the line.

Figure 2 (Left). Castelvecchio Museum's plan of the exhibition area of the statue of Cangrande (Museo di Castelvecchio, C. Scarpa 1961-1964.).

Figure 2 (Right). Longitudinal and cross section and plan of the support of the statue of Cangrande. (Museo di Castelvecchio, C. Scarpa 1964.). © Archivio Carlo Scarpa del Museo di Castelvecchio. Musei Civici di Verona.
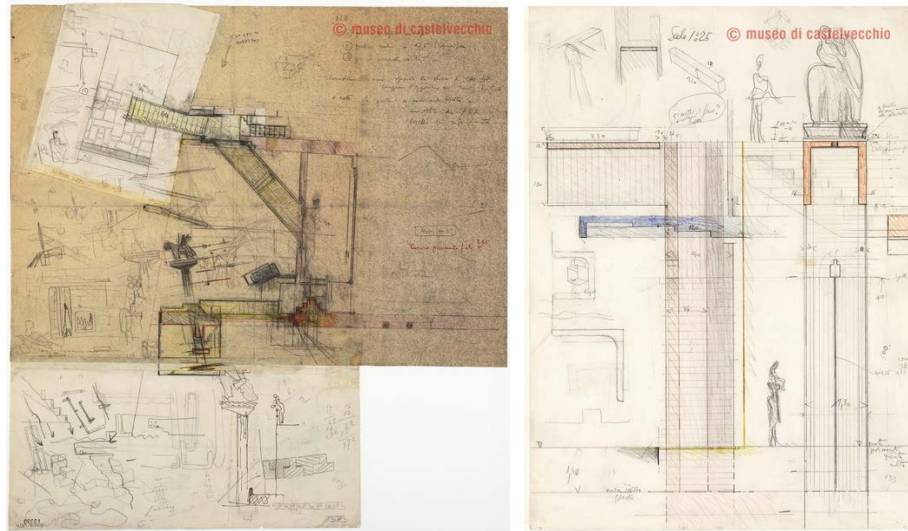
The first sketch (Fig.2.left) discussed within the scope of the study is the layered drawing where almost all spatial relations of the museum are visible, and plan, section, and perspective drawings are considered together. The second sample (Fig.2.right) is the drawing depicting the installation work of the *Cangrande della Scala* statue, which is perhaps the most striking element of the entire restoration project. *Cangrande della Scala* (first half of the 14th century) is one of the first great equestrian monuments of Italian art. Until 1909 it was on the facade of the church of Santa Maria Antica then transported to the renovated Castelvecchio Museum (Cervini, 2016). When we look at the sketches (Fig.2.left) in which the statue's location and the other element's place (stairs, details etc.) is sought we encounter some drawing trials. The indecisive lines in this drawing cause us to envisage ambiguous images of the design process. In particular, one can dream about the relationship the sculpture is planned to establish with its floor and pedestal through those lines. On the other hand, while the calculations on the paper indicate an analytical search, drawing the perspective of the existing stair steps and marking the directions with arrows indicate a perceptual search. Considering both the sculpture as a whole and considering how the architectural elements will keep the sculpture standing by coming together indicates the transition between the details. Therefore, one can evaluate Scarpa's decisive and indecisive lines in this sketch as a trace of the awareness and obscurity of the imaginary wandering in space. While we can easily navigate the space we create in our minds as an eye that dreams through decisive lines, we go on a kind of quest when we encounter indecisive lines. However, in both situations, we dream between the old and the new and try to sense what kind of spatial perception the orientations/movements in the space will create for us. Besides, we create various images such as the harmony that comes with

the geometric order in the space, the excitement we get when we dream of climbing the stairs, the light breeze we feel while trying to understand the indoor-outdoor relationship in our imaginary world, and experience the emotions triggered by those images. Every dream we build through sketches allows different perceptions and emotions to be revealed. For example, the line and contrast created by color mediate us to question the old and new relationships in the space.

When we look at the second sketch (Fig.2.right), we encounter a drawing in which Scarpa has decided where the *Cangrande della Scala* sculpture will be located but thinks/imagines how the sculpture will appear and be perceived from which points. Since the fundamental design decisions are made, we see that decisive lines in the sketch replace indecisive lines. In addition to the sculpture image, which is also dominant in this sketch, we begin to read more clearly the detailed elements. Thanks to the density of the lines (with scribbles and hatch lines), the detailed profiles' images begin to appear in our minds. In addition, the dimensions that we can now read allow us to visualize the greatness arising from the traces of those lines. Detail inquiries at different scales, both thought of/imagined contextually and individually tried, also affect our dreams. For this reason, in this sketch, we dream together with the question: *How can I perceive the Cangrande della Scala sculpture from different points?* At the points where we start looking for an answer to this question, it becomes possible to make the following inferences: While the sculpture creates an overwhelming effect when we perceive the sculpture from the ground plane, our understanding of scale changes when we are on the same plane, and the sculpture we perceive begins to scale to the human. However, "Even if organically included in the museum layout designed by Carlo Scarpa, it is difficult to grasp the evocative appeal of the sculpture outside the architectural structure for which it was originally intended (Cervini, 2016)". This approach highlights an intergenerational conversation between the original artist and Scarpa. Nevertheless, through the sketches as a whole, one can say that we feel different emotions based on the points where we position ourselves imaginatively, and the poetic power of the line reveals itself precisely in these moments.

Figure 3. Castelvecchio Museum's *Madonna con Bambino* support drawing. (Museo di Castelvecchio, C. Scarpa 1962-1964.).
© Archivio Carlo Scarpa del Museo di Castelvecchio. Musei Civici di Verona.

In the sketch (Fig.3) belonging to the design phase of the *"Madonna con Bambino"* support, another example of the study, and located in the sculpture gallery, one again encounters a dominant sculpture image. However, the first thing that draws the attention is the red lines creating contrast. The scribble lines, which become dominant with color, create a feeling of material and textural difference. One can characterize the lines used in the sketch as scribble, hatch, decisive and indecisive lines. Such content can be read as the decision-making phase of the point detail design, which constitutes the main problem with respect to this sketch and the search for the spatial effects of that detail. The relationship between detail and sculpture, designed with plain language, makes the sculpture seem suspended in the air; thus, one feels the spatial depth. Contrast, depth, and suspension create a sensuous spiritual effect with the image of a sculpture floating in the void. The *line* that triggers the spiritual emerges poetically through the void.

Finally, the sketch (Fig. 4) showing the facade work of the sacellum in the Castelvecchio Museum is discussed. This sketch was made with pencil and crayon on paper. Since the rhythmic order in which colors and geometry are brought together in harmony creates a perceptual effect, it enables the moments of becoming to be revealed. This two-dimensional holistic order, which is read with a square-within-square setup in a geometric sense, also creates a three-dimensional cube perception. Because of the relationship between decisive, indecisive lines and the use of color, the drawing object begins to come to life in the mind together with its material and texture. Thanks to this imagination or dream, which creates a tactile effect, we find ourselves in a kind of language game through "lines". The layering of the sketch with legend, notes, and dimensions allows us to produce stories about the relationship established with the existing structure. Thus, we try to visualize the spatial relationship between the old and the new in our imagination. Besides, the rhythmic order and color used in the sketch mediate our

excitement and curiosity about that space while tracing the line. A composition that emphasizes the created continuity perception and the part-whole relationship emerges. The detail arising from the said relationship and handled through the juxtaposition of the units mediates the poetic emergence.
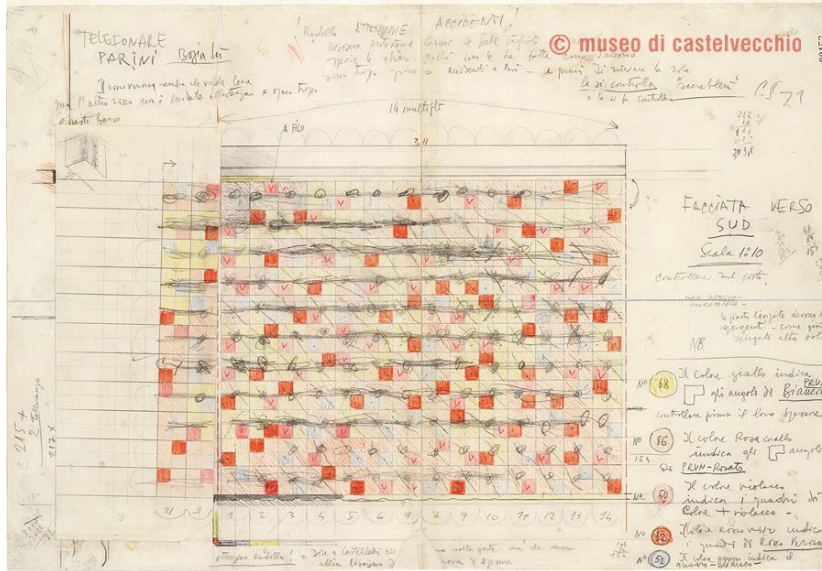
Figure 4. Castelvecchio Museum's sacellum facade drawing. (Museo di Castelvecchio, C. Scarpa 1962-1964.).
© Archivio Carlo Scarpa del Museo di Castelvecchio. Musei Civici di Verona.

As a result, in all four sketches, the spatial pursuits that follow the *line* are expressed by cognitively transferring a two-dimensional plane to the third dimension, imagining the depth. The poetic discussion has been carried out through the dream of the observer-subject over Scarpa's sketches that reveal the relational situation created between line and drawing. This relational state is essential for tracing the line. Scarpa expresses his relationship with the drawing as follows: "I want to see things. I do not trust anything else. I place things in front of me on the paper so that I can see them. I want to see therefore I draw. I can see an image only if I draw it (as cited in Murphy, 1990)." As can be seen in Scarpa's statement, the relationship between *line*, *the act of drawing*, and *drawing* reflect his desire to see the image that appears in his mind on paper. With the influence of this desire, one can establish a dialogue with Scarpa's sketches, can make a dream through them, and a journey can be made towards his imaginary world. The perceptual and sensory process experienced during this journey establishes the discussion of poetics through language, not-language, poetry, and not-poetry. In the Scarpa example, spirituality, curiosity, excitement, alike emotions expressed can be considered the keywords that set up this discussion, and the poetic appears precisely in these moments. The emotions felt, which cannot be fully expressed or are insufficient, differ for each observer-subject. On the other hand, to share these feelings, we need to be able to express the bond we have established with the *poetic emergence* by making use of the common language we use. At this point, our ways of internalizing and expressing that emergence appear as *poetic insight.*

IN LIEU OF CONLUSION

Scarpa's sketches of the Castelvecchio Museum, which include different spatial relationships and details, show the relationship between *line, the act of drawing,* and *drawing.* The narrative of *the eye that dreams* has found expression by following the lines of *the hand that draws.* This narrative is revealed based on spatial searches by imagining the third dimension. The two-dimensionality of the line space does not prevent the third dimension of the imagined space; on the contrary, the ability to imagine the third dimension reveals the power of the line.

Avanoğlu states that despite the view that spatial depth and poetry are lost by transferring the third dimension to a two-dimensional plane, depth is a metaphorical fiction on paper, and it is read just like a text (Avanoğlu, 2021). This kind of reading brings the imagination to life, and for this, the imagination has to be triggered. The perceived depth not only opens the discussion regarding knowledge of the read thing but also that thing's meaning and the affectivity it adds to the reader. At this point, poetics appears on a threshold that is neither language nor poetry. Therefore, the sense of impermanence created by the sketches, even though they are on a two-dimensional plane, helps us follow the poetics in the footsteps of the line. This type of tracking is a personal journey. In this journey, the concepts of *image, dream* and *affectivity* have helped to reveal the poetics of the *line.*

Between language, not-language, poetry, and not-poetry relationship the theoretical basis of the poetics debate in the study is given form. Here, while one can talk about language and poetry structurally, one can also speak about not-language and not-poetry semantically. Although the negativity field discussed through the language and poetry has a conflicting effect, it reveals the "ambiguity" of the *image, dream,* and *affectivity.*

At this point, ambiguity becomes part of the personal perspective of the designer-subject or *the hand that draws* and the observer-subject or *eye that dreams.* In the discussion on Scarpa's sketches, this personal point of view can be explained through various "codes" that Tafuri points out. First of all, the existence of decisive, indecisive, repetitive, or weak lines becomes the line's characteristic, a primary reflection of its relationship with the line. It can be said that the indecisive lines in Scarpa's sketches correspond to the formation process in which his thought or thought has not yet fully emerged, while the more stable and decisive lines correspond to those situations in which his thought or dream begins to internalize. There is a similar situation in the four sketches discussed in the study. The secondary code is the element that explains the semantic world of the line, which includes the notes, calculations, measurements, and texts in Scarpa's sketches. One can consider these elements as auxiliary elements that direct to the imaginary one and prepare the ground for it. For example, the dimensions in the second sketch (Fig.2.right) provide information about the sizes of the architectural elements used, and this knowledge allows us to perceive the

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space in the third dimension. Another made inference from the sketches is to express the context with lines. The fact that images of people or sculptures are a part of the drawing or become an element of space research contributes to the structural and semantic content of the line. It gives perspective to both *the hand that draws* and *the eye that dreams.* The texture created with the line can be described as another code that we can extract from Scarpa's sketches. The texture created with lines and line characteristics in all the sketches within the scope of the study revealed the hierarchy in the first sketch, the emphasis in the second, the contrast in the third, and the material-color relationship in the final item. Finally, the sketches have created a part-whole relationship with/through the line because of the different details (or detail solutions) they contain. The dominance of images and their effect on the whole drawing (Fig.2.left, Fig.2.right), the detail solutions both in themselves and together with their place in the space (Fig.2.right, Fig.3), and the holistic effect created by unit repetitions (Fig.4) can be considered in this sense.

In brief, the data obtained at the end of the study with/through Scarpa's sketches are as follows; the characteristic of the line, the secondary elements that points to the meaning of the line, the expression of the line and the context, the texture created with the line and the line characteristic, and the part-whole relationship created with/through the line. The personal viewpoint formed in the context of these data has prepared the environment for the poetic one to emerge from the line's traces. Therefore, a journey has been made with/through these sketches, which continue to establish their dialogue with the observer, even though they have finished their dialogue with their designer.

From the perspective of *the eye that dreams* as an observer-subject, inferences have been drawn about emotions such as spirituality, curiosity, and excitement from Scarpa's sketches. This affectivity, which derives from an ambiguous world of dreams and images, has created moments of poetic emergence, while poetic emergence and the moments when that appearance is personally internalized have created moments of poetic insight. Since the moments of poetic emergence and insight arose from each other, they did not reveal themselves in a specific order but in a reticulated cycle flowing into each other.

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Resume

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Reproduction of Architecture in Modernizing Local Architecture: The Case of Muqarnas

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Abstract

The present study aims to investigate the cultural identity concept and its relation to cultural heritage within a conservation framework under the threat of unfettered interventions for modernity and its requirements by analyzing the reproduced architectural works. Furthermore, the study focused on clarifying and tracking the effects of architectural reproduction on society and individuals, as well as on the local way of thinking and local culture in a specific region known as the "*Levant.*" The research method is developed in two interconnected ways: qualitative 'interpretive' research methods are used to explain the pure concept of cultural heritage, while a 'simulation strategy' is used between traditional and historical architectural elements to create new architectural elements with historical origins and contemporary touches. Construct logic is a method of "*modernizing local architecture*", in that it controls modern architecture and uses it to develop local architecture rather than obliterating and distorting it. "*Muqarnas,*" one of the Islamic architectural decorative elements widely used in the Levant and surrounding geography, is chosen as the simulation case study for developing new contemporary architectural elements used both structurally and decoratively. The simulation approach used in the study is limited to several traditional architectural elements from the study's historical and cultural context, which were documented with architectural and technical data as well as illustrative drawings. It may be possible to raise conservation awareness by simulating some traditional architectural elements and developing them in a highly technical environment. Furthermore, it can provide the opportunity to obtain new architectural elements of a contemporary cultural nature that resist architectural reproduction in a variety of internal and external fields, as well as structural solutions.

INTRODUCTION

Different cultures have emerged around the world as a result of integrating the natural environment with the local living conditions of each region, each with its environment, sources, and languages. Cultural identity becomes a pattern and an integral part of daily life to express societal values based on these cultural expressions created as traditions (Li, 2017). Given such scope, Madanipour (2003) argued that cultural identity was the primary component of place memory, which can be considered one of the most important pillars of cultures and societies. According to Bachelard (1994), compressed time in a specific unit of the earth produces a variety of memories, which when combined create a unique memory of the place. This memory contains details about the place and stimulates its distinctive qualities and characteristics, which can be referred to as cultural identity. According to Bell et al. (1996:306), identity belongs to places and individuals, beginning with personal space and progressing to public space (Figure 1). Identity is a critical component of society's structure for the formation of social and cultural links and cannot be ignored.
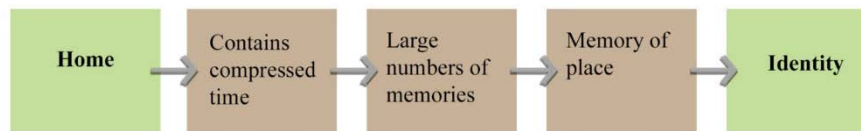
Figure 1. Shaping cultural identity within a place (Source: Authors)

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However, it is undeniable that the world is constantly evolving functionally, economically, and technologically, resulting in continuous growth situations for living requirements (Ouyang, 2016). As a result, globalization has taken hold, assisting in raising living standards and meeting basic needs while also erasing cultural differences and traditional styles, transforming the entire universe into a small town where all elements and forms are shared. This is known as "*architectural reproduction*" because the universal style serves as the foundation for all design standards used worldwide (Jokilehto, 2010). According to Navickienė & Riaubienė (2018), international concepts such as "*heritage conservation*" have been developed to achieve a balance between contemporary "*functional and economic*" requirements and cultural diversity within natural habitats. The concept of "*heritage*" has influenced how the term "*conservation*" has been used throughout history (Rahman, 2012). Larkham defined heritage as "*simply all things to all people*" (1995: 85; Figure 2).
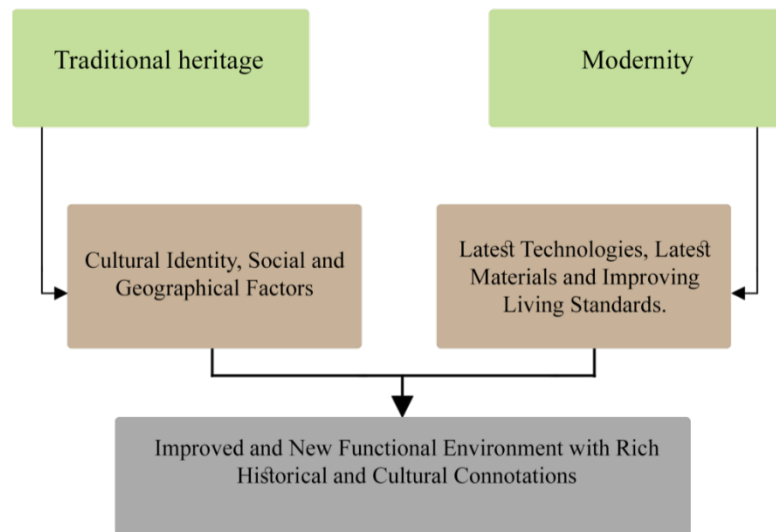
Figure 2. Characteristics of modernity and heritage and their balancing relationship (Source: Authors)

According to Ouyang (2016), the phrase "*heritage conservation*" has coexisted with other terms such as "*modernization of traditional architecture*" and "*localization of modern architecture*", where all three terms originated from the same source and were all developed to preserve cultural diversity, traditional daily life, and customs while also integrating them with contemporary technology to achieve the following goals:

• Keeping up with economic developments and new functional requirements.

• Preserving the spatial structures and the surrounding environment.

Heritage, on the other hand, can be preserved and national identity can be accentuated within the framework of awareness-raising and education policies that emphasize the importance of national identity in terms of its distinctiveness in the artistic, cultural, and intellectual aspects of societies and individuals, but that it shares the human aspect with all other civilizations and societies (Brockhoff et al., 2015). As a result of such awareness and educational policies, it is possible to avoid turning cultural, artistic, and intellectual diversity into a source of conflict and hostility within or between societies.

RESEARCH METHODOLOGY

Modernity and its demands for architectural reproduction, facilitated by globalization, pose a threat to cultural identity and the relationship with heritage. To draw away such threats, qualitative "*interpretive*" research methods were used in the present study to explain the pure concepts of cultural identity, cultural heritage, and architectural reproduction within the conservation framework. Simultaneously, a "*simulation*" strategy between traditional and historical architectural elements has been used to create new architectural elements within the historical origins and contemporary ways. This is to demonstrate an approach towards "*modernizing local architecture*", through which the process controls modern architecture and turns it into a tool for developing local architecture rather than exterminating it (Figure 3).
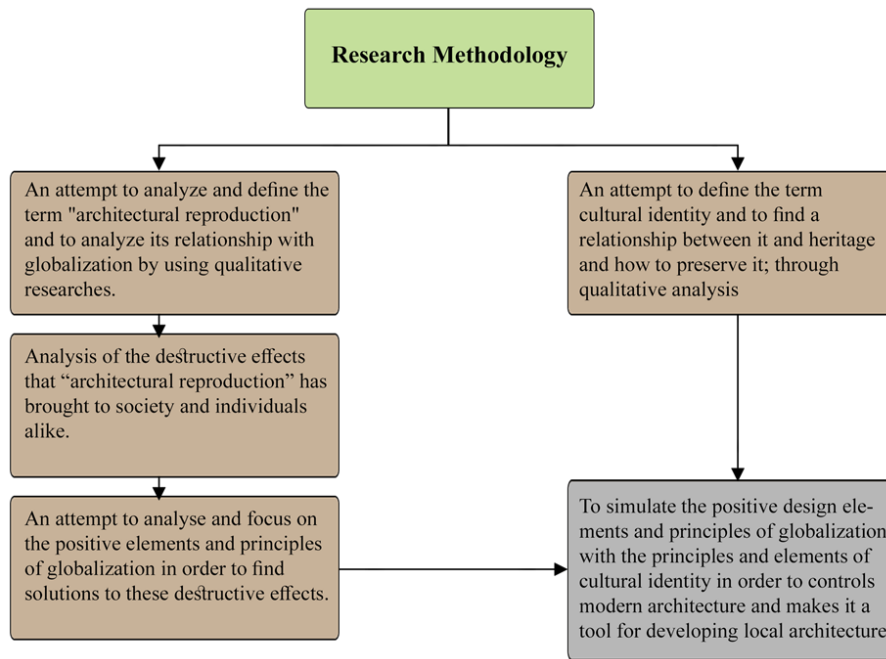
Figure 3. The research methodology (Source: Authors)

THE PURE CONCEPT OF IDENTITY, REPRODUCTION, AND GLOBALIZATION

Despite the difficulty in defining identity, Arnett Jensen (2003) developed an identification and demonstration framework based on the definition of identity characteristics, their formation and relationship to individuals and communities, and the details of everyday life. According to Shweder et al. (1998), behavioral practices that unite people within a community can involve the formation of a cultural identity. Furthermore, according to Whiting & Child (1953), cultural identity encompasses a wide range of spiritual, religious, and moral beliefs, as well as behavioral practices, thus the relationship between these cultural beliefs and practices becomes the main pillar of society.

According to Madanipour (2003), cultural identity can be considered one of the most important pillars of cultures and societies, as the main component of the memory of the place. Bachelard (1994) argued that compressed time in a particular unit of the earth creates a wide range of memories, which then together create a unique memory of the place. This memory contains details about the place and stimulates its distinct character and unique value, which differentiates it from others and is referred to as cultural identity. According to Bell et al. (1996: 306), identity belongs to places and individuals, beginning with personal space and progressing to public space. Identity is an essential unit in the structure of societies for the development of social and cultural ties and it cannot be neglected.

The Relationship between Cultural Heritage and Identity

Identity is the foundation of societies, as it reflects cultural and architectural aspects. Its existence indicates the existence of people and is the determinant of both private and public spaces. Furthermore, identity serves as a springboard for daily expressions and social

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interactions that reflect the spirit, language, and physical conditions of the urban environment (Turner & Singer, 2015). Once threatened, the architectural and cultural heritage is at risk. As a result, identity is an essential component of heritage, and the process of preserving heritage in its various forms and patterns must include the preservation of cultural identity. However, the concept of heritage had not previously been fixed or defined, thus the definition of heritage passed several stages, such as world wars, and periods of occupation and destruction, which had the greatest impact on shaping the concept of "*heritage*" over decades.

1ˢᵗ Definition **of "Heritage" after WWI**: According to Behiri (2011) "*Heritage is a symbolic resource, strongly linked to the question of collective memory and identity.*"

2ⁿᵈ Definition **of "Heritage" after WWII**: According to Graham (2011: 94), "*the content of heritage is commonly seen as embracing both the tangible (natural landscapes, buildings, monuments, and the like) and the intangible (folklore, rituals, traditions, faiths, myths, and others).*"

3ʳᵈ Definition **of "*Heritage*" in the 1960s-1970s:** Park and Allaby (2017: 13) describes heritage as follows: "*Heritage must be seen as separate from the pursuit of history, as it is concerned with the re-packaging of the past for some purpose in the present.*"

Following the development of modern movements in the Arab world between 1980 and 1990, and following Western trends, national identity began to be lost to meet modern requirements. Under the pretense of "*conservation,*" new concepts have emerged to reduce modern incursion and develop and preserve Islamic heritage content (Bagader, 2016; Ouyang, 2016), such as:

- Localization of Modern Architecture
- Modernization of Local Architecture

The development of identity and local heritage within the framework of the new preservation approach based on modernization and localization creates an atmosphere based on enjoying architecture without the need for a translator, resulting in an emotional rapprochement between the material and human fabric. When the viewer's relationship with the building reaches a critical threshold and he becomes aware of his own identity.

The Concept of Reproduction and Globalization

Globalization is a multi-faceted process with political, economic, and social dimensions and has architectural and cultural implications. According to Adam (2008), globalization emerged to create global social relations, a global economic market, and a unified global identity "*to eliminate aggressive nationalism and strengthen social ties around the world*". According to Barr, Hitchcock, and Johnson (1995), an attempt was made to reverse this architecturally by constructing identical iconic buildings around the world with specific and pre-determined standards according to the international style. The concept of "*architectural reproduction*" began to emerge here.

Koolhaas et al. (1995) also claimed that globalization had an architectural face that transformed ordinary countries into global attractions by converting money into tourist attractions, and these "*cloned and similar buildings*" acted as economic engines to increase capital. Yet, the question arises: "*The iconic and global products had been created to attract visitors, but they became similar everywhere, so what is the need for a visit to distant countries to see those products while they can be seen anywhere?*". Frampton (1993) discusses how modern civilizations incorporate elements of scientific, technical, and technological rationalism, as well as political rationalism, into mass production. Furthermore, Tzonis (2008) contends that globalization is the result of a long-term process of transportation and communication innovations. However, based on actual outcomes and Adam (2008) and Madanipour (2003), it is possible to conclude that these concepts and principles emerged with globalization, particularly the principle of redefining and unifying stereotypes and sensations such as "*luxury, beauty, strength, and sustainability*" to market and promote policies, economies, standards, and Western influence, led to creating the concept of architectural reproduction through a global architecture that shares same elements, concepts, and principles. As a result, destructive effects in societies were created, with "*cultural occupation*" being one of the most crucial components of these effects (Figure 4).
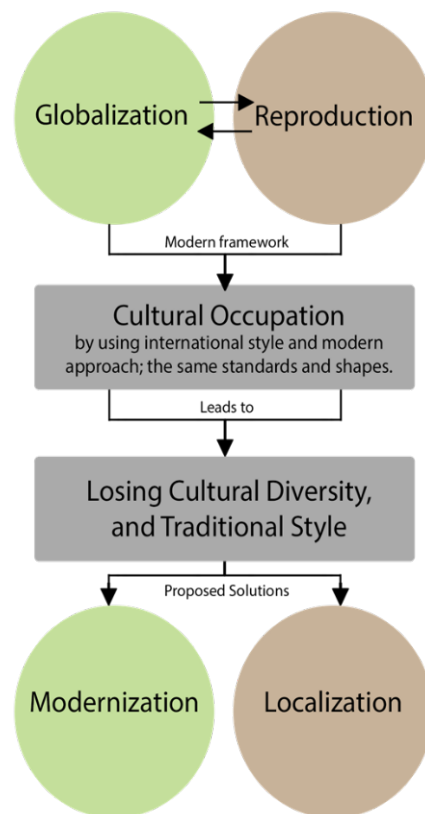
Figure 4. The destructive effects of Globalization [Source: Authors, based on Lefaivre & Tzonis (2012) and Tzonis (2008)].

Cloned architectural "*reproduction*" can lead to a so-called cultural occupation, which locks cultural identity and biological diversity behind modernity's bars with the locks of Western standards and policies.

Furthermore, there are numerous other negative consequences of architectural reproduction resulting from globalization, such as:

• ***Create a social gap*** (Tzonis, 2008) due to the high cost of creating modern buildings.

• ***Eliminate the creative nucleus*** that has produced the great civilizations of the past through cultural diversity (Frampton, 1993).

• ***Environmental wastefulness*** (Lefaivre & Tzonis, 2012).

In the present study, localization and modernization are proposed as solutions to the destructive effects of globalization, which result in the loss of cultural diversity and cultural heritage from past lifestyles.

APPLICATIONS OF LOCALIZATION AND MODERNIZATION: THE CASE OF MUQARNAS

According to Li (2017), certain conditions must be met during the application of "*localization*" and "*modernization*" to maintain their methodology and the desired goal (Table 1), including:

A) Preserving the Indigenous Population after the modernization and localization processes have been completed, thus the Indigenous people are the true definition of spatial identity.

B) Upholding traditional customs and improving quality of life.

C) The functional spaces should continue to be used as a continuation of social activities in everyday life.

Table 1. The goals of localization and modernization (Source: Authors)

Process	Goal
1-Simulation with architectural elements	Acquire new architectural elements with historical characteristics and conventional sources with modern touches
2- Simulation with structural elements	Its goal is to revive old structural formulas and geometric formations based on traditions and practices.

According to Ouyang (2016), systematic localization and modernization processes aim to use modernity's characteristics and features and simulate them with the cultural and historical connotations of each region. Furthermore, one of the most important applications of "*modernizing local architecture*" is to simulate traditional heritage elements with each other using modern technological means and materials. Therefore, *muqarnas* of the Islamic heritage in the Levant was simulated with other traditional architectural and structural elements since it was a highly adaptable element with advanced geometry that adapt to several formworks. *Muqarnas* could also be designed to simulate other architectural elements to acquire new architectural elements (with Islamic roots and a contemporaneous identity) without misrepresenting Islamic architecture with massive glass facades cloaked in modernity and contemporaneity.

There is no doubt that the following factors should be considered to improve Islamic architecture generally and *muqarnas* in particular (Maskin, 2019):

1. Become attentive to structural proportions

2. Using geometrical vocabulary, assess the aesthetic unity and decorative details

Furthermore, *muqarnas* may continue to evolve indefinitely to survive. Such a well-defined structural feature with varied and intriguing ornamentation can be used in a variety of contexts.

A framework was used to define the process of simulating *muqarnas* with other architectural elements so that the simulation process is based on achieving functional, sustainable, and aesthetic goals that are proportional to the needs of the time, but without losing the spirit and pure concept of *muqarnas*. Furthermore, this framework is critical in the evaluation of the simulation outcomes.

The methodology used in the present study is based on analyzing ancient and modern historical cases of *muqarnas*, which demonstrate how *muqarnas* have evolved and survived over time. After mastering the fundamentals of *muqarnas*, they were combined with architectural elements to create brand-new elements with a "*modern Islamic identity*" that could be applied as "*decorative and structural solutions*" in a variety of interior and exterior domains. Figure 5 depicts a flowchart of the methodological technique for modeling *muqarnas*.

Although *muqarnas* are an Islamic product, there is no information on where they were first used. While some early *muqarnas* monuments show its geometrical forms and construction techniques in various regions, including the center of Iran's northeastern region and Northern Africa, the first *muqarnas* were reportedly discovered in Iran in 1968 at the Takeht-I-Sulayman castle in Buchara, the Ismail Samani Mausoleum, and the Mausoleum of Arab-ata in the town of Tim, according to DoldSamplonius and Harmsen (2005) (Near Buchara). The first known example of *muqarnas (stalactite vaults)* was discovered in ImmDuva's tomb. Furthermore, *muqarnas* also appeared as a design feature to conceal and divide squinches, as well as to improve the decorative value of the squinches' and enrich the Islamic identity. These "*splits*" evolved into more sophisticated, consolidated, and functional components in decorative structural fields over time, as seen in the Samanid Prince Ismail Tomb in Bukhara, Uzbekistan (Figure 6).

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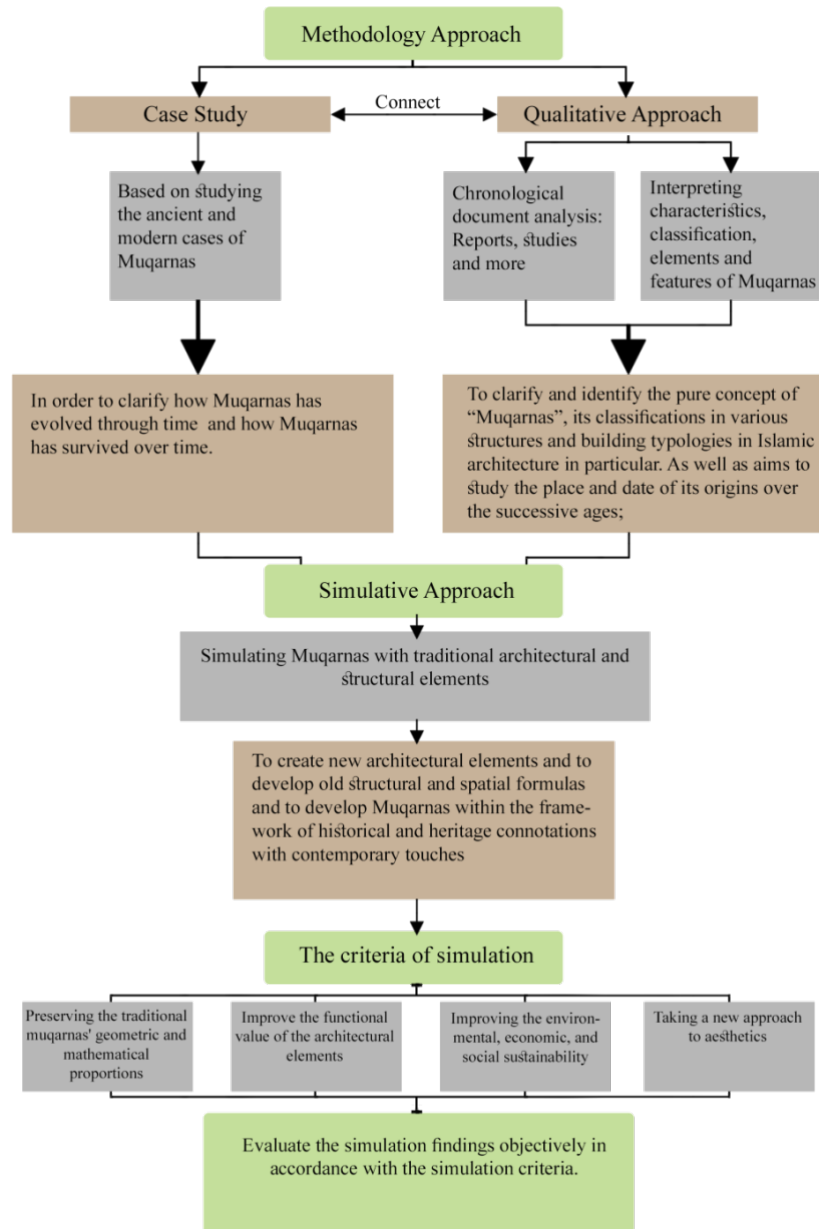
Figure 5. The Methodology Approach for Simulation (Source: Authors)
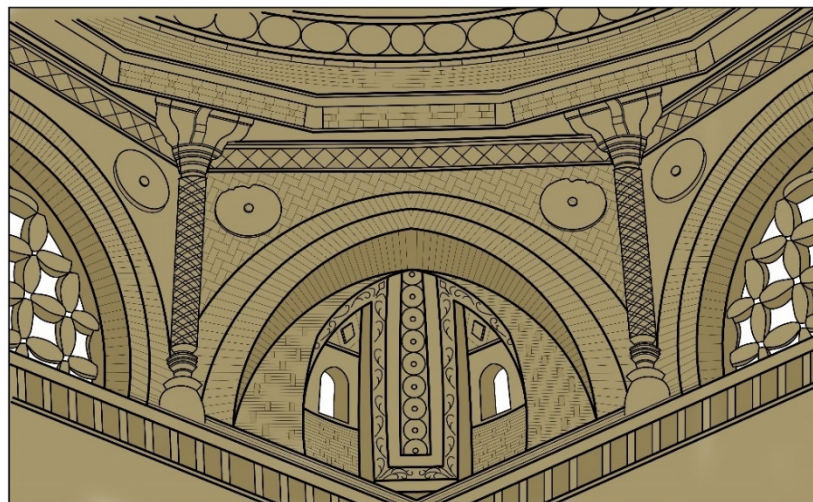
Figure 6. The transition zone of Bukhara's Samanid Prince Ismail Tomb (Source: Authors, based on Hattstein, M. and P. Delius 2000, p. 115).

The Basic Elements and Principles of Muqarnas

The outside of the muqarnas typically resembles the stalactites that form naturally in caves. According to van den Hoeven & van der Veen (2010), the "*stalactite vault*" is known in the Levant as "*muqarnas.*" Furthermore, Maskin (2019) argued that this motif is also common in Islamic culture and resembles stalactites; when combined, it takes on the shape of structural vaults.

The conversion of Islamic patterns and motifs (Arabesque) from two to three dimensions, which represent Islamic lifestyle, architecture, art, and societal design, could have been the fundamental design element of *muqarnas* (Castera, 2003). Figure 7 depicts this point of view.

Muqarnas were also seen as support structures that distributed load like flying buttresses by Creswell (1952), Bloom (1988), and Imani (2017). Although it can be found in almost all Islamic structures, mosques, and mausoleums are said to have more of this distinctive architectural element. Despite the wide range of architectural styles found in each country, this architectural feature unites the Islamic world. It was discovered in Egypt, Turkey, Iraq, Iran, Syria, Andalusia, and the Maghreb, among other places. Muqarnas are decorative and structural elements found in a wide range of buildings, including facades, domes, arches, and entrance portals.

According to the previously mentioned characteristics and composition of *muqarnas*, it is made up of "*cells*" that are connected by intermediary elements. The *muqarnas* elements are grouped in layers, or "*tiers*". According to al-Kashi (1960), these intermediary components are as follows:

The *muqarnas* is characterized as "*a roofed (musaqqaf) [vault] resembling a stairway (madraj-مدرج) with facets (dil'-ضلع) and on the part of a roof*" (*sateh -*سطح). Each side makes a right angle with its neighbor, a half-right angle with it, and their total, or integration among these two. The two sides can be represented as being on a plane parallel to the direction of the horizon. It has either two surfaces, one flat and the other curved, that make up its roof, or one surface that is not parallel to the horizon. According to al-Kashi (1960), both facets and their ceiling are referred to as unit cells (*baayt-*بيت). Al-Kashi additionally split the cell into two parts (the roof and the side component) to simplify arithmetical computations and identify *muqarnas'* flatness in the simplest manner (Figure 8).
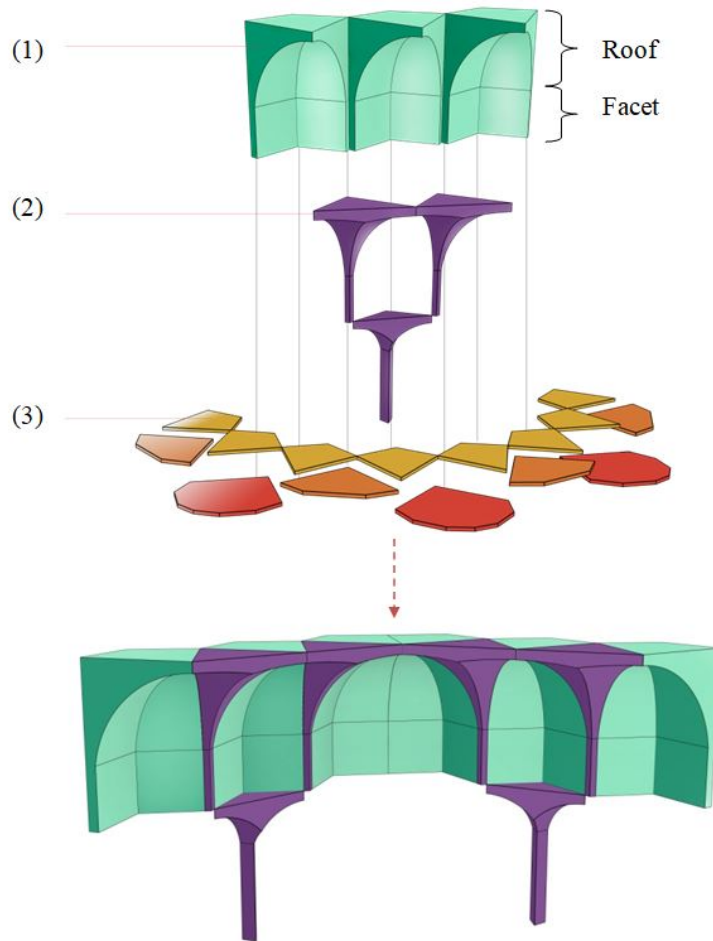
Figure 8. The fundamental elements of a muqarnas. (Source: Authors. Drawings were inspired by al-Kashi's (1960) descriptions).

Muqarnas patterns and classifications

One of the primary goals of *muqarnas* in a wide range of Islamic architectural heritages is the seamless transition from the quadrilateral shape of the dome to its circulatory shape. The layout of the *muqarnas* connected the cupola to the surrounding square-shaped walls. *Muqarnas* were used as ornaments in both cultural and social structures to convey the aesthetic value of Islamic civilization (Carrillo, 2016).

Muqarnas is created by manipulating surfaces that are connected horizontally and vertically by intricate geometric shapes, interlocking, and fractal elements. The elements and shapes of this fractal *muqarnas* are the product of mathematical operations and algebraic equations. According to van den Hoeven and van der Veen (2010), it is reasonable to conclude that the first *muqarnas* were composed of a limited number of basic types and components that, when combined, produced a wide range of parts. These diverse groups of elements can be organized into strata (layer-طبقة), and these strata can be combined to create various molds of *muqarnas* (Figure 9).

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Figure 9. A muqarnas illustration from the Topkapi Inscriptions (Asad, 1995, p. 352).

Based on al-Kashi, Dold-Samplonius (1992) also noted that the fundamental design components of the *muqarnas* were made up of intermediate elements and cells. These cells, which appear to make up a small percentage of the vault, house the body of *muqarnas*. The intermediate parts are used to connect and combine the cells. In terms of classification and type, *muqarnas* are divided into two categories:

1. The first group was classified by early researchers using mathematical approaches based on al-Kashi (1960), who stated that there were four different types of *muqarnas*: "*The simple muqarnas: only plane surface; the clay plastered muqarnas: similar to the simple muqarnas but the tires are not all of the same height; the curved muqarnas: curved surface and the plan all consist of triangles and quadrilaterals; the Shirazi Muqarnas: other polygons such as pentagon, hexagon, octagon, and multi-pointed stars*".

2. Takahashi (1973, 1982) provides the second distinction of *muqarnas* types, categorizing them into three major styles: "*The square lattice muqarnas (developed in the 11th century), the pole table muqarnas (15th–17th century), and 'Other Style' muqarnas*", (Table 2).

Table 2. Muqarnas categories were defined by Takahashi (1973, 1982).

	Types	Features	cases
a.	*Muqarnas* with square lattices first appeared in the eleventh century.	• Squares and 45-degree rhombus shapes were arranged to cover the top sides of the *muqarnas*. • Has a quadruple reasonable symmetry.	Granada's "*Hall of the Abencerrajes*", the Alhambra palace (Figure 10)
b.	*Muqarnas* (pole tables)	• Not being a direct connection between *muqarnas* and architectural structure; "The elements are created separately. After this phase, it is attached to the architectural structure using the ribs system."	Isfahan's Shah Mosque (Figure 11)
c.	Other-Style *Muqarnas*	• not included in the initial two categories	Mosque of Süleymaniye in Istanbul, Turkey (Figure 12)

Figure 10. Square lattices. Alhambra Palace in Granada - Hall of the Abencerrajes. (Source: Van den Hoeven & van der Veen, 2010, p. 2-3)
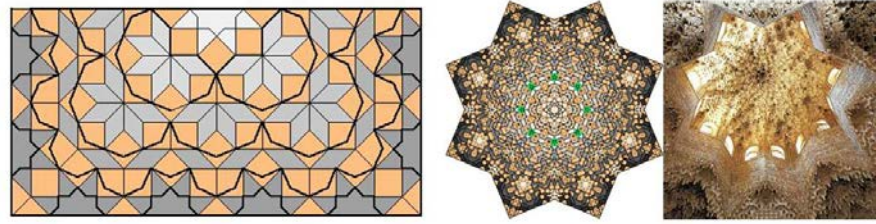
Figure 11. Pole table: The design and a picture of the Shah Mosque in Isfahan. (Source: Van den Hoeven and van der Veen, 2010, p. 3)
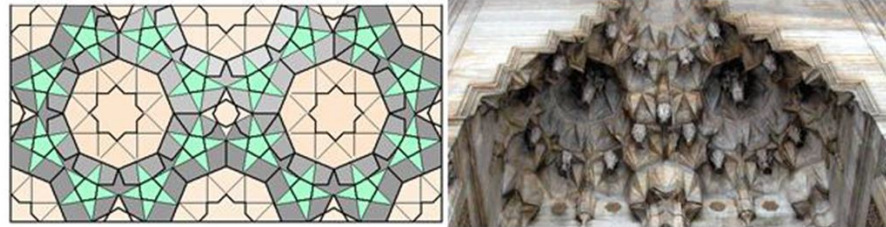
Figure 12. Other styles: Muqarnas designed by Sinan in 1557 in Süleymaniye Mosque in Istanbul, Turkey (Addressed by Van den Hoeven and van der Veen, 2010, p. 3).
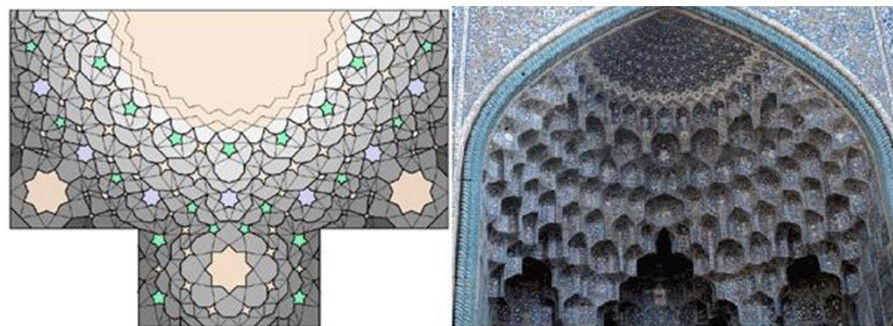
Muqarnas has received attention in the past and present during many historical eras, particularly during the Islamic era between the tenth and sixteenth centuries, as evidenced by cases of their transformation from traditional to modern forms. According to Ömer (2011), modern initiatives to update how the *muqarnas* are used have also emerged, all while claiming to uphold the original vision of the *muqarnas* as a collection of structures, monuments, and ornamental formations for the twenty-first century. These approaches are examined and analyzed in this chapter to determine how they uphold the fundamental concept of muqarnas.

To begin, scientific and technological guidelines and standards based on traditional *muqarnas* must be developed to aid in the assessment of current situations. These guidelines and standards must preserve the original identity of *muqarnas* while simplifying their application. Furthermore, these criteria are derived from analysis and understanding of the geometric patterns and ratios of conventional *muqarnas*. According to Imani (2017), the following criteria were obtained under "*geometrical characteristics*": 1) The fundamental component, 2) Isometric, 3) Types of basic elements, 4) Basic module, 5) The basic module's element types and numbers, 6) Isometric types of modules, 7) Number of layers.

These geometrical characteristics of traditional *muqarnas* Based on Imani (2017) were presented in Table 3, from which contemporary cases will be evaluated and the following guidelines will be deduced:

Guide 1: Squares and rhombuses are the most important design elements in all six case studies of historical *muqarnas*.

Guide 2: The essential components are rotated through the angles of 45°, 60°, 90°, and 180°.

Guide 3: Each module is composed of at least two and up to five smaller components, which include rhombuses, half-rhombuses, squares, half-squares, almonds, jugs, large bipeds, and small bipeds.

Guide 4: The basic modules in each of the six historical motifs are rotated at 45°, 90°, 315°, and 180°.

Guide 5: The number of layers in *muqarnas* compositions is determined by the composition's complexity. These six historical *muqarnas* specimens have three to six structural layers.

Guide 6: The golden ratio was commonly used in the composition of historical *muqarnas*.

Guide 7: Isometric baseline has four different types in all *muqarnas* compositions: rotation, reflections, translations, and glide reflection.

Table 3. Geometrical characteristics for traditional muqarnas (adopted from Imani, 2017).

Pattern's buildings	Basic elements	Isometry types of basic sector	Basic module	Number of basic module elements		Isometry types of pattern		Number of layers
pattern 1 Tinmal Mosque	□	Rotation 45°		Large biped / Jug / Small biped / Almond / Half square	5	Mirror 315° Mirror 90° Mirror 180°		3
pattern 2 II.Beyazid Mosque	□	Mirror 45° Rotation -45° Mirror 45°		Large biped / Jug / Small biped / Almond	5	Mirror 315° Mirror 90° Mirror 180°		3
pattern 3 Murat pasha Mosque	□	Rotation 60°		square / Half rhombus / Almond / Rhombus	4	Mirror 45° Mirror 90°		5
pattern 4 Zisa Castle	□	Mirror 45° Mirror 45° Mirror 45°		Half square / Rhombus	2	Mirror 315° Mirror 90°		3
pattern 5 Selimiye Mosque	◇	Mirror 90°		Jug / Almond / Half square / Half rhombus	4	Mirror 315° Mirror 90° Mirror 180°		4
pattern 6 Sahabiye Madrasse	▱	Mirror 90° Mirror 90° Mirror 180° Mirror 90°		Large Biped / Jug / Small biped / Almond	4	Mirror 45° Mirror 90°		6

As a result, *muqarnas* can be described as an adaptable feature with an intricate configuration that can be merged with various architectural components to create *"modernized"* elements (with Islamic roots and contemporary touches) without misrepresenting Islamic architecture with enormous glazed facades imitating the modern and the contemporary.

There is no doubt that the following factors must be considered to develop Islamic architecture in general and *muqarnas* in particular (Maskin 2019). Furthermore, it is possible to argue that *muqarnas* can continue to evolve indefinitely to survive.

As shown in Table 4, such a significant element with imposing ornamentation can be used in a variety of ways:

Table 4. Simulating the muqarnas utilizing different architectural and structural components

Operation	Main objective	Outcomes
1. Simulating *muqarnas* through the use of other architectural elements	Acquire new architectural elements with historical characteristics and traditional sources while incorporating contemporary meanings	The new interpretation of the conventional shading component "*Mashrabiya*", the new interpretation of Ottoman birdhouses, and so on.
2. *Muqarnas* simulation using structural elements	Its goal is to revive old structural formulas and spatial compositions based on cultural practices.	Created spatial spaces for various purposes such as commercial, religious, and so on.

The simulation criteria are summarized as follows:
- Preserving the geometric and mathematical proportions of traditional *muqarnas*
- Improve the functional value of the architectural elements
- Improving environmental, economic, and social sustainability
- Taking a new approach to aesthetics

Muqarnas Simulating Various Islamic Architectural Features

The renowned Islamic components are being modernized and repurposed with a contemporary take by using architectural principles for combining the elements and simplifying architectural concepts in the context of modern and current frameworks. As a result, traditional Islamic architecture is modernized while remaining true to its Islamic origins and references, rather than inflating and distorting the modernization image, which obscures national identity.

Simulation of *meshrabiyya* with *muqarnas* "*muqarnabiya*": *Muqarnas* and *meshrabiyya* are "*trademarks*" of Arab-Islamic architecture in Sham region, the Arabian Peninsula, and Egypt based on architectural observations (Abdelkader and Park, 2017; Maskin, 2019).

To be able to integrate and discover new architectural features, the merging and simulation procedures must be built on foundations and principles, in which the two elements are first simplified and abstracted, then demonstrate the design concept and the principles of their composition.

- Abstraction of muqarnas: The *muqarnas* structure is made up of cells, which appear in a variety of shapes but are most commonly observed as cubes. While studying the elements of the *muqarnas*, these cubes serve as the repeated unit of measurement (the module) (al-Kashi, [1427] 1960).

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- Muqarnas design principles: The *muqarnas* design is based on fractal geometry, rhythmic scale, and harmonic repetition.

- Mashrabiya abstraction: Mashrabiya is composed of vertical modules that are repeated horizontally; it is frequently made of wood and features arches.

- Mashrabiya design principles: The horizontal integral repetition and the overlap concept form the foundation for the *mashrabiya* design's unit coverage.

After comparing and contrasting the two elements' principles and architectural design concepts, it is possible to conclude that they share several characteristics, such as the module and the norm of rhythmic recurrence, which allows their modules to be repeated and merged within the framework of *"fractal geometry"* to give the traditional *mashrabiya* depth and motion (Figure 13).
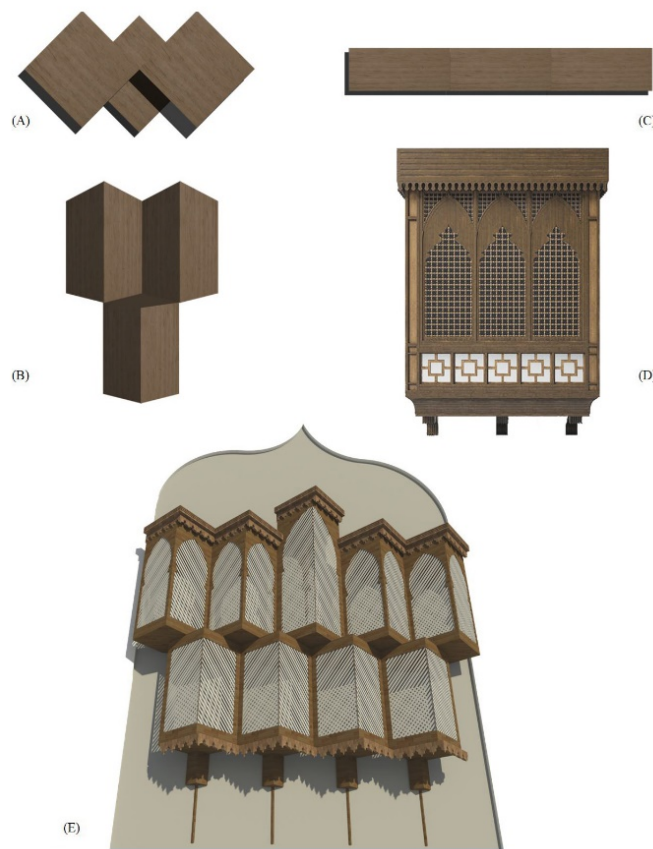
Figure 13. (A) the plan of *muqarnas*; (B) the 3D representation of *muqarnas*; (C) the plan of *meshrabiyya*; (D) the 3D perception of *meshrabiyya*; and (E) the simulated element "*muqarnabiyya*" (Source for A, B, C, and E: Authors.
Source for D:
ttps://3docean.net/item/Islamic-window-mashrabiya/23430425).

According to al-Kashi's concept, the third element, *"tiers,"* can be used to increase the diversity of the construction of *muqarnas* within the context of *mashrabiya*, "*muqarnabiyya"*, resulting in a wide range of compositions. This is determined by the designer's effort and inventiveness, as seen in Figure 13 (E), which represents one of the described forms.

In this regard, it is possible to conclude that the (*muqarnabiyya*) element is a new architectural element resulting from the merging of the *muqarnas* with the *mashrabiya*, as the *muqarnabiyya* emphasizes the traditional touches by preserving the traditional geometric proportions,

modularity, and harmonious repetition found in the traditional architectural elements. However, the contemporary aspect demonstrates that the *muqarnabiyya* consists of simple and clean masses without complex details and decorations.

Muqarnas simulating Islamic arches: *Muqarnas*, as previously stated, is a technique for converting flat geometric patterns to multidimensional vision (Castera, 2003). These geometric and decorative patterns were defined by al-Kashi (1960) and later Takahashi (1982), and they have been used as a layer analogous to the horizon to construct cells and intermediate components on their top. However, the patterns will be applied orthogonally to the horizon, and the geometric components will be simulated with one of the remarkable arches in Islamic architecture, with the intersecting arches (Figure 14).

Figure 14. The intersecting arch (Source: *https://www.neh.gov/, date of access; 2022, December 5*)

To facilitate the merging and simulation processes, both the decorative and arch lines must be reduced and abstracted. Furthermore, *muqarnas* always relies on adding depth and a third dimension to the models. Instead of simply extruding the design lines, the vertical portions above the renewed arches and intermediate joining elements will be used to give the integrating procedure depth. Figure 15 shows how *muqarnas* simulation using Islamic archetypes achieves the desired result.

In this context, it is possible to conclude that the combination of *muqarnas* and intersecting arches resulted in a new architectural feature with the traditional touch of converting two-dimensional geometric patterns into three-dimensional architectural elements. On the other hand, the contemporary approach can be demonstrated by the resulting streamlined and elegant masses that are dynamically interconnected without delving into complex details, in addition to emphasizing the importance of arches as an architectural element and their proportions in the modern design process.

***Muqarnas* simulating columns:** The simulation's goal is to modernize traditional architectural elements. Hence, Lang (2002) asserts that it is necessary to emphasize the following characteristics of contemporary modern architecture:

• Masses that are simple and neat.

• Modernity is dependent on the persistence of mass configurations and unity.

As previously stated, *muqarnas* can be abstracted with the cube serving as the primary construction component. It is also important to recognize that *muqarnas* is based on homogeneous sequences within the boundaries of geometric patterns. As a result, simulating *muqarnas* with columns in the modern era is based on geometric repetition within the cubic technique with a robust and consistent configuration of the masses. Figure 16 demonstrates how the *muqarnas* simulation with columns leads to the desired result.
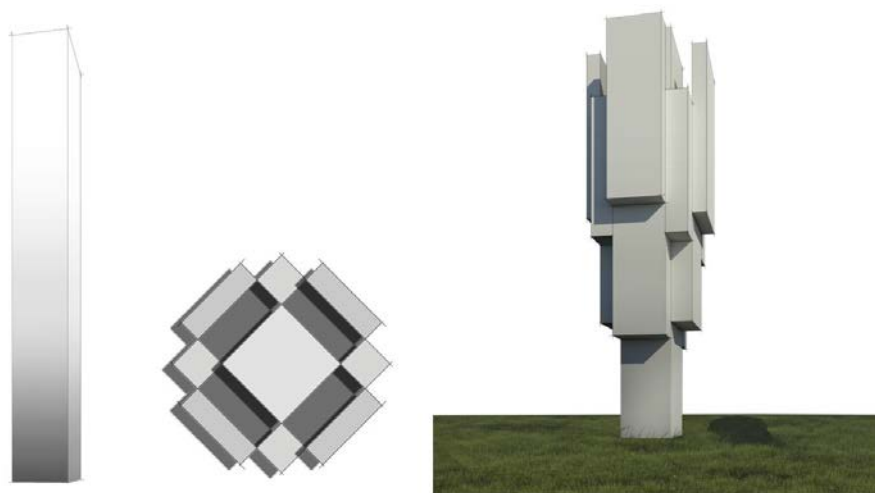
Figure 16. The design process for the renewed column. (A) is a regular column, (B) is a plan for a simple muqarnas, and (C) is a new column (Source: Authors)

As a result, it is possible to conclude that combining the *muqarnas* with the columns produced a new architectural element that bears the traditional *muqarnas* characteristics, such as the harmonious repetition

of the masses and the depth given to the architectural forms. This merging implies dynamic movement in the composition while also being composed of interconnected and streamlined masses, which is a contemporary aspect.

***Muqarnas* simulating Flat *Mashrabiya*:** *Muqarnas*, as it is composed of several layers, is without a doubt a decorative architectural element used to add dimension and structural depth to the building (van den Hoevenand and van der Veen, 2010). This is accomplished by transforming two-dimensional lines into three-dimensional faces and surfaces (Castera, 2003), whereas the flat *mashrabiya* is used as a sustainable component to control lighting and ventilation (Li, 2018). However, the problem with flat *mashrabiya* is that it is not adjustable and is not appropriate in volatile situations. The flat *mashrabiya* will be simplified into repeated units called *"modules"* that fold and adapt to sunlight to develop it (Figure 17).

Figure 17. The process of designing the Adaptive Mashrabiya. A. 3D Muqarnas, B. Flat Mashrabiya, C. Adaptive Mashrabiya (Source for A and C: Authors. Source for B: *https://www.meashots.com/photo/210117/wooden-latticed-window-(mashrabiya)-with-two-small-swinging-sash.html*)

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It contributes by introducing daylight without solar radiation; in other words, the surface opens based on the external temperature and time, *"when the sun is indirect."* However, it closes automatically when the sun is directly overhead and serves as a thermal and luminous barrier. As a result, a new, contemporary, and long-lasting architectural element based on traditional and cultural roots is created.

The combination of *muqarnas* and flat *mashrabiya* created a new architectural element that retains the traditional features, while adding a decorative and structural dimension to the elements while preserving the

effective function of the traditional *mashrabiya* in regulating lighting and ventilation by blocking heat without blocking the entry of sun rays, resulting in reduced energy consumption. The contemporary and modern aspects of this new element, on the other hand, are represented in an adjustable formation based on changing environmental factors while also providing a dynamic feature in the building envelope as it is formed of triangular planes, which are simplified and devoid of complex decorations.

***Muqarnas* Simulation with different structural elements:** *Muqarnas* should be simulated with other structural elements in a building to activate it as a structural and an independent element without the need for other supporting elements such as columns which could disrupt the interior design. The "*flying buttresses*", a traditional Gothic architectural structural element, are studied and modeled with *muqarnas* (Figure 18).
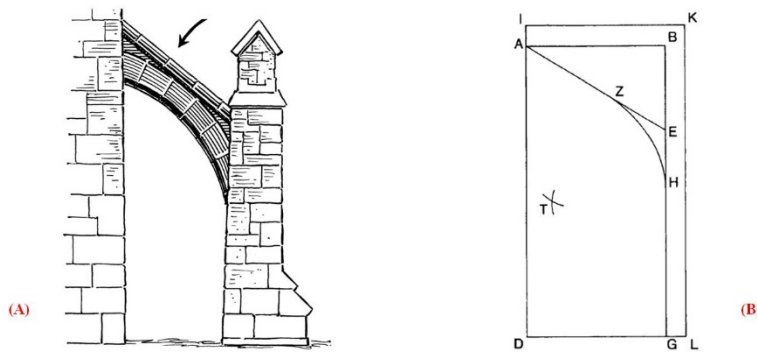
Figure 18. A flying buttress muqarnas simulation. A. The Flying Buttress (2022); B. Muqarnas' module (DoldSamplonius, 1992).

Given the long history of success of *"flying supports"* in Gothic architecture, it can be argued that they were used as a structural feature that redistributed loads (Nikolinakou, Tallon, and Ochsendorf, 2005). While *"flying buttresses"* necessitate precise calculations of the arch's drawing to avoid structural deformations in transferring loads (Verstrynge, Schueremans, and Smars, 2012). Figure 19 demonstrates the working principles of *"flying buttresses."*
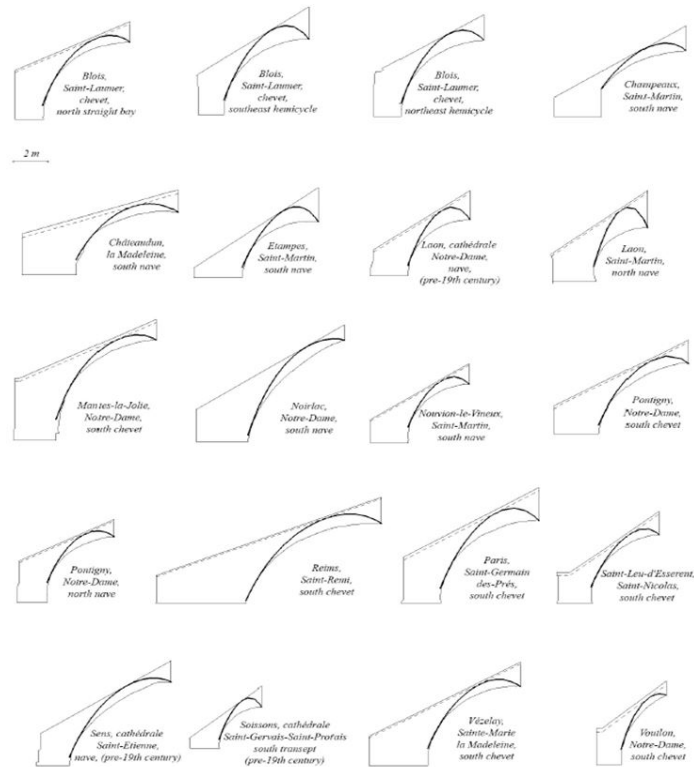
Figure 19. Structural analyses used for flying buttresses (Nikolinakou, Tallon, and Ochsendorf, 2005).

Muqarnas has also been successful in supporting a wide range of structures, including domes, half-domes, and even quarter-domes (Yaghan, 1998). There is, however, no known example of a structure made entirely of *muqarnas*. In the given example, the loads will be moved vertically between cells until they are fully transferred to the ground. The roof (the curved part of the cell) will be simulated using the proportions of the curved flying buttresses' parts to achieve the best load-transforming shape factor. When simulating the *muqarnas* with flying buttresses, an effective structural component *"capable of carrying itself and the weight of the building"* was created (Figure 20). Furthermore, to protect *muqarnas'* characteristics, it was designed within the confines of geometric shapes.
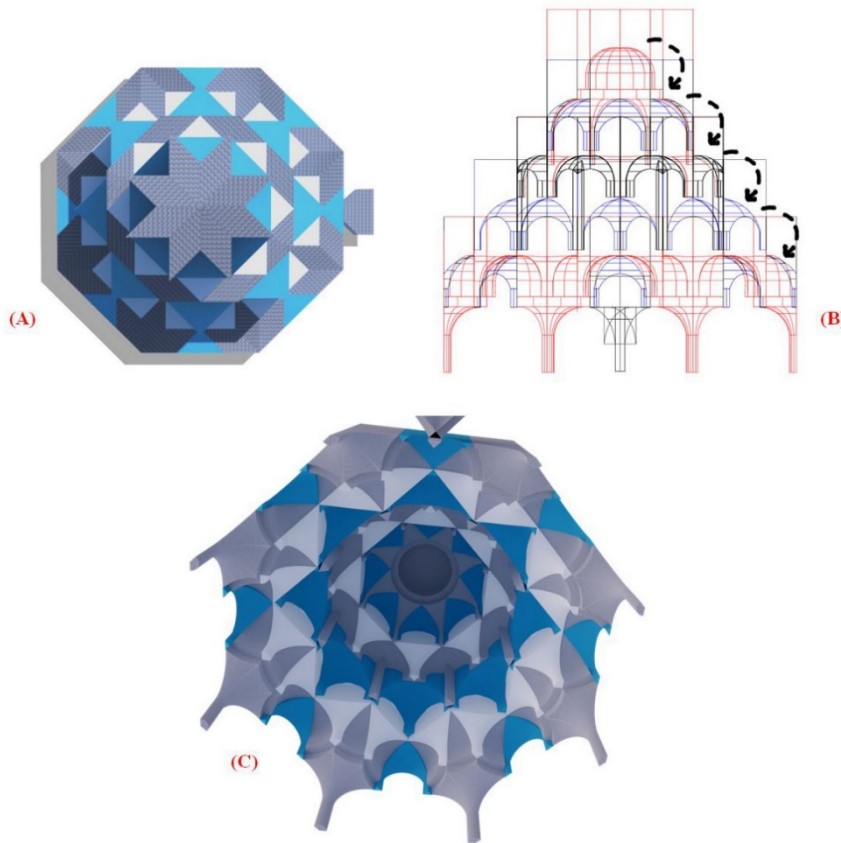
Figure 20. *Muqarnas* simulation with flying buttresses produces the following results: (A) a top view of the "*geometric design*", (B) an analytical illustration for load distribution, and (C) a 3D interior view of the "*muqarnas building*" (Source: Authors).

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Given the approach described above, it is reasonable to conclude that combining and simulating *muqarnas* with other structural elements resulted in new structural elements with the characteristics and traditional shape of the *muqarnas*. However, the new element's contemporary and modern aspect lies in its function, where it can be claimed that the new structural element, as the constituent unit of the building, can carry itself in addition to the weight of the entire building, without the need for other structural elements like massive structural columns, which may lead to deformation in interior design.

CONCLUSION

Cultural identity can be defined based on three main aspects: "*identity as a sustainable cultural treasure*", "*identity as a cultural power*", and "*identity as a cumulative memory*". There is a link between geographical location and cultural experience, which helps shape identity characteristics as a long-term cultural heritage. It can be argued that the application of modern technological frameworks within the contemporary vision and cultural context, as well as national affiliation. Such an approach strengthens the ability of identity as a distinct cultural asset, where national identity has been the most successful modern apparatus for orchestrating belonging. Cultural identity can also be defined as a collective concept of all knowledge that directs behavior and

experience in the interactive society framework and in repeated societal practice that occurs across generations.

As a result, as the primary component of a place's memory, cultural identity can be considered one of the most important pillars of cultures and societies. Identity is a necessary unit in the structure of societies for the development of social and cultural ties. It cannot be done away with. In the present study, *muqarnas* and its structural and formal characteristics were studied. The following highlights are the summary of these fundamental concepts:

- The fundamental idea behind *muqarnas* is to transform geometric patterns and motifs from a two-dimensional medium to a three-dimensional medium. *Stalactite vault* has been used to characterize *muqarnas*.

- Although there are several early indications of *muqarnas* in northeastern Iran and central North Africa, there is no documentation regarding the precise location of the first *muqarnas*.

- *Muqarnas* were first used as a decorative element to cover and divide squinches*. Muqarnas*, on the other hand, are decorative and structural elements that can be applied to domes, facades, entrance portals, arches, etc.

- *Muqarnas* uses fractals and interconnected parts that are linked by sophisticated geometric shapes in both horizontal and vertical transformations. These fundamental components are made up of tiers, intermediate elements, and cells.

- *Muqarnas* are constructed using a variety of materials because they are based on local materials in each location.

- *Muqarnas* have numerous architectural applications, and they can even be combined with other architectural features to create entirely new designs (with an Islamic root and a contemporary feel).

This study demonstrates an attempt to upgrade traditional architecture by incorporating *muqarnas* as new and contemporary elements into Islamic architecture. This is explained by al-*muqarnas*' reliance on geometrical and harmonic recurrence, as well as adaptability and structural integration. *Muqarnas* also provide structural value and depth. Furthermore, these architectural features were unique in that they served as both decorative and structural components.

Based on the newly discovered elements in the present study, it is possible to state that historical and traditional backgrounds can be interpreted and incorporated into contemporary architecture through the coupled simulation of the historical architectural features with one another. Hence, it becomes possible to reflect the process of modernizing traditional architecture. Given that the organic, deformed massive glass facades with several traditional motifs have recently proliferated in the Middle East, it can be concluded that they do not reflect the modernization of traditional architecture since they simply imitate modernity with no obvious sources.

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Resume

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Morphological Evolution of a Commercial Setting: The Study of Konya Uzum Bazaar

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Abstract

Urban morphology aims to formally study the movement in space and to detect the changing character of cities in the context of time, space and physical environment. When the morphology of Konya in the historical process was examined, the first formation developed around the settlement center known as the historically prominent Alâeddin Hill. Over time, the Mevlâna Dargah and its surroundings, which are religiously prominent, appear as the second focal point. The commercial texture that was born and developed between these two focuses in Konya is the traditional Konya Bazaar. In this commercial texture, the "Uzum Bazaar", located to the west of the second focal point of the city, was formed in harmony with the surrounding texture during its period. After the Uzum Bazaar continued its life for many years, it was demolished, and Mevlâna Bazaar was built in its place, described as a contemporary 'passage' in its period. At the beginning of the 21st century, this commercial texture was included in the scope of the transformation project, and the Altın Bazaar period began. The morphological change of this historical and commercial texture, which was called the Uzum Bazaar in the past, according to the periods, was studied by the Space Syntax method and evaluated comparatively. As a result of the analyses and evaluations conducted, it has been determined that the gate counts and intelligibility values have been continuously decreasing in the process following the Uzum Bazaar period, which is characterized as self. According to the integration value, it has been seen that the Uzum Bazaar period, which was formed as part of the traditional Konya Bazaar, has a higher value compared to the Mevlâna Bazaar and Altın Bazaar periods. Although the numerical values of the Altın Bazaar period are close to the Uzum Bazaar period in the connectivity analysis, they are higher than the values of both the Uzum Bazaar period and the Mevlâna Bazaar period. As a result, when the formation of the Uzum Bazaar in the first period is described as 'essence', it can be said that steps have been taken towards the "return to essence" with the transformation of the Altın Bazaar in the last period.

INTRODUCTION

Cities have emerged from an organic formation due to changing living conditions, the needs of society and an increasing population, and have entered into a planned and modern urbanization process. However, this process has caused urbanization without identity in many cities and unable to connect with the past. For this reason, research on the traditional texture is of great importance in order for the architectural memory of a city to remain alive and understood (Gürbüz Yıldırım and Çağdaş, 2018). Urban morphology research is based on the logic of following the transformation traces of the change performed by a man in place within the temporal data. It is essential to follow the historical process for morphological research (Kaya and Akdemir, 2020). Urban morphology, which deals with the form of urban space (Larkham, 1998) is an urban space reading approach that helps to examine the transformation of urban space from physical, social and historical perspectives over a certain period of time. Definitions of urban morphology are found in various contexts, it is stated that urban morphology is an examination of the city as a human settlement (Moudon, 1997) or that it is a discipline that deals with the geography, history and life of the city in general terms through all urban structures (Rossi, 2006) and allows understanding the form, formation and transformation processes, spatial structure and character of human settlements by analyzing the component parts that make up historical development processes and settlements (Kubat and Topçu, 2009).

Urban morphology, which came to the agenda at the end of the nineteenth century as a result of the research of German geographers and first appeared in English literature in 1928 and aimed to analyze urban space in terms of form, is a branch of science that serves to study the dynamic structure of cities in the historical process (Larkham and Jones, 1991). Within this framework, urban morphology allows to detection of the changing character of cities in the context of time, space and physical environment (Sakar and Ünlü, 2018). With this quality, urban morphology is used as an important evaluation tool or method in determining the change-transformation processes of urban texture, making sense of the historical roots of their spatial and functional structures and transferring them to the present (Kubat and Topçu, 2009).

Cities, which are one of the most important spatial formations of the modern world, express the way of formation of an era. Cities have always been of strategic importance their location in the geography in which they are located (Boz and Kubat, 2018). Konya, which is the subject of this study, has been under the influence of many changes and transformations with urban planning decisions that affect the historical development process. At this point, it is a city where morphological changes have been experienced frequently throughout history due to being one of the oldest settlements in Turkey.

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Konya is the largest province of Turkey with a surface area of 40.838 m² and is located in the Central Anatolia Region. According to the results of Address Based Population Registration System, 2022, 2.296.347 people live in Konya, Turkey's seventh most populous city (Turkish Statistical Institute, 2023). It is believed that the first settlement in the city of Konya began from the Prehistoric era. In various archaeological studies, many cultural heritages from the Neolithic (Polished Stone Age) and Ancient Bronze Age periods have been unearthed in the city (Küçükbezci, 2018). Along with these, the geographical location of Konya and the fact that it has been one of the important administrative centers for centuries, as well as the passage of various commercial roads through the city, show that the city is one of the important commercial centers in the world. When the morphological examination of the city of Konya in the historical process was carried out, the formation developed around the settlement centre known as the historical Alâeddin Hill. Over time, the religiously qualified Mevlâna Dargah and its surroundings appear as the second focus (Önge, 2018). The commercial texture formed and developed between the two central focuses is called the Traditional Turkish Bazaar. Konya Traditional Turkish Bazaar contains various historical heritage products, religious buildings, and various small bazaars within its structure. Located west of the city's second focal point (Mevlâna Dargah) in this bazaar, the Uzum Bazaar is a commercial texture with an internal courtyard suitable for human scale, built in the traditional bazaar architecture, where fruit and vegetable sales were held during the period. This commercial area, which developed with the surrounding texture, was in harmony with the urban skyline. Due to the influence of modernist architectural approaches seen in Turkey since the second half of the 20th century and social, economic, and political reasons, the Uzum Bazaar was demolished, and Mevlâna Bazaar was built in its place. With the identity of Mevlâna Bazaar, it has not found a place for itself in the traditional bazaar texture and city skyline. The Mevlâna Bazaar, which is in the passage culture, was demolished at the beginning of the twenty-first century within the scope of the 'The Tomb Front Urban Renewal Project' due to reasons such as its inability to reach the expected commercial and user density, its lack of harmony with the historical texture, decaying the continuity of pedestrian movement between the Mevlâna Dargah and the Bedesten (Şardağ and Kervankıran, 2022). Within the scope of this transformation project, the Altın Bazaar was built instead of Mevlâna Bazaar. The Altın Bazaar project, which is aimed to increase commercial activities and a design approach that will adapt to the traditional historical texture has been adopted.

The 'Uzum Bazaar', which appears as a part of the Traditional Konya Bazaar, which was formed and developed between Alâeddin Hill and Mevlâna Dargah in the historical city center of Konya, has become the focus of this study. This study, it was aimed to examine the morphological change that the commercial texture, which was called

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Uzum Bazaar in the past, periodically underwent. In this direction, it has been analyzed and evaluated comparatively by the Space Syntax method according to the transformation periods of this commercial texture, which has been changed twice and on a large scale in the recent past. The planning, architectural, socio-cultural attitude, construction-destruction and transformation relations of this change process were revealed within the scope of the study. The most important factor in making the selected sample area the subject of this study is that any arrangements to be made in this area will directly affect the trade, tourism and social life of the region, since it is located adjacent to the Mevlâna Dargah, one of the triangulation points of Konya.

TRADITIONAL TURKISH BAZAARS

The word meaning bazaar is derived from the Persian term Cihar-Suk (four streets). It is the name given to the streets or squares suitable for shopping, shops on two sides, covered or open. Bazaars are lively places where product manufacturing of various qualities is carried out in the city, and retail and wholesale shopping is carried out, which usually occur in urban centres and show density every period. In the historical process, the bazaar of the city or, in a more general sense, the city's commercial centre usually consists of covered bazaars, inns, and ottoman bazaars, which show development and life around a single focus (Cezar, 1981).

With their original structures, traditional Turkish Bazaars reached their classical structure in the 16th century and became the most important urban element defining the Turkish city with the grand mosque. During this period, there was an orientation towards the bazaar that developed around the covered bazaar and the grand mosque in Turkish cities (Cezar, 1981; Cezar, 1985; Denny, 1986). Such bazaars are shaped around the covered bazaar, integrated with religious functions such as mosques and madrasas, and are the city's focal point, as they are the central public living space of the city culturally and socially and commercially. The positive contribution and value of traditional bazaars, where human relations are intense, in social life with their self-established physical system, humane dimension and integral qualities of social harmony and relations, is an indisputable fact (Çetin, Birol and Doyduk, 2004).

Traditional Turkish Bazaars are architecturally human-scale, simple and functional when viewed in the context of their physical characteristics. In Turkish Bazaars, the urban texture is in the form of small building islands formed by 7-8 shops coming back-to-back. Building island widths are 4-8 meters, with shops measuring 2-4 meters. Roads with a width of 5-7 meters are more numerous and denser than residential areas. In shops with a single volume, where there is no warehouse and cellar, there is usually no basement, and it is a single floor. Shops with multi-functional countertops, eaves and shutters have been solved in a simple and easy way to build with stone,

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brick and wooden materials and masonry systems (Uysal, 2010). When the road widths, user density and building heights are examined, an architectural understanding that appeals to people on a human scale is observed in traditional bazaars.

With their unique qualities, traditional Turkish Bazaars are one of the main elements of the city's formation, which bear important traces in the city's identity and memory. Today, traditional Bazaars, regardless of meeting the demand-supply balance, have begun to lose their functionality and intensive user base due to the constant and rapid change in social life. Maintenance, repair, improvement, and renovation follow today's requirements to keep the traditional Turkish bazaars from breaking away from their current life. The arrangements made should be appropriate to the identity of the bazaar and respectful of the history. The practices in which the identity of the bazaar is destroyed under the name of editing and the delete-sweep-do-it-again practices under the name of renovation leave incurable damages to the traditional Turkish Bazaar identity and the identity of the city where the application is made and the social memory.

Historical Development of the Traditional Konya Bazaar

The city of Konya was formed from a single residential focus, developed with the knitting of new focuses and elements into the urban structure over time, and grew by changing its shape in a historical process in which the qualities of the foci and various events and interventions that changed the urban structure were effective. The main focus is the 'mound', known today as Alâeddin Hill, which provided the birth of the city and the area where the remains of life belonging to different periods are found. Because it is a mound, the city of Konya's primary focus is historical. The second focus of the city of Konya, which is developing close to the main focus, is the Mevlâna Dargah and its surroundings, which are religious in nature. The formation of traditional commercial texture in Konya has developed (in the west-east direction) on the transport axis formed between the main focus and the secondary focus axis (archaeological, historical focus and religious focus) with the formation of a secondary urban focus (Table 1) (Önge, 2018).

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Table 1. Distribution of commercial area of the city of Konya from the end of the 14th century to the beginning of the 20th century

Qualified Focuses and Trade Centers of the City of Konya until the end of the 15th century	Qualified Focuses and Trade Centers of the City of Konya between the 16th-18th centuries (Önge, 2018)	Trade Centers and New Settlement Areas of the City of Konya between the 19th-20th Centuries
▬ Konya Alâeddin Hill (The First Focus of the City with a Historical Qualification) ▬ Mevlâna Dargah (The Second Religious Focus of the City) ▨ Bazaar Areas — Internal Fortress Walls — City Walls ---- Axis of Trade	▬ Ottoman-Era Commercial District (Bedelci Palace, Court and The New Administrative Center Housing Religious Buildings) — Internal Fortress Walls — City Walls	▬ New Commercial Areas (Bazaar Reorganized After 1867) ▬ New Residential Areas (Hamidiye, Cedidiye, Abdulaziz Neighborhood) — Internal Fortress Walls — City Walls

As the main focus lost its former importance in the process, the intensity shifted to the secondary focus. Accordingly, it is seen that the commercial texture has gained a place in this region in various administrative structures, as well as concentrating in this area. This central transportation axis has maintained its commercial and social vitality throughout history. Mevlâna Dargah, the eastern end of the central axis, and its surroundings are composed of historical-commercial spaces and religious buildings such as mosques (Çınar, 2020). One of the most important of these is the residential area called "Uzum Bazaar" in the past, located on the pedestrian axis between Mevlâna Dargah and Aziziye Mosque, within the historical texture (Table 2).

Table 2. Uzum Bazaar Commercial District in the City of Konya in 1955

Uzum Bazaar in Traditional Konya Bazaar in 1955 (KKBS, 2022)

Konya Alâeddin Hill (The First Focus of the City with a Historical Qualification)	Mevlâna Dargah (The Second Religious Focus of the City)	Uzum Bazaar
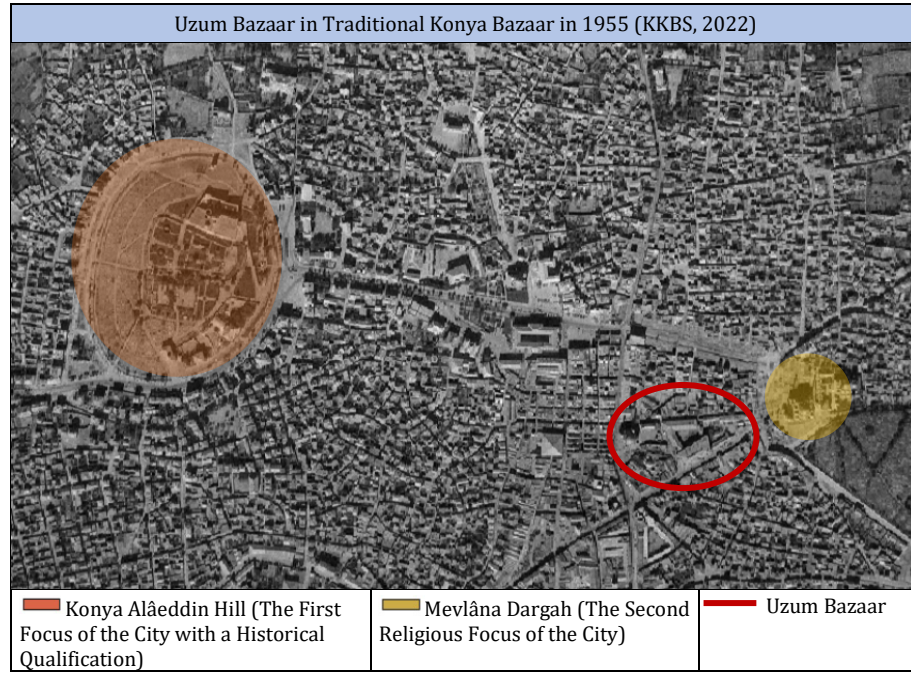
With the study, the morphological change and transformation of the historical and commercial textural space located in the traditional Konya Bazaar in the historical process; Uzum Bazaar, Mevlâna Bazaar and Altın Bazaar have been studied. After the Uzum Bazaar period with its fragmented mass settlements and human-scale design, Mevlâna Bazaar was built in a holistic single-mass form and multi-story arcade culture in the commercial texture. After the Mevlâna Bazaar, with the Altın Bazaar project, the design approach suitable for fragmented mass and human scale was returned. The field study was carried out on the transformation of this building island. The scope of work "Space Syntax" method taps the historical and commercial review process, a mass-pedestrian focus for Connectivity, Gate Count, Integration and Connectivity/Integration (Intelligibility) values was comparatively evaluated.

METHOD

Within the scope of the study, a detailed literature review was carried out to reveal the Traditional Turkish Bazaar, Traditional Konya Bazaar, and data for the study area. In this direction, books, journals, and other published works of a scientific nature have been used. Observations were made in the study area, opinions were taken about the findings obtained, the necessary documents were used, and conclusions were made by reflecting the researchers' opinions and thoughts. At the same time, the Space Syntax method was used to reveal the change in an urban built environment morphologically, which gives an objective point of view by digitizing morphological analyses. Quantitative and qualitative evaluations were made on the process

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development and transformation of the work area using the space syntax method.

The Space Syntax Method

With the Space Syntax method, it is possible to provably analyze the morphological structure of cities. The Space Syntax Method analyzes how each area in the urban environment is connected to each other and provides an analytical approach (Jiang, 1998).

Space Syntax, a space reading method developed by a group of researchers led by Hillier and Hanson at the UCL Space Syntax Laboratory in the UK, is based on the argument that the social structure that creates spatial texture can be inferred from the physical configuration of space. In other words, the primary objective of the "Space Syntax" analysis, which presents spatial structuring as a theoretical and practical research method that examines spatial structuring together with social logic, is to understand the potential of physical space to bring people together. Emphasizing the importance of the role of space in shaping society, Syntax group members believe that Space Syntax is a factor in shaping hierarchical structure, social organization, and morphological structure. According to them, space is not only the product of society, society is also the product of space. The method makes it possible to investigate the morphological and quantitative characteristics of space, interpret spatial formations using statistical data, and understand the daily life and social-spatial production that passes through space (Kubat, 2015). However, the morphology of urban built environments is provably analyzed and an analytical approach is presented (Jiang, Claramunt and Klarqvist, 2000).

Space Syntax analysis provides unbiased and consistent results by using mathematical methods in which the spatial system is represented to describe complex physical structures at the urban scale. The method, which allows us to see and analyze the daily movement network with counts processed on representative maps, tries to Decipher the mutual relationship between the shaping characteristics of the studied areas and the observed functions. These functions depend on land use patterns, social and economic performance, pedestrian movement studies and are directly related to the legibility of the space. The ability to relate phenomena at different layers and effects at different scales to each other makes Space Syntax analysis stand out as an effective method (Kubat, 2015).

The building island, which is part of the commercial texture in the historical city center of Konya, which is focused on in the study, is divided into time periods as Uzum Bazaar, Mevlâna Bazaar and Altın Bazaar periods with reference to the deep-rooted transformations in this texture in order to understand and explain the morphological process. The analysis and morphological transformation of historical periods have been revealed by the Space Syntax method. In the application of the method, it has been effective to analyze the spatial

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connections of commercial texture and to be able to analytically observe the change in commercial texture since the historical process. However, with the integration, connectivity, gate counts and intelligibility parameters offered by the method, mathematical measurements have been made on the definition of the spatial system and the interpretation of relationships (Hillier and Hanson, 1984).

With the connectedness value; the number of neighboring places directly connected to the space is measured. This criterion is the most basic information for understanding space (Çakmak and Kalfaoğlu, 2011). The value of connectivity is high in structures where the spatial relationship is high. The spatial integration value is the most important criterion for predicting movement along the circulation line. Integration is the average depth of the space to other spaces in the system and is a global criterion. As the integration value increases, the intelligibility of the space increases. As the depth of the space increases, intelligibility and sociability decrease, and in parallel, the phenomenon of privacy increases. Gate count is a value that shows the intensity of movement and use of the space. If this value is interpreted by establishing a relationship with the integration value, it gives the predictability of its space. The more the mobility in the space is compatible with the measured mobility, the more predictable the space is defined. Intelligibility (connectivity/integration) gives the observer information about his position within the spatial system and how he can be informed about the totality of a place where he is potentially located. The key to deciphering the parts and the whole is understanding the relationship between different integrations (Hillier, 1996). The relationship between connectedness and integration values gives the concept of 'intelligibility'. If the interconnected spaces are integrated simultaneously, it means that the spatial relationship is strong, or the system is understandable. In this case, the system is readable from all the parts that make up itself (Hillier, Hanson and Peponis, 1987).

Along with the changes in the structure of the commercial texture, the stages of development and transformation were evaluated using a mathematical method, and the Space Syntax method was used on an urban scale. With these measurements made within the framework of the Space Syntax method, which provides a provable framework for the study, quantitative and qualitative interpretations of historical periods have been made.

FINDINGS

The processual findings of the commercial texture located in the traditional Konya Bazaar and transformed into Uzum Bazaar, Mevlâna Bazaar and Altın Bazaar, respectively, over time and the numerical data obtained by the Space Syntax method are included.

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Uzum Bazaar Period in the Traditional Konya Bazaar

The city of Konya has two main centres, which can be called Alâeddin Hill, which is the main focus, and Mevlâna Dargah, which is the secondary focus. Between these two main focuses, the commercial texture, which showed commercial and social vitality and has continued to this day, has developed from the 14th century to the present. Various commercial places, religious buildings and administrative structures have been located on this axis. As a secondary focus that develops after the main focus, the secondary focus has strengthened as a result of the formation of the religious focus and the loss of the former effect of the main focus. The majority of the structures that are developing in the secondary focus part of the mentioned axis are "commercial and religious functional" structures (Uysal, 2010).

An important area in the Traditional Bazaar of Konya is the "Uzum Bazaar", which was born and developed in the 14th century, located between the Mevlâna Dargah and the Aziziye Mosque. Uzum Bazaar, the city's centre, is located between two focal points west of the secondary focal point, 'Mevlâna Dargah'. Nakipoğlu Inn, Aziziye Mosque, Ahmet Efendi Bath, Alaca Inn, Ciğerci Ali Aga Inn, Çancılar Bazaar, Sultan Selim Mosque, Sultan Selim Imaret and Mevlâna Dargah are in the center of the circle formed by. Uzum Bazaar, which is used as a fruit and vegetable bazaar, is an urban space with an inner courtyard surrounding the area where it is located with its lined and gable roof shops. In addition to its commercial function, it houses an accommodation unit on its premises. A fountain is also in the centre of the spaces surrounding the courtyard (Table 3) (Uysal, 2010).

Table 3. Traditional Konya Bazaar in the Seljuk and Ottoman Periods

Traditional Konya Bazaar and Important Buildings in the 14th Century (Uysal, 2010)

1-Alâeddin Hill	7-Nakıpoğlu Inn
2-Alâeddin Mosque	8-Aziziye Mosque
3-Mevlâna Dargah	9-Ahmet Efendi Bath
4-Sultan Selim Mosque	10-Alaca Inn
5-Sultan Selim Imaret	11-Ciğerci Ali Ağa Inn
6-Uzum Bazaar	12-Çancılar Bazaar

A General view from the Konya Bazaar from the beginning of the 20th century (Anonymous, 1996).

When the map of 1980 and the orthophoto image of 1955 are examined, the Uzum Bazaar is in harmony with the surrounding texture with its scale, shape and size. Although it has a spatial layout with an inner courtyard, it can be said that the inner courtyard opens to the streets from different points. It is both inward-facing and has a strong relationship with the external environment, from the facades of the shops to the external roads. The fact that the units constituting the bazaar have different heights and these heights are limited on a human scale is in harmony with the surrounding commercial and religious buildings, the surrounding texture and the skyline with its gable rooftop cover and architectural design language (Table 4, 5).

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Table 4. Uzum Bazaar Period in Traditional Konya Bazaar

Orthophoto Image of the Uzum Bazaar in 1955 (KKBS, 2022)	General View of the Uzum Bazaar in 1969 (Anonymous, 2015)

Table 5. Current Maps and Silhouette Analysis around Uzum Bazaar in 1980

Uzum Bazaar on the Current Map in 1980 (Uysal, 2010)	Uzum Bazaar in 3D Analysis on the Current Map in 1980 (Uysal, 2010)
Uzum Bazaar on the Skyline of Konya Bazaar on the Current Map in 1980 (Uysal, 2010)	
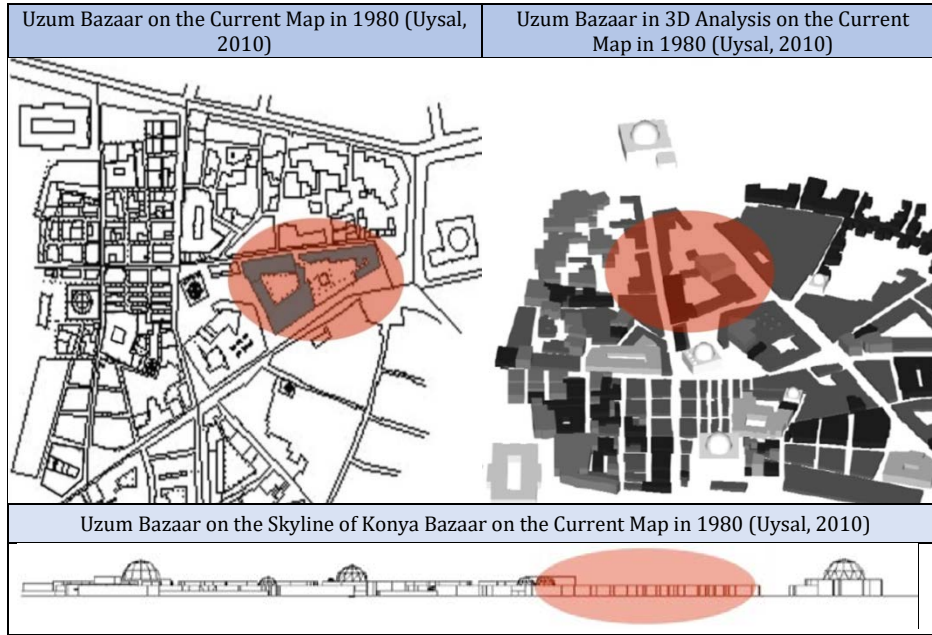
Uzum Bazaar operated in the traditional Konya Bazaar until 1980. In 1980, the Uzum Bazaar was demolished for various reasons. In its place, the 'Mevlâna Bazaar', designed in 1978, was built to continue commercial activity. The construction of the Bazaar, which started in 1982, was completed in 1987 and entered into operation in 1988.

It is aimed to compare the morphological change and transformation effects of the commercial area under study with numerical values and to embody them using the Space Syntax method. Within the scope of the three-stage transformation research, the Uzum Bazaar period in the Traditional Konya Bazaar, which is the first stage of the field, was analyzed by the "Space Syntax" method in order to monitor user movements. The values of Connectivity, Gate Count and Integration and Intelligibility were reached through the analysis studies (Tables 6, 7).

Table 6. Table of Values for Uzum Bazaar Period

Values	Minimum	Average	Maximum
Connectivity	11	1302,69	5808
Visual Integration	2.18669	5.41614	8.51714
Gate Counts	1	13.1523	97
Connectivity/Integration (Intelligibility)	-	0,642934	-

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Table 7. Results of Space Syntax Analysis of Uzum Bazaar Period

Connectivity	Integration	Gate Counts

| Connectivity/Integration (Intelligibility) | | |
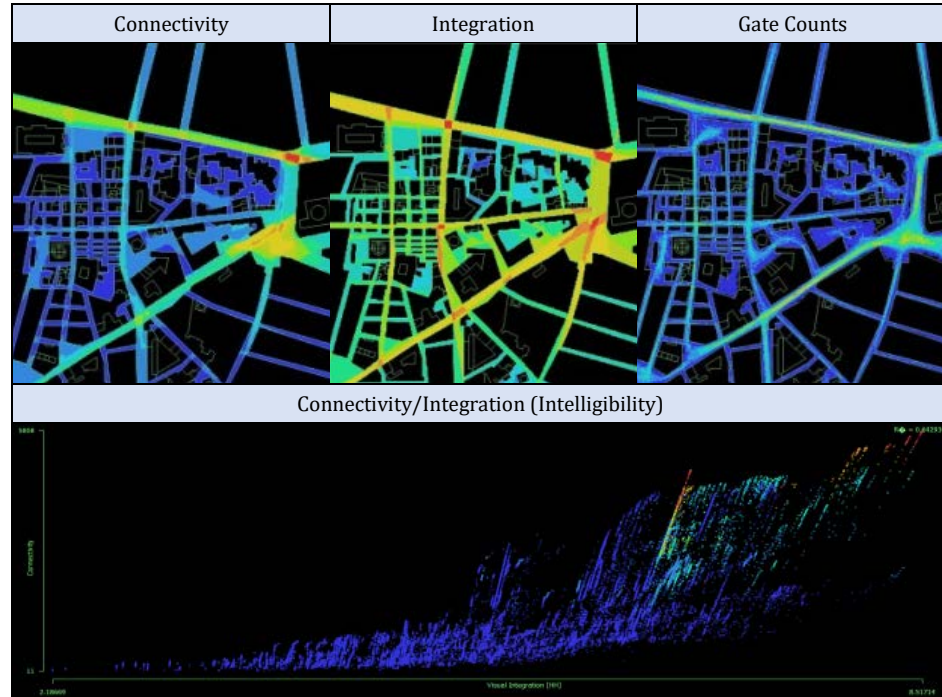
Mevlâna Bazaar Period in the Traditional Konya Bazaar

With its multi-layered structure, city centers always carry the traces of history and ensure the continuation of urban culture. This situation is even more obvious and important for cities with historical and cultural heritage (Uludağ, 2021). The applications and interventions made in urban centres that have developed and changed in line with different needs in the historical process should be made with respectful approaches to the historical and local ones, considering the urban identity, memory and social memory. When we looked at Konya in 2000, the Uzum Bazaar section of the traditional Konya Bazaar, which shows a local and authentic bazaar feature, was demolished. Then a multi-story, monolithic mass-shaped passage was built in this area, described as 'modern and innovative' at the time. Because this bazaar, closed to the environment and disconnected from the ground and identity, is located opposite Mevlâna Dargah, and to easily ensure its connection with the city's identity, the "Mevlâna" element was used as a commodity and was named "Mevlâna Bazaar" (Şardağ and Kervankıran, 2022).

Although the building reaches eight floors with its rising mass, it reaches the highest level at the farthest point from the historical Mevlâna Dargah with its gradually retreating mass movements (Uludağ, 2021). Although this attitude seems to be respectful of historical and cultural heritage, when viewed from a broad perspective, the construction of such a high structure in the historical city centre has led to a deterioration in the textured silhouette (Tables 8, 9). In addition, the Aziziye Mosque-Mevlâna Dargah has caused the pedestrian axis and perspective to be closed.

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Table 8. Mevlâna Bazaar Period in Traditional Konya Bazaar

Orthophoto Image of the Mevlâna Bazaar in 2003 (KKBS, 2022)	General View of the Mevlâna Bazaar in 2020 (Yenişafak Newspaper, 2020)
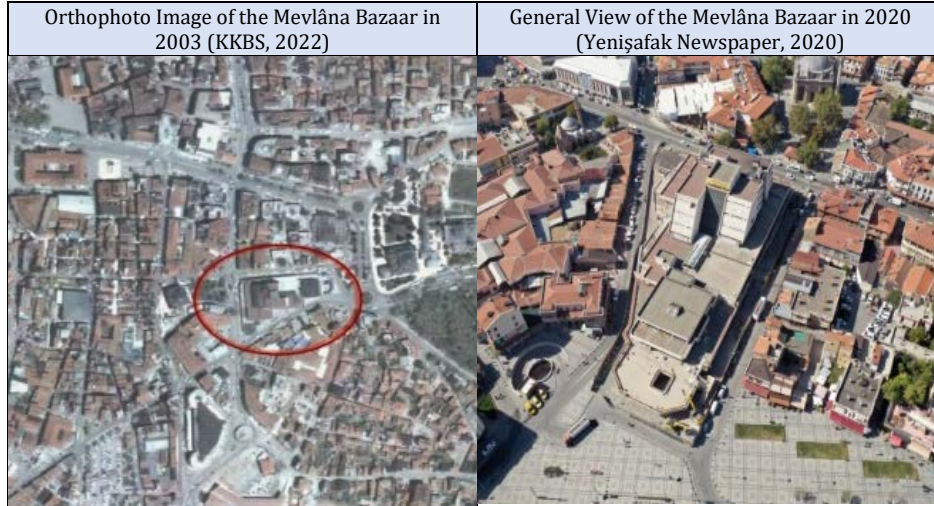
Table 9. Current Maps and Silhouette Analysis around Mevlâna Bazaar in 2000

Mevlâna Bazaar on the Current Map in 2000 (Uysal, 2010)	Mevlâna Bazaar in 3D Analysis on the Current Map in 2000 (Uysal, 2010)
Mevlâna Bazaar on the Skyline of Konya Bazaar on the Current Map in 2000 (Uysal, 2010)	
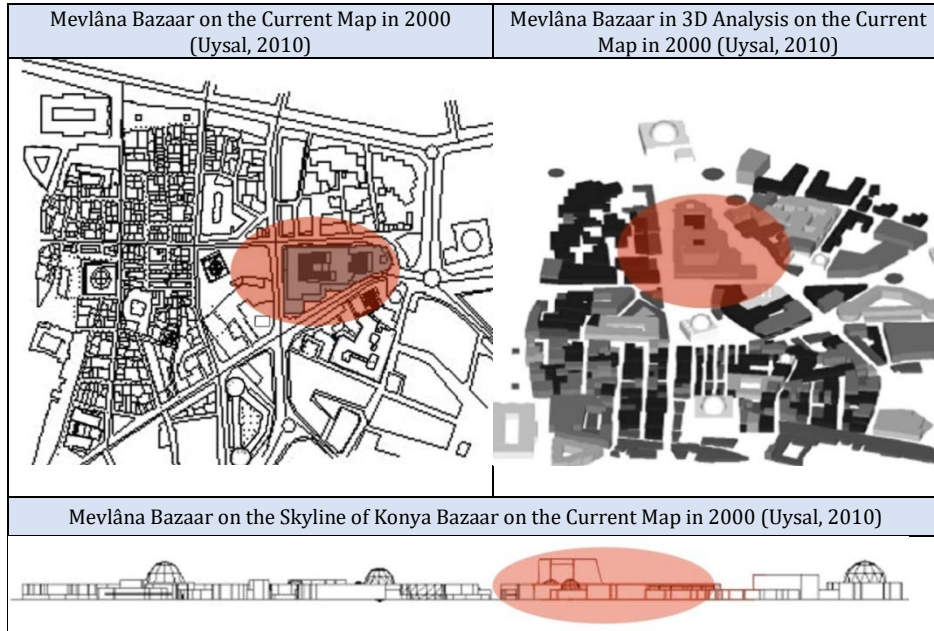
Mevlâna Bazaar, built within the traditional commercial texture, is designed as a covered bazaar/passage (Yenişafak Newspaper, 2020). When examined from the architectural point of view at the building scale, the horizontal architecture and human-scale structure of the traditional commercial structure were interrupted by the construction of the Mevlâna Bazaar in this area. In the historic commercial centre, where horizontal architecture dominates, the shops in the passage, which can be described as vertical architecture with a total of 8 floors with 6+2 floors, are separated from the street texture. This transformation has led to a decrease in user density both in terms of a radical change in the physical space and due to its short-term and sudden occurrence (Şardağ and Kervankıran, 2022).

Mevlâna Bazaar characterized as a symbol of modernity during the period it was designed and built, contrasts with the historical and

traditional architectural language of the environment in which it is located with its architectural identity. The traditional architecture is seen in the traditional Konya Bazaar; wooden, adobe, stone building elements, traditional building elements, wooden windows and doors, eaves, roof types, etc. It has been transformed into reinforced concrete building elements in Mevlâna Bazaar.

Within the scope of the road widening works carried out in the 19th and 20th centuries on Mevlâna Street, various commercial and administrative structures located in the commercial texture between the two main focal points of the city were destroyed. Road widening works have caused negative destructions to the city's identity. However, it has brought vehicle traffic and parking problems with it. Mevlâna Bazaar's most positive contribution to the city is that it has partially solved the vehicle parking problem in the historical and commercial texture in which it is located with the 2-story basement parking lot.

Mevlâna Bazaar, one of the applications made individually in the traditional Konya Bazaar, caused deterioration in the textured silhouette, and the integration of the old texture with the new construction could not be achieved (Uysal, 2010). For various reasons, such as the fact that Mevlâna Bazaar is in a closed arcade culture, the presence of functionally unused spaces in it, and the fact that there are non-purpose uses of these spaces, the density of users has decreased in the process, and the quality of physical space has become insufficient, have made the transformation necessary. The demolition of the Mevlâna Bazaar was carried out at the end of 2020 (Şardağ and Kervankıran, 2022).

Within the scope of the morphological change and transformation of the commercial texture studied, Connectivity, Gate Count, Integration and Connectivity/Integration analysis values of the Mevlâna Bazaar period in the Traditional Konya Bazaar, which is the second stage, were achieved using the "Space Syntax" method (Tables 10, 11).

Table 10. Table of Values for Mevlâna Bazaar Period

Values	Minimum	Average	Maximum
Connectivity	11	1134.21	5764
Visual Integration	1.65282	4.4292	7.21813
Gate Counts	1	12.5229	108
Connectivity/Integration (Intelligibility)	-	0,544654	-

Table 11. Results of Space Syntax Analysis of Mevlâna Bazaar Period
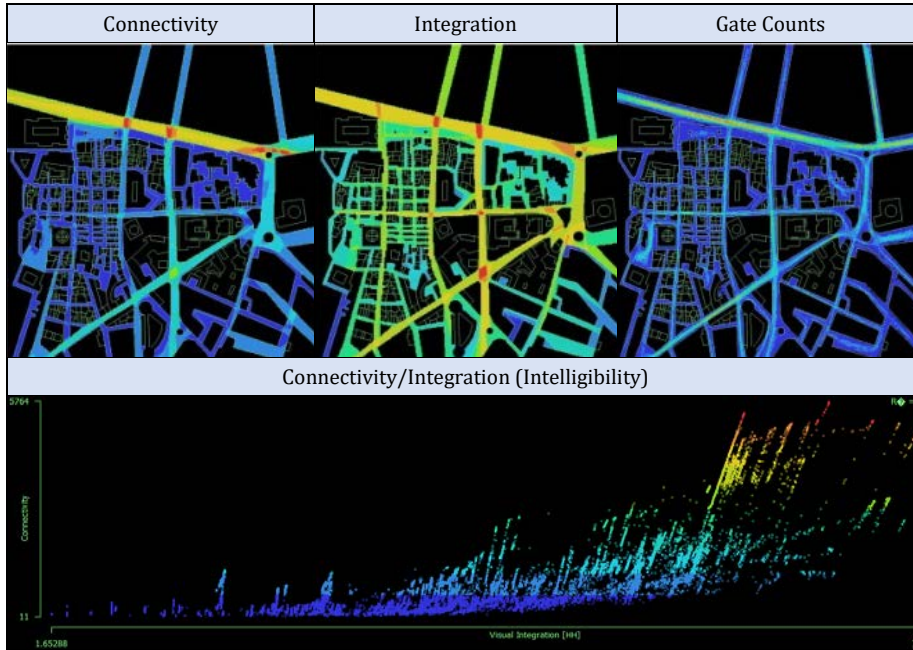
Altın Bazaar Period in the Traditional Konya Bazaar

Mevlâna Dargah, which constitutes the urban identity of Konya, and its surroundings contain important historical and cultural heritage. It aims to preserve this historical texture by eliminating the structures that disrupt the integrity of historical and cultural heritage and building bazaars suitable for urban identity (Şardağ and Kervankıran, 2022). In the area of the Mevlâna Bazaar, which was destroyed for physical, social, economic and political reasons in 2020, the reproduction of the space within the scope of the 'The Tomb Front Urban Renewal Project' has been on the agenda. The main factor that triggered the transformation of Mevlâna Bazaar-Altın Bazaar is the desire to upgrade the spatial quality of the Altın Bazaar, which will be rebuilt while Mevlâna Bazaar is in the high-rise arcade culture, usually designed as 2-story shops and pedestrian streets.

Mevlâna Bazaar, with its large and bulky mass based on the parcel's boundaries and its gauge rising to 8 times, clashes with the fragmented and human-scale commercial texture in the surrounding texture. It is seen that the buildings designed with the Altın Bazaar transformation project are on a human scale, respectful to the pedestrian and have strong relationships with the street, parallel mass design and mass relationships with the surrounding texture. When the forms of the masses and their relationships with each other are examined, it can be said that planning was done based on the layout plan of the Uzum Bazaar, where the first commercial activities occurred in the area within the scope of the demolition of Mevlâna Bazaar and the reproduction of space (Table 12).

Table 12. Altın Bazaar Period in Traditional Konya Bazaar

Orthophoto Image of the Altın Bazaar in 2022 (KKBS, 2022)	General Views of the Altın Bazaar in 2022 (Sabah Newspaper, 2021)
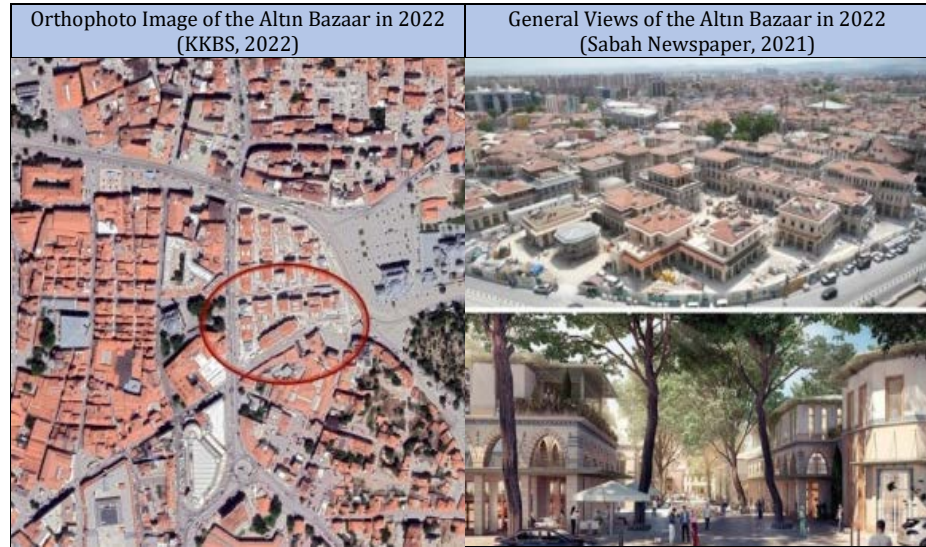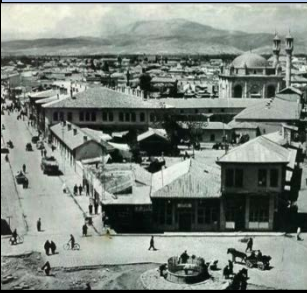
With the transformation project, the pedestrian axis interrupted by the mass of Mevlâna Bazaar and the reopening of the Aziziye Mosque-Mevlâna Dargah perspective is among the project's first goals, along with these adaptations to the historical texture silhouette. Decisiveness of the pedestrian axis was ensured with the partial mass designs, the positions and orientations of the masses, and the necessary landscaping arrangements and the perspective between the important historical units was restored (Table 13).

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Table 13. Current Maps and Silhouette Analysis around Altın Bazaar in 2020

Altın Bazaar on the Current Map in 2020 (Uysal, 2010)	Altın Bazaar in 3D Analysis on the Current Map in 2020 (Uysal, 2010)
Altın Bazaar on the Skyline of Traditional Konya Bazaar on the Current Map in 2020 (Uysal, 2010)	
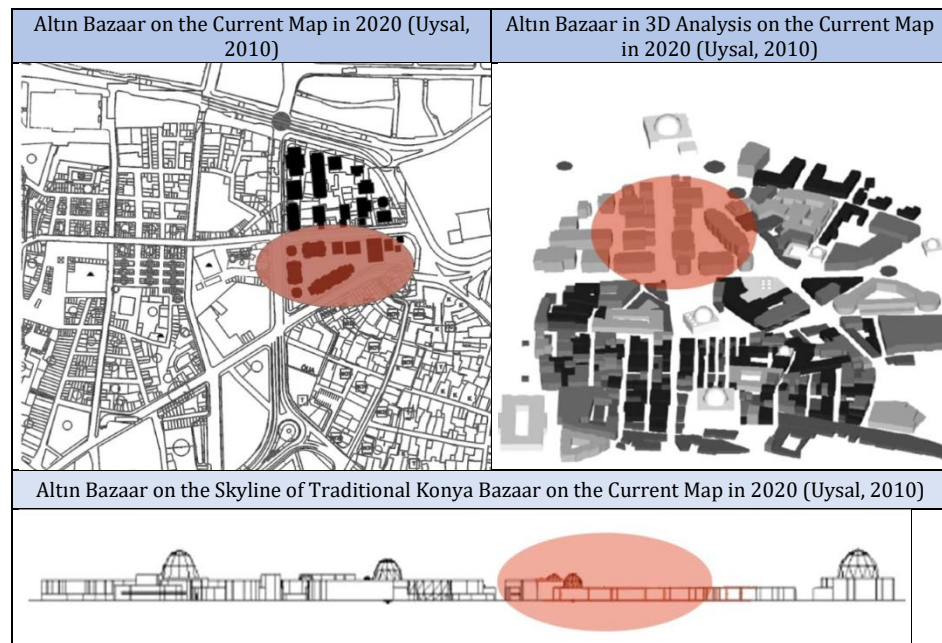
The demolition of the Uzum Bazaar and the construction of the Mevlâna Bazaar have been described as modern. With a commercial texture, deep-rooted historical and cultural value, and the intensely functional identity of modernism, the area has undergone a transformation again for various reasons explained after it broke away

from the local identity. The Mevlâna Bazaar-Altın Bazaar transformation project bears traces of a historicist approach. The current of historicism, which emerged together with the postmodernist approach in architecture, emerged in response to the uniformity of modern architecture. It is an international architectural style that developed in the 1970s, which brings the architectural forms of ancient periods to the forefront again as aesthetic elements (DeCombo, 2022). The new bazaar is one of the examples of new space production by copying the history and culture one-to-one or imitating certain architectural elements to keep the history and culture alive. Various reasons, such as returning to what is characterized as essence, establishing a cultural connection, gaining a place in urban identity and memory, and social expectations, explain the historicist approach in the transformation project (Table 14).

Table 14. The General Impression of the Transformation of the Uzum Bazaar Area in the Konya Bazaar

General View of the Uzum Bazaar in Konya Bazaar (Anonymous, 2015)	General View of the Mevlâna Bazaar in Konya Bazaar (Memleket Newspaper, 2019)	General View of the Altın Bazaar in Konya Bazaar (Sabah Newspaper, 2021)

The basement parking lots of Mevlâna Bazaar, which were produced as a solution to the vehicle traffic and parking problem around Mevlâna Street, became busy in terms of pedestrian and vehicle traffic with the road widening works carried out in the 19th and 20th centuries, were demolished as part of the 'The Tomb Front Urban Renewal Project' together with Mevlâna Bazaar. The demolition of the covered parking lot, which partially provided a solution to this problem during the Mevlâna Bazaar period, along with the Mevlâna Bazaar, and the failure to propose a solution to this problem in the new bazaar project, has also brought about an important planning and process problem in the city centre of Konya, which has historical and commercial importance.

The construction of the Altın Bazaar transformation project started in 2020 and was opened in December 2022. Commercial activities started in January 2023, with the tradespeople starting to settle in the shops.

The values of connectivity, gate count, integration and intelligibility were reached with the "Space Syntax" method of the Altın Bazaar period, which is the last stage of morphological change and transformation of the commercial texture examined within the scope of the study (Tables 15, 16).

Table 15. Table of Values for Altın Bazaar Period

Values	Minimum	Average	Maximum
Connectivity	4	1393.53	6055
Visual Integration	1.73447	5.12243	7.89934
Gate Counts	1	10.0326	89
Connectivity/Integration (Intelligibility)	-	0.445737	-

Table 16. Results of Space Syntax Analysis of Altân Bazaar Period

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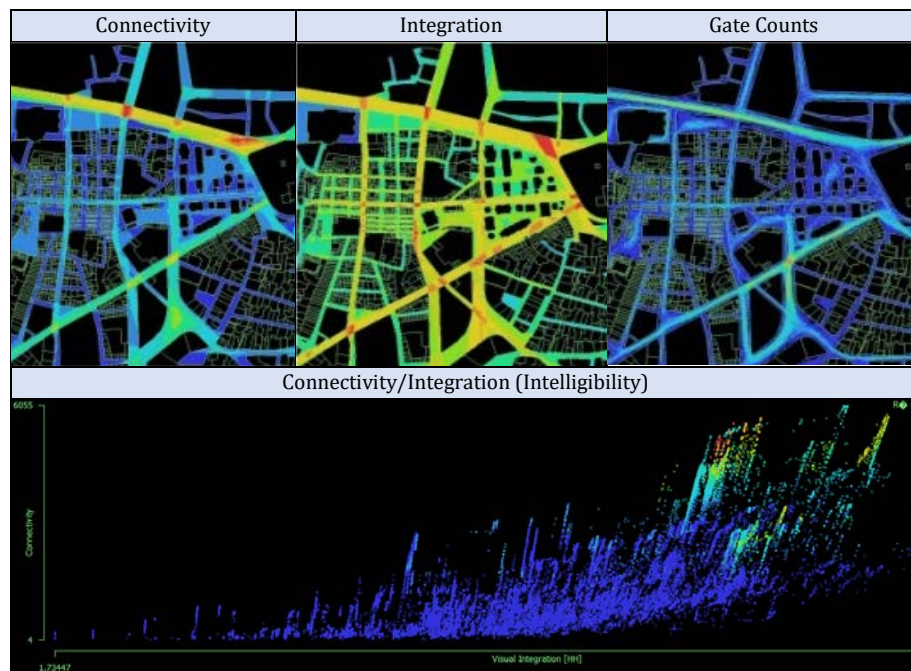
Periodic comparison can be made with the numerical data obtained from the Space Syntax method. For this reason, the analysis results made separately for each period were evaluated by considering them holistically.

Comparison of the Sample Area According to the Periods

Within the scope of the study, the changes and transformation of the Uzum Bazaar commercial area, which has developed in the traditional Konya Bazaar, has been studied morphologically on the scale of the building island, which has undergone two times in the historical process, namely the Mevlâna Bazaar and the Altın Bazaar period. The Space Syntax method was used to make qualitative and quantitative evaluations of the study area. The analyses of this commercial texture in terms of Connectivity, Integration, Gate Counts and Connectivity/Integration (Intelligibility), and the analysis results were evaluated comparatively (Table 17, 18, 19).

Table 17. Numerical comparison of analysis values for the periods

Values	The Uzum Bazaar Period (Average)	The Mevlâna Bazaar Period (Average)	The Altın Bazaar Period (Average)
Connectivity	1302.69	1134.21	1393.53
Visual Integration	5.41614	4.4292	5.12243
Gate Counts	13.1523	12.5229	10.0326
Connectivity/Integration (Intelligibility)	0.642934	0.544654	0.445737

When examined in terms of connectivity analysis of commercial texture within the scope of the research, The connectivity value of the area during the Uzum Bazaar period, which was formed in harmony with the historical bazaar texture, was 1302.69, while the connectivity value of the study area decreased to 1134.21 during the Mevlâna Bazaar period, which was built as a holistic mass in arcade architecture. This situation shows that the connection between places on an urban scale was more intense during the Uzum Bazaar period, which is a part of the historical commercial texture, than the Mevlâna Bazaar in the arcade culture. When the results of the Space Syntax analysis of the Altın Bazaar period are examined, the connectivity value of the study area has increased to 1393.53. It is seen that the working area has reached the most connected state of the spaces with the recent period, namely the Altın Bazaar Transformation project period (Table 17).

When the integration values were examined, it was determined that the value of the Uzum Bazaar period was 5.41614, and the value of the Mevlâna Bazaar period was 4.4292. This situation indicates that the working area is more integrated, and mobility within the system is more during the Uzum Bazaar period than during the Mevlâna Bazaar period. According to the analysis results for the last period, the integration value was 5.12243. This value shows that compared to the Uzum Bazaar period value of 5.41614 and the Mevlâna Bazaar period value of 4.4292, the connection between spaces is less than in the first period. However, the integration value, which decayed significantly with the second period, has risen again with the latest period project and approached the value of the first period. Although this rise is important, the value of integration between places, because the Uzum Bazaar period was formed together with the traditional Konya Bazaar, could not be decisively captured (Table 17).

When the Gate Count values are examined, it is seen that while this value was 1315.23 during the Uzum Bazaar, it was 1252.29 during the Mevlâna Bazaar. Accordingly, it has been concluded that the intensity of mobility in the study area is higher during the Uzum Bazaar period than in the Mevlâna Bazaar period. When the gate count analysis is examined, the latest period data is 10.0326. It has been concluded that the mobility intensity is less in the Altın Bazaar project compared to these values,

which is the first-period value of 13.1523 and a second-period value of 12.5229 (Table 17). It can be said that the reason for this situation is the decoupling between the masses. The numerical decrease of the commercial use spaces and the expansion of the circulation areas between these spaces have caused the density value to decrease within the framework of the study area.

Table 18. Graphical comparison of analysis values for periods

	Connectivity	Integration	Gate Counts
The Uzum Bazaar Period			
The Mevlâna Bazaar Period			
The Altın Bazaar Period			
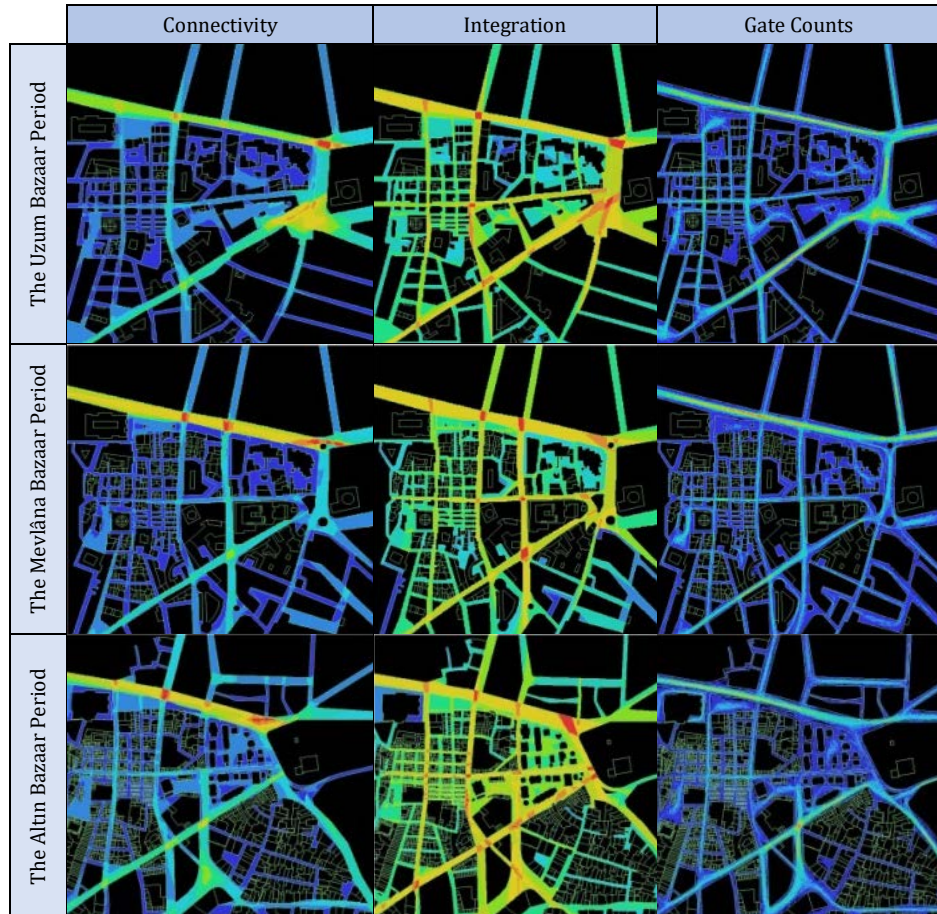
When the Connectivity/Integration (Intelligibility) values were examined, the value of the Uzum Bazaar period was measured as 0.642934, the value of the Mevlâna Bazaar period was measured as 0.544654 and the value of the Altın Bazaar period was measured as 0.445737. Accordingly, it is observed that the first period is more readable and understandable by the user within the spatial system. It is possible to say that there has been a severe decrease in intelligibility values with the arrangements made in this commercial texture and that the intelligibility of the workspace in the system has decreased at every stage of the changes and transformations it has undergone in the historical process (Table 19).

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Table 19. Graphical comparison of analysis values for periods
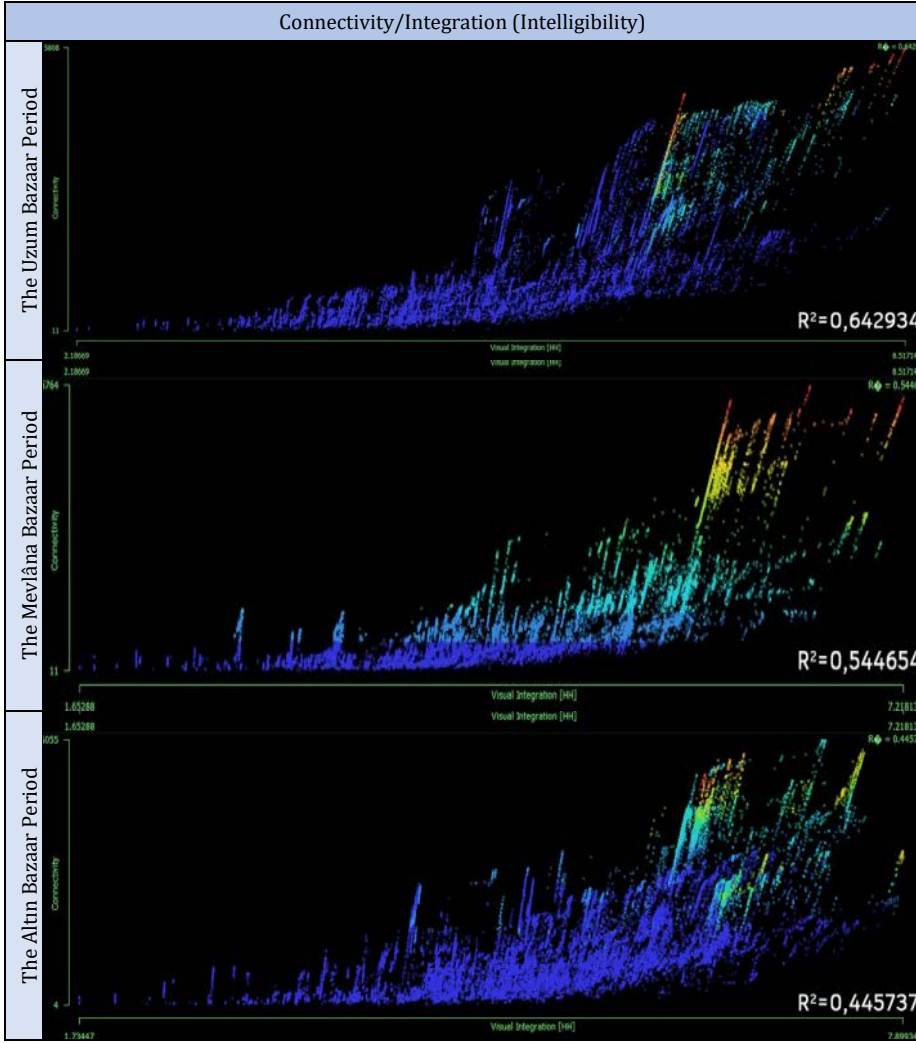
The Uzum Bazaar, which is a part of the Konya Traditional Bazaar, which is developing between Alâeddin Hill, which is the main focus in the historical process, and Mevlâna Dargah, which is the secondary focus, is a commercial area that has taken place in the commercial texture silhouette, urban memory and urban identity with its architectural identity. According to the analysis results, the perception of connectivity and integration in this area has been proven concretely. The Gate Counts and Connectivity/Integration (intelligibility) values have constantly declined throughout the process. The decrease in Gate Counts and Connectivity/Integration (intelligibility) analysis values can be explained by correlating them with the balance of commercial space and circulation areas within the spatial organization. Mevlâna Bazaar, built after the Uzum Bazaar Period, could not take place in the historical and commercial texture with its architectural identity and could not establish strong ties with the city's identity and memory. These situations, supported by the analyses carried out, were demolished again within the scope of the Altın Bazaar transformation project. This commercial area approached the connectivity and integration values

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given by the Uzum Bazaar period with an architectural identity close to the traditional commercial texture identity.

EVALUATION AND RESULT

The cities have been changing piecemeal with expansion, contraction, construction and destruction since the day they were founded. This variable structure of cities and the factors that cause their change have always been the subject of morphological research. In this direction, in cities that are in a rapid process of change and transformation in today's conditions, it is important to process analysis and understanding of the existing texture for a healthier construction of urban spaces.

Urban morphology provides revealing an understanding of the changes and transformations of cities in mobility within the historical process. In this context, it is used as a tool or method in order to objectively evaluate the historical roots of cities in the context of time, space and physical environment and to provide reliable data on today's transformations.

Providing a holistic approach in the construction of urban spaces, and avoiding the production of urban environments that are decoupled or weak with no connection to the environment is listed among the important urban design criteria. Especially the inclusion of historical cities in the design and production process by removing them from the context affects not only the physical structure of that city but also the social, economic and cultural structure, dragging people's living spaces from mobility to stasis. In this context, the areas located in historical city centers and planned to be transformed should be designed not completely disconnected from the existing texture, but in a way that is compatible with the existing texture and at the same time depending on their users and social needs.

Within the scope of this study, the changes and transformations that the Uzum Bazaar area, located in the traditional commercial texture, has undergone, have been periodically examined from a morphological point of view. Uzum Bazaar, which is formed together with the traditional Konya Bazaar, is a commercial texture where vegetable and fruit sales are made in accordance with the needs of the area in terms of the functions it contains. In addition, it contains accommodation units, has a human scale, a size proportional to the surrounding texture, and the street-building relationship is strong. It was physically in harmony with its environment until it was destroyed and integrated with the urban identity. After the demolition of this area in 1980 for various social and political reasons, the construction of Mevlâna Bazaar, which has a passage culture in the region, was started. Mevlâna Bazaar is characterized as detached from the surrounding skyline due to its multi-story structure, mass size and inability to ensure street-pedestrian relationship, building materials and historical texture contrast, but it is characterized as contemporary. Mevlâna Bazaar, which was built in place of the Uzum Bazaar, which is a fruit and vegetable sales area and

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accommodation unit, has undergone a change in function, the new function has evolved mainly to the sale of textiles and souvenirs, and the old functions have been destroyed with this transformation. The elevation of the structure to eight floors within the traditional texture has caused the deterioration of the traditional commercial texture silhouette. It has interrupted the pedestrian flow in the bazaar with its bulky mass. After the opening of Mevlâna Bazaar to the user, the desired user density could not be reached. It could not find a place in the texture with its bulky mass. Due to various political reasons, it was included in the scope of the Altın Bazaar transformation project in 2020, and its demolition was carried out in this process. Thus, the urban space within the historical texture has been transformed for the third time. Including this commercial area, which has an important place in urban identity and urban memory, in such an extensive demolition-construction process for the third time is an important process and planning problem. Within the scope of the Altın Bazaar transformation project, it has been aimed to move away from the arcade architecture seen in Mevlâna Bazaar again and to have a strong street-pedestrian relationship, to consist of masses on a human scale and to show settlement in harmony with the surrounding texture, as in the Uzum Bazaar period. It aims to ensure the connection and integration that is gradually breaking with the area's environment. Unlike the large and bulky mass of Mevlâna Bazaar, it has been oriented towards a fragmented settlement with its mass organization and compositions.

As a result, it is seen that the area, which has undergone radical changes twice, is trying to integrate into the traditional commercial fabric and meet current social expectations with the recent Altın Bazaar project. The fact that both the project-specific ties and the spatial organization ties he established with his surroundings are strong shows that he is of consistent integrity. When the formation and life process of the Uzum Bazaar area is characterized as "Essence", it can be said that a "Decoupling from Essence" was observed between the first period (Uzum Bazaar period) and the second period (Mevlâna Bazaar Period); while steps were taken towards "Return to Essence" with the last period (Altın Bazaar Period) and applications were made in this direction.

The study conducted within this framework is expected to contribute to supporting the relationship between morphological research and practice, to producing original subregions in historical urban spaces by taking into account, to forming appropriate properly for similar studies in which the characteristic urban commercial texture will serve as an example to displaying an innovative attitude in holistic spatial interventions.

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Resume

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User Perceptions of Shopping Centres with Different Spatial Configurations

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Abstract

This is the first study in the literature investigating the effects of different spatial configurations (open, semi-open and enclosed) of the shopping centres on user perceptions. The aim of this study is to determine the effects of shopping centres' different spatial configurations (open, semi-open and enclosed) on the perceptions of users, investigate current trends and predict likely designs for consumer-wise shopping centres in the future. Accordingly, the open-air Konya Bedesten Bazaar, the semi-open Forum Bornova Shopping Centre, and the enclosed Kule Site Shopping Centre were selected as sample areas. The study questionnaire was administered to 300 participants to determine the participants' demographic characteristics, reasons for choosing and visiting the shopping centre, and shopping centres' physical, landscape and sensory effects on the participants. According to the results of the data analysis obtained by the SPSS program, it has been determined that contemporary consumer is less interested in enclosed shopping places, longing for the traditional bazaar. In addition to the spatial configuration, traditional market images and local values were seen to be perceptually prioritized for consumers. In this context, it is very important that open-air shopping centres, which are a new trend for users, emulate the traditional features, establish a relationship with the open air and the environment, and use real equipment such as green-water element, urban furniture strengthens the perception of the city in shopping centres. In addition, the concept of "freshness" was specified as the most important sensory concept by the users. It is essential due to forming a basis for determining the likely design criteria for future shopping centres, creating spatial configurations and fictions according to user requirements, and future theoretical studies related to this. The study contributes to the literature by providing valuable insights for planners, architects, and investors in terms of user perceptions for future shopping centres.

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INTRODUCTION

The shopping act is one of the important requirements of social life. Although shopping has been transformed by civilizations and paradigm changes in societies, the critical transformation took place with the rise of capitalism and the industrial revolution. The effects of the capitalist point of view on the economy reshaped the relations between production and consumption, while the industrial revolution speeded up mechanization and technological development, eventually enlarging product ranges and manufacturing capacity. Henry Ford triggered the primary change in manufacturing by inventing the assembly line in 1914 after the effects of Taylorism[1]. Consequently, mass production and standardization were initiated, dependence on labour was reduced, and work hours were minimized. This meant that workers had extra free time to consume products. On the other hand, people's desire for standard products faded in the postmodern era when post-Fordism replaced Fordism and product range was expanded using computers. Although post-Fordism was based on the consumer culture of Fordism, its zone of cultural development was even wider (Harvey, 1989). These changes in the production system also transformed the concept of shopping which was once perceived as a comparison of cost, quality, and style into an activity. Shopping was also associated with individual identity development, social status, and socialization (Gruen, 1973). In parallel with Gruen, Falk and Campell (1997) claimed that the current version of shopping was a social experience that goes beyond meeting people's needs. Thus, shopping has nowadays constituted a form of social behaviour that brought people together and got them to communicate and no longer merely meet needs and exchanged products (Miller, 1998). In this sense, shopping, as an important public behaviour, has established a link between individuals and the urban environment (Miles and Paddison, 1998).

According to Beddington (1991), shopping, as a public and social behaviour pattern, has become a free time activity and a relaxing practice in today's daily life. Bocock asserted that the current definition of consumption included people's desires concerning who they are and who they would like to be. Consumption was thus shaped by the sense of the formation and development of identity. This revealed the social, psychological and cultural aspects of consumption in addition to its economic parameters (Bocock, 1997). Baudrillard indicated that current consumption habits included consuming not only physical objects, but also signs and symbols. In addition, consumption as a system of signs controlled by rules and codes rather than a way of meeting basic needs with goods and objects (Baudrillard, 1997). As the literature shows, consumption has acquired different meanings over time, and growing ever more distant to its original meaning, which is meeting needs, it now has multidirectional layers of content. With modernism, it began to contain symbolic meanings, while preserving its conventional sense (Table 1).

[1] Machines replaced craftsmen in this system, increasing production speed and reducing the need for labor force. Marx defined this process as alienation, the separation between producers and their products. This meant that producers had to buy and become consumers of their own products (Bocock, 1997).

Table 1. Shopping: Necessity versus Pleasure (Falk and Campbell, 1997)

Shopping as a pleasurable social activity	Shopping as a necessary activity for meeting needs
Passing time as the objective	Shortage of time
An objective on its own	A means
Does not necessarily mean buying anything	Always means buying things
Stimulation	Planning
Dreamy and semi-imaginary hedonism	Meeting needs practically
Activity is not important	Maximum activity
Pleasure	Necessity
Not a daily routine	A daily routine, like all other activities
Emphasis on the experience	Emphasis on rationality
Game-like	Serious

Shopping became a decisive parameter in architectural design over time due to its changing meanings and increased value in social life. Standardized consumption patterns also led to similarities in spaces for shopping and transformed them to almost a single form specialized for consumption, disregarding regional differences. Current shopping centres are artificially produced in harmony with the mindset of modern capitalist society (Yırtıcı, 2005).

The Spatial Transformation of Shopping Centres in The Context of Consumption Habits

Looking at the spatial alteration, it is seen that the first shopping spaces were temporary and open places. Although the sales units turned into closed units in time, pedestrian circulation has taken place in open areas. Agora, which was the first known shopping place before Industrial Revolution, turned into an urban space containing social, economic, political and religious factors in time, and later called 'marketplace' (Önalan, 2004). The open space sense of Roman's forums and Greek's agoras had left its place to the sense of semi-open shopping space with row of shops. Basically, they were centres that serves as a square and enables the urbanites to gather, meet and shop (Mutlu, 1993; Batı, 2007; Dökmeci, et al., 2006). Market places were the important focal point of public spaces, which were the commercial spaces of medieval Europe, established in the squares, socialized the buyer and seller, and included different types of places from mobile stalls to permanent shops (Sennet, 2002). Sequential and regular sales units established in the ancient period changed with the independent stalls of the marketplace. The sense of the independent sales stall had left its place to the shops in time (Geist, 1983). The shopping streets with arcade emerged for the first time with the addition of a sheltered cover coat in front of these shops (Zengel, 2002).

In the Middle Ages Anatolia, the place of worship and commerce were intertwined since the worship in the Muslim Turkish society was during working hours, and the city's focus was formed in the mosque and its

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surroundings. This focus had determined the direction of gathering and city's movement. While the mosque was for only Muslims, the bazaar was a gathering place for people of all religions. Bazaars, which were shopping places in Anatolia, had turned into public spaces where social introversion decreased and socialization and interaction happened (Cezar, 1985). In this age, five types of shopping places can be addressed in Anatolia; These are shops (*dükkan)*, bazaars (*çarşı*) (for definition, see Işın 1995, Weber 1999), *arasta* (for definition, see Sözen ve Tanyeli, 1986), *bedesten* (for definition, see Özdeş,1998) and inns (*han*) (for definition, see Akar, 2009).

After the 12th century in Europe, trade places moved away from the cathedrals, were located near rivers and harbours, and appeared in special fairs (Sennet, 2002). In the 17th century, with the effect of increasing Europe population, fairs turned into enclosed multi-stored fair constructions built of cast iron with large openings (Tokyay, 2005). The most notable among these spaces was the Crystal Palace, which was built for the industry fair in 1851. Despite its segregated shop layout, this building became a pioneering in the development of enclosed shopping centres by gathering of brands under one large roof, integrating imports, exports and surplus products, the size of it and its garden concept created indoor (Erin and Gönül, 2015). Public life that constituted by itself spontaneously in the city centre moved into these new enclosed fair structures (Onay, 2005). Later, passages and big stores emerged as a result of industrial luxury and material rise (Benjamin, 2004), shopping spaces of the 19th century, are similar to the shopping centres nowadays in terms of their spatial fiction and bonds with the city. Passages, which were among the first places where shopping had left its place to consumption, were consumption places that were spaces to spend leisure time, look at shop window displays, and satisfy the desire to see people and to be seen (Urry, 1998). Passages of Paris were the first public spaces of modernism (Zukin, 1996). In addition to being different with its space fiction (Benjamin, 2004), the passages were a novelty for the world with the consumption culture it revealed, after western Europe.

In point of the separation from the city and increasing the closure degree of the space, passages and big stores pioneered to the shopping centres. The shopping spaces started to demonstrate the same trends all over the world with the Industrial Revolution, including European and Anatolia. In Anatolia, the shopping spaces continued traditionally until the 18th century. At the end of the 18th century, trade relations with Europe increased, and the changing consumption culture and spaces in Europe with the Industrial Revolution began to influence Anatolia in the 19th century as well. One of the most important developments in the name of Western consumption in this transformation process was the emergence of new consumption places (bon marche, passage etc.) that contain western and diverse products unlike traditional consumption places (Toprak, 1995). As a result, values from the West, fashion and

consumer goods have been perceived as the basic elements of the new lifestyle (Işın, 1995).

By the 20th century, due to the economic crisis and destruction experienced after the World War II, economic concerns were in the forefront in the shopping spaces seen in Western Europe and America. Consumers with the effect of war psychology, wanted to reach their basic needs by the fastest, most practical and economical. For this reason, spaces had developed in line with this demand. Individuals experienced economic hardship combined their capital and revealed the market typology (supermarket/hypermarket), which was a planned and mixed organization, low profit, fast and practical shopping place. In addition, socialization had almost completely disappeared with management intellection such as quick access to the product, buy it yourself, clear and fix price. In time, the consumption expectations of people had begun to change, and their desire to socialize and spend free time had caused the supermarket typology to be insufficient (Arslan, 2009). In the same period in Turkey, due to insufficient production and food shortages, foreign capitals were encouraged with subvention, and the supermarket period started in the 1950s. In the 1960s, this process continued with merchandising, especially big stores belonging to foreign capital started to open branches in Turkey. The most important feature of this period was the rapid spread of consumption culture towards the lower-class of the society (Zorlu, 2003). Unlike Western societies, in Turkey, firstly consumption and then production process took place.

Early prototypes of contemporary shopping centres (semi-open Northland Mall and enclosed Southdale Mall) were separate from traditional city centres, and reconfigured public life in enclosed and introverted spaces with infrastructure for social activities other than shopping. With origins in the USA, shopping centres also began to appear in Europe in the 1950s (Gruen, 1973; Ceylan, et al., 2018). Turkey's encounter with the shopping centre typology took place in the 1980s, approximately 30 years after America and Europe. Neo-liberal policies implemented in Turkey in the 1980s, urbanization, increase in income, spread of mass media and automobile use, contact with foreign culture because of globalization triggered the alteration of shopping spaces in metropolises, especially in Istanbul (Erkip and Özüduru, 2015).

In the post-1980 period, global, exotic and foreign products were highly desirable due to urbanization, increase in income and globalization (Zorlu, 2003). The shifting of traditional trade centres to contemporary shopping centres, especially in Istanbul, also the replacement of traditional craftsmen by big foreign capital groups were observed (Tokatlı and Boyacı, 1999). Although it was known that the investors of shopping centres were generally private capital, an interesting situation had been experienced in the case of Turkey. The first shopping centre, "Galleria" in Istanbul, was built in 1988 by the state with the build-operate-transfer model, imitating the examples abroad (Arslan, 2009). With the opening of these new shopping centres in Turkey,

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wandering, looking the shop window displays spread to wider masses, especially among the middle class, and almost became a ritual of daily life. Shopping centres began to take over shopping from city centres due to irregular settlements, increased crime rates and diseases, insecurity, and traffic jams that replaced pedestrian circulation (Gottdiener, 2005). Shopping centres fulfilled the missing functions of cities turned into enclosed town, a new typology (Uzzell, 1995). On the other hand, town-dwellers began to miss city centres, which led to the reconfiguration of artificial urban spaces in contemporary shopping centres isolated from the real cities' disadvantages. Crucial components of the urban environment, nostalgic streets and city squares were reconfigured using daylight and plants in recreational areas (Shields, 1992). Effectively receiving daylight in buildings using atriums, choosing street furniture and landscape elements put the urban fabric in shopping centres and made people feel as if they were in open environments. This approach reflects the reconfiguration of urban structures in enclosed spaces with a unique goal, which is to use urban environments' elements as tools to stimulate consumption (Birol, 2005). This configuration fundamentally cannot give people the pleasure of spending time in real city centres, but it can get them to stay longer in enclosed environments and consume more. Open-air shopping centres integrated streets to restructure urban life in a different way from the enclosed shopping centres. Using living green areas and enabling people to walk around semi-open, public areas in a natural atmosphere reflects a design intention of generating publicity and real urban life in interior spaces (Uzun, 2008). These shopping centres referred to traditional shopping districts in terms of spatial configurations and integrate the real climatic atmosphere, while retaining the shops and stores of ordinary enclosed shopping centres. It imitates the functions of city centres with the public space qualities which offers to the citizens (Özdemir and Cengizoğlu, 2016). New design approach's (open-air shopping centres) goal was to provide the city dweller the experience of a real bazaar-city centre that they missed (Lazarus, 2006).

The tendency to replace enclosed shopping centres with open-air shopping centres all over the world started to be seen in Turkey in the 2000s. As a result of the acceleration in the number of shopping centres increasing competition, the trend of open-air shopping centres, which would attract the attention of consumers and satisfy their curiosity about places different from the common enclosed shopping centres, has begun to be seen. The first example in Turkey was the Kanyon Shopping Centre, which was built in 2006 in Istanbul. After the interest in Kanyon Shopping Centre, the tendency towards open-air shopping centres has increased.

Literature Review

In the literature, researchers have studied shopping centres from different points of view. Alawadhi and Yoon (2016) investigated the effects of shops' layouts and the density of people on the perceptions of

crowds using 3D simulations. Kusumowidagdoa, et al. (2015) focused on the perception of space by visitors in the public parts of shopping centres. Oppewal and Timmermans (1999) aimed to investigate the effect of different physical aspects of shopping centres on the public perception of public spaces in shopping centres. Another study assessed the satisfaction levels of visitors and the effects of a shopping centre on the local context, focusing on residents and tradesmen (Faslı, et al., 2016). Uzzell (1995) found that users choose shopping centres based on their social and psychological satisfaction levels in addition to the sales capacities of the shops. Wakefield and Baker (1998) investigated the dynamics of the users' desires and habitual ways of passing time in shopping centres. Sommer (1992), in order to examine the change in the free time and consumption rate in the shopping centre, individually or in groups investigated the effect of moving. Ng (2003) studied the effects on consumers' experiences of shopping centres' physical properties such as the layouts of shops and background music. Ng (2003) also evaluated their physiological satisfaction capacities such as sociability, safety and comfort. Patricios (1979) found that the macro model approaches according to consumer preferences are more favourable for shopping centre design. Aktaş (2012) said that leisure activities affected shopping centres' forms and shopping centres in Turkey had been transformed into entertainment parks similar to Disneyworld, which had a great effect on urban social life. Afkan and Rouz (2015) compared shopping centres and traditional bazaars using the space syntax and determined that the shopping centre was consumption-oriented and could not be an urban space like traditional bazaars. Ünlükara and Berköz (2016) evaluated the location selection criteria of shopping centres through the example of Istanbul. Uzun and Gül (2017) found that shopping centres were enclosed, artificial and monotonous, and that they were not combined with the environment. In the literature, while there are some studies conducted on users' perceptions in shopping centres, some studies have investigated the needs and users' satisfaction in shopping centres. However, there are no studies investigating the effects of spatial configurations of the shopping centres on user perceptions. The contemporary cities today contain many shopping centres with a variety of different configurations (open, semi-open, enclosed, introverted, extroverted, isolated from the city, engaged with the city) based on changes in consumer culture. This study investigates the landscape and sensory effects of three different spatial configurations (open, semi-open, enclosed) shopping places on users' perception to meet the changing needs of the spatial organization, to see what the trend is today and to predict the fictions of the shopping places to be designed in the future.

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METHOD
Environmental Setting and Procedure

Shopping centres have been transformed into social spaces for more than just consumption by changing user habits. People spend time in

them on their own or with their families. This study conducted a questionnaire survey to determine users' perceptions of feeling peaceful, safe and happy in enclosed, semi-open and open shopping centres. It found relations between reasons for choosing shopping centres, purposes of visiting them, the environmental effects of their design elements, their sensory effects on user perceptions and their spatial configurations.

The open-air Konya Bedesten Bazaar, the semi-open Forum Bornova Shopping Centre and the enclosed Kule Site Shopping Centre were selected as sample areas. Konya Bedesten is a traditional bazaar built according to a typical Turkish bazaar configuration with an arrangement of shops, connections to streets and the city centre, pedestrian-scale proportions, ornamented eaves and products on display. Konya Bedesten was largely renovated in 2014 and turned into a favourite shopping centre with pedestrian paths free from vehicle traffic, configured open spaces and a renovated façade. Forum Bornova Shopping Centre is the first open-air shopping centre built in Izmir in 2006. It has the architectural features of traditional Mediterranean towns and shopping districts with streets, squares, bridges, and terraces. Kule Site Shopping Centre is a multipurpose building with a three-story shopping block and as forty-two story office tower that was built in 2004. Although it is in the city, it is still a typical introverted shopping centre with its isolated, inward-oriented design. These three case studies not only help to compare user perceptions of different spatial configurations (open, semi-open and enclosed), but also the traditional, contemporary, and mimicking traditional features of shopping centres (Table 2).

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Table 2. The shopping centres used as sample area.

| Konya Bedesten Bazaar | Kule Site Shopping Centre | Forum Bornova Shopping Centre |

Participants

The questionnaire was administered to 100 participants for each sample area. The 300 participants were randomly selected among the visitors with a focus on a balanced distribution by gender. Of the participants, 57.3% (172) were female, and 42.7% (128) were male. Of them, 30% (90) were 18-25 years old, 28.3% (85) were 26-35, 26.3%

(79) were 36-50, 11.3% (34) were 51-60, and 4% (12) were 61 years old and over (Figure 1).
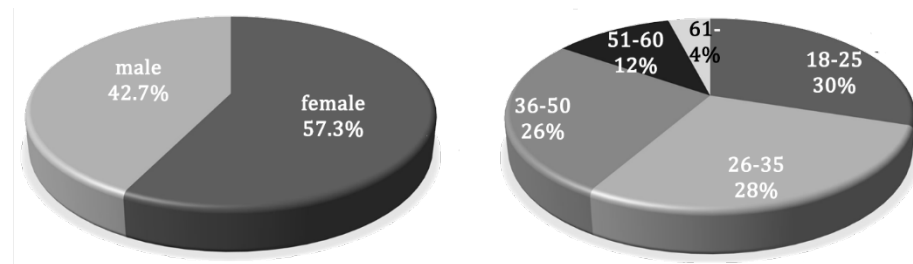
Figure 1. Gender and age range distribution of the participants.

Questionnaire

The questions were in four categories. The first was demographic information, and the second included reasons for choosing the shopping centre, reasons for shopping and frequency of visits. The third category was the effects of the shopping centres' physical properties, landscape design and spatial elements. It contained questions about spatial elements such as entrances, façades, wall and floor claddings, atriums, squares, semi-open spaces, interior lighting, shop windows, green zones, the use of water, signboards and dustbins. The last category concerned the sensory effects of spaces using the parameters of attractiveness, entertainment, security (a welcoming, safe and risk-free environment), spaciousness and liking.

EVALUATION

The responses of the participants were analysed using SPSS software. The findings were evaluated using the chi-square test, descriptive statics, correlation analysis and ANOVA. Advanced data analysis was done using Tukey's test. The Cronbach's alpha reliability values were 0.83 for the sensory concepts of spaces and 0.86 for landscape effects. The x^2 value was 1.335 for the relation between gender and choice of shopping centres. This finding is not meaningful at the 0.05 significance level, which indicates gender was not a significant factor in choice of shopping centre (p=0.513). In terms of age range and choice of shopping centre, 50% of the Konya Bedesten Bazaar participants were 18-25 years old, 40% of the Kule Site Shopping Centres participants were 26-35, and 44% of the Forum Bornova Shopping Centre participants were 36-50. The youngest participants chose Bedesten, and the older participants favoured Kule Site and Forum Bornova (Table 3).

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Table. 3 The age range distribution of the users in the three shopping centres.

			AGE					Total
			18-25	26-35	36-50	51-60	61-	
SHOPPING CENTER	**Bedesten**	Count	50	14	19	8	9	100
		% within avm	50,0%	14,0%	19,0%	8,0%	9,0%	100,0%
		% within age	55,6%	16,5%	24,1%	23,5%	75,0%	33,3%
	Kule	Count	30	40	16	11	3	100
		% within avm	30,0%	40,0%	16,0%	11,0%	3,0%	100,0%
		% within age	33,3%	47,1%	20,3%	32,4%	25,0%	33,3%
	Forum	Count	10	31	44	15	0	100
		% within avm	10,0%	31,0%	44,0%	15,0%	0,0%	100,0%
		% within age	11,1%	36,5%	55,7%	44,1%	0,0%	33,3%
Total		Count	90	85	79	34	12	300
		% within avm	30,0%	28,3%	26,3%	11,3%	4,0%	100,0%
		% within age	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%

The responses of the participants about transportation to the three shopping centres were similar for all the shopping centres. Of them, 56.7% went to the shopping centres by private car, 35.7% went by public transportation, and 6.3% went on foot. This shows that the location of the shopping centres and their relationship with the city was not a crucial effect since the current users tend to use private cars to get to them.

In the second part of the study, the participants were asked for their reasons for visiting the shopping centres. The order of the responses for Konya Bedesten Bazaar was; shopping (X=7.63), visiting the shops (X=4.22) and passing time (X=4.09). The order for Kule Site Shopping Centre was: shopping (X=5.98), going to movies (X=2.99) and visiting the shops (X=2.90). It was shopping (X=7.41), passing time (X=6.36) and visiting the shops (X=6.33) for the Forum Bornova Shopping Centre (Table 4).

Table. 4 Reasons for visiting the shopping centres.

BEDESTEN	N	Mean	KULE	N	Mean	FORUM	N	Mean
Shopping	100	7,63	Shopping	100	5,98	Shopping	100	7,41
Visiting shops	100	4,22	Cinema	100	2,99	Passing time	100	6,36
Passing time	100	4,09	Visiting shops	100	2,90	Visiting shops	100	6,33
Eating	100	3,64	Eating	100	2,85	Eating	100	4,93
Meeting friends	100	2,45	Passing time	100	2,79	Cafe	100	4,24
Cafe	100	2,17	Meeting friends	100	2,40	Meeting friends	100	3,64
Children	100	1,24	Children	100	1,95	Children	100	3,48
Art activities	100	1,17	Cafe	100	0,77	Cinema	100	2,72
Cinema	100	0,04	Art activities	100	0,66	Art activities	100	2,02

Visiting shops and passing time were among the respondents' major reasons for visiting the three shopping centres, but shopping was their main reason. On the other hand, cinema was an important reason for them to visit Kule Site Shopping Centre, which indicates the role of

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contemporary and introverted shopping centres' additional activities in user choices. Such additional activity facilities were replaced by enlarged open areas in Konya Bedesten and Forum Bornova where they were converted into frequently visited places for passing time. The second part of the study asked the participants their reasons for choosing the shopping centres. The responses for Konya Bedesten Bazaar were: product range (X=0.55), reasonable prices (X=0.41) and convenience of access (X=0.34), in that order. The order for Kule Site shopping centre was: product range (X=0.45), convenience of access (X=0.42) and range of brands (X=0.37). It was product range (X=0.38), range of brands (X=0.31) and car parking (X=0.27) for Forum Bornova. Product range was their main reason for choosing the shopping centres, which is consistent with their main reason for visiting them, shopping. Range of brands, convenience of access, and car parking facility were also important reasons for choosing the shopping centres (Table 5).

Table. 5 The respondents' reasons for choosing the shopping centres.

BEDESTEN	N	Mean	KULE	N	Mean	FORUM	N	Mean
Products	100	,55	Products	100	,45	Products	100	,38
Prices	100	,41	Transportation	100	,42	Brands	100	,31
Transportation	100	,34	Brands	100	,37	Car parking	100	,27
Convenience	100	,29	Convenience	100	,34	Transportation	100	,24
Brands	100	,27	Car parking	100	,18	Product quality	100	,22
Product quality	100	,25	Product quality	100	,15	Convenience	100	,21
Discounts	100	,20	Weather conditions	100	,14	Discounts	100	,18
Security	100	,13	Discounts	100	,12	Weather conditions	100	,16
Weather conditions	100	,11	Security	100	,09	Security	100	,10
Hours of operation	100	,10	Prices	100	,08	Prices	100	,10
Car parking	100	,08	Hours of operation	100	,06	Hours of operation	100	,09
Attitude of employee	100	,06	Attitude of employee	100	,03	Attitude of employee	100	,02

The respondents were asked which of the shopping centres they liked shopping most. The most common response at 53% was the semi-open Forum. The least common response at 18% was the enclosed Kule Site. The participants favoured semi-open, modern space where the climate is controlled, the city and nature are integrated, a connection with the outdoors is available, and traditional features are preserved (Table 6).

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Table. 6 Spatial configurations of the participants' favourite shopping centres by level of enclosure.

		Frequency	Valid Percent
Valid	**Closed**	55	18,3
	Open	86	28,7
	Semi-open	**159**	**53,0**
	Total	300	100,0

The respondents were asked what they considered the most attractive element in the three shopping centres. The most frequent responses for Kule Site Shopping Centre were its atrium (X=0.40). It was the square for both Bedesten Bazaar (X=0.59) and Forum Bornova (X=0.52). This shows that large gathering spaces are significant for users, and that urban space elements such as the squares in Bedesten and Forum Bornova are remarkable features (Table 7).

Table. 7 Attractive elements of the shopping centres according to their users.

KULE	Mean	FORUM	Mean	BEDESTEN	Mean
Atrium	,40	Squares	,52	Squares	,59
Lighting Elements	,28	Shop Window Design	,32	Facade	,45
Entrance	,18	Interior Design	,26	Wall Cladding	,37
Interior Design	,18	Covered Semi-open Spaces	,19	Entrance	,22
Shop Window Design	,15	Floor Cladding	,15	Interior Design	,22
Facade	,08	Facade	,12	Floor Cladding	,20
Wall Cladding	,07	Entrance	,12	Shop Window Design	,19
Ceiling Cladding	,07	Wall Cladding	,10	Lighting Elements	,12
Squares	,03	Lighting Elements	,09	Ceiling Cladding	,10
Floor Cladding	,02	Ceiling Cladding	,03	Covered Semi-open Spaces	,09
Level Differences	,02	Atrium	,02	Atrium	,02
Covered Semi-open Spaces	,01	Level Differences	,01	Level Differences	,00

The relations between the landscape elements of the three shopping centres (lighting elements, signboards, dustbins, art activities, car parking, hard surfaces, green areas, the use of water as a design element and variations) and sensory concepts (spaciousness, attractiveness, entertainment, security and liking) were assessed using correlation values. The r values indicated a significant relation between landscape elements and sensory concepts at the 0.05 significance level. The perceptions of Konya Bedesten Bazaar, which is rich in variations, were: liking (X=0.429), entertainment (X=0.272) and attractiveness (X=0.253). Lack of lighting elements, signboards, car parking, green areas and water use were also noticed by the respondents. The perceptions of Kule Site Shopping Centre were: spaciousness (X=0.316), attractiveness (X=0.250) and liking (X=0.497). Safety guards and cameras in this centre increased the participants' perception of security (X=0.579). The use of green areas

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and water as design elements were significant factors in the landscape of Forum Bornova. Its strongly related and meaningful parameters were: entertainment ($X_{green\ areas}$= 0.386, X_{water}= 0.392) and liking ($X_{green\ areas}$= 0.379, X_{water}= 0.470). The findings show that almost all the perceptions are strongly related to the variation parameter, which makes it the main factor in the choice of one shopping centre over the others. The use of green areas and water had significant effects for Forum Bornova but were missing in Bedesten and Kule Site. Increase in this parameter was associated with increased perceptions of entertainment and liking (Table 8).

Table. 8 Correlation values between the landscape concepts of the shopping centres and user perceptions.

Sensorial Concepts		Lighting elements	Signboards	Dustbins	Art activities	Car parking	Security	Hard surfaces	Green areas	Water as a design element	Variations
BEDESTEN	Spacious	,135	,102	,139	-,292**	,091	,170	,042	-,151	-,107	,097
	Attractive	,138	-,001	,013	-,179	,140	,202*	,216*	-,086	,132	,253*
	Entertaining	,089	,033	-,041	-,037	,225*	,072	,152	-,032	,029	,372**
	Secure	,106	,146	,144	,040	,137	,226*	,234*	-,014	,193	,172
	Liking	,042	-,002	,146	-,020	,005	,266**	,116	-,125	,143	,429**
KULE	Spacious	,178	,166	,056	,110	,234*	,247*	,060	-,088	-,024	,316**
	Attractive	,286**	,149	,161	-,045	,071	,169	,034	,065	,116	,250*
	Entertaining	,111	,160	,008	-,012	,161	,198*	,053	,101	,130	,212*
	Secure	,157	,226*	,189	,181	,198*	,579**	,129	-,012	,094	,370**
	Liking	,298**	,274**	,228*	,168	,329**	,296**	,176	,094	,173	,497**
FORUM	Spacious	,218*	-,016	,215*	-,066	,420**	,251*	,019	,250*	,240*	,269**
	Attractive	,110	,113	,284**	,088	,345**	,184	,308**	,293**	,254*	,243*
	Entertaining	,142	,221*	,388**	,285**	,248*	,245*	,375**	,386**	,392**	,230*
	Secure	,160	,070	,394**	,150	,329**	,312**	,233*	,278**	,228*	,259**
	Liking	,213*	,186	,299**	,234*	,427**	,347**	,266**	,379**	,417**	,470**

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

The common perceptions of the three shopping centres were determined using one-way ANOVA, which showed that the users perceived the places differently in terms of entertainment (F=35.311), spaciousness (F=32.330), attractiveness (F=36.998) and liking (F=22.764). This variation was investigated using Tukey's test (Table 9).

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Table. 9 One-way ANOVA results for user perceptions in the three shopping centres.

Sensorial Concepts		Sum of Squares	df	Mean Square	F	p
Liking	Between Groups	222,207	2	111,103	22,764	,000
	Within Groups	1449,580	297	4,881		
	Total	1671,787	299			
Complexity	Between Groups	151,820	2	75,910	10,752	,000
	Within Groups	2096,750	297	7,060		
	Total	2248,570	299			
Spaciousness	Between Groups	378,000	2	189,000	32,330	,000
	Within Groups	1736,250	297	5,846		
	Total	2114,250	299			
Attractiveness	Between Groups	316,847	2	158,423	36,998	,000
	Within Groups	1271,750	297	4,282		
	Total	1588,597	299			
Entertainment	Between Groups	371,327	2	185,663	35,311	,000
	Within Groups	1561,590	297	5,258		
	Total	1932,917	299			
Security	Between Groups	203,820	2	101,910	20,110	,000
	Within Groups	1505,060	297	5,068		
	Total	1708,880	299			

Table. 10 Tukey's test results for user perceptions of the three shopping centres.

Multiple Comparisons Tukey HSD

Dependent Variable		F	p
Liking Bedesten	Kule	22,764	,013*
	Forum		,000*
Kule	Bedesten		,013*
	Forum		,000*
Forum	Bedesten		,000*
	Kule		,000*
Spaciousness Bedesten	Kule	32,330	,024*
	Forum		,000*
Kule	Bedesten		,024*
	Forum		,000*
Forum	Bedesten		,000*
	Kule		,000*
Attractiveness Bedesten	Kule	36,998	,997
	Forum		,000*
Kule	Bedesten		,997
	Forum		,000*
Forum	Bedesten		,000*
	Kule		,000*
Entertainment Bedesten	Kule	35,311	,233
	Forum		,000*
Kule	Bedesten		,233
	Forum		,000*
Forum	Bedesten		,000*
	Kule		,000*
Security Bedesten	Kule	20,110	,000*
	Forum		,000*
Kule	Bedesten		,000*
	Forum		,554
Forum	Bedesten		,000*
	Kule		,554

		N	Subset for alpha = 0.05		
			1	2	3
Liking	Kule	100	6,03		
	Bedesten	100		6,92	
	Forum	100			8,13
	Sig.		1,000	1,000	1,000
Spaciousness	Kule	100	5,95		
	Bedesten	100		6,85	
	Forum	100			8,65
	Sig.		1,000	1,000	1,000

		N	Subset for alpha = 0.05	
			1	2
Attractiveness	Bedesten	100	6,06	
	Kule	100	6,08	
	Forum	100		8,25
	Sig.		,997	1,000
Entertainment	Bedesten	100	5,78	
	Kule	100	6,31	
	Forum	100		8,36
	Sig.		,233	1,000
Security	Bedesten	100	6,33	
	Kule	100		7,89
	Forum	100		8,22
	Sig.		1,000	,554

* The mean difference is significant at the 0.05 level.

Tukey's test found that the parameters of liking and spaciousness were significantly different for the three shopping centres. In other words, the users distinctly experienced the places' liking and spaciousness. The highest levels of these parameters were obtained for Forum Bornova, Bedesten and Kule Site, respectively. This order is consistent with the participants' spatial configuration preferences on semi-open, open and enclosed shopping centres, respectively and verifies the reliability of the test. Kule Site and Bedesten were in the same category for the attractiveness and entertainment parameters. Forum Bornova got the highest score, which shows that the users found Forum Bornova most attractive and entertaining. There was no significant difference between the results of Kule Site and Bedesten. The security

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levels of Forum Bornova and Kule Site were quite close, but the participants considered Bedesten to be the least secure place (Table 10). Forum Bornova not only got the highest score for the security parameter, but also was the most attractive, entertaining, and liking shopping centre among those investigated.

CONCLUSION

Baudrillard (1997) regards current spaces for consumption as acclimatized and monolithic environments, where depletion covers all life, all activities are connected as a chain in the same form, and time management and rewarding psychology are satisfied. Controlling and increasing consumption levels in these spaces opened the way for new architectural design with unique spatial and perceptual regulations. These new spaces prioritize consumption instead of shopping itself. Planned and predicted consumption goals are integrated with capital flows using spatial configurations, which generates a new type of building, the shopping centre, which is the concrete spatial outcome of changing consumer culture with design criteria defined by the consumption parameters.

Early shopping centres were public spaces, strongly related to cities by open-air arrangements. They turned into enclosed, isolated, and separated spaces over time. The transformation after 1956 used the ideal shopping schema developed by Gruen, which has continued until today, the layout of a typical contemporary shopping centre. This schema is quite different from the historical layout with regard to meaning and quality, although there are similarities in terms of spatial configurations. Enclosed, isolated, acclimatized, and introverted shopping centres were highly favoured by users for about 50 years. The loss of interest in these spaces over time led to the generation of alternative designs and concepts. Traditional shopping districts organically shaped by needs of users were replaced by planned shopping centres first, but loss of interest in them led to the creation of semi-open shopping centres that integrate modern functions and traditional spatial configurations.

In this study, three different configurations were compared in the context of user perception; traditional/open, contemporary/enclosed, and modern (that emulate the traditional elements)/semi-open shopping space. The first sample area was Konya Historical Bedesten Bazaar intertwined with the city, which had an open-air space setup and a traditional cultural value. The second sample was İzmir Forum Bornova Shopping Centre designed as semi-open and inspired by traditional elements with the sense of a modern and global shopping centre. As the last sample, enclosed Konya Kule Site Shopping Centre, designed with the sense of a global capitalist building, and located in city centre but isolated from the city, was chosen. Most of the users said that they prefer semi-open shopping centres, and the fewest of them preferred enclosed shopping centres. This shows that current users have lost their interest in enclosed shopping centres and began to seek alternatives, one of which

is safe and spacious contemporary shopping centres with traditional spatial configurations like Forum Bornova. Traditional bazaars are insufficient to meet the needs of current users, and enclosed shopping centres are losing their attractiveness due to their excessive homogeneity and people's longing for urban spaces (Uzun, 2008). New space designs have started to be seen in shopping centres through analogy with historical bazaars and buildings, transferring urban landscape elements (such as streets, squares and open spaces), diversifying uses, and renewing the image and definition (choosing the term, lifestyle centre, instead of the term, shopping mall, which has a quite negative connotation in current perception) (Kılıç and Aydoğan, 2006). This led to a kind of shopping centre that realistically reflects urban space, looks like traditional shopping districts, and faces the outer world instead of being introverted. These new outdoor shopping centres have approximately 50,000 m² of floor area with open air shops, social and cultural activities, and they look like small-scale, nostalgic cities (Gose, 2004). The results obtained from the Forum Bornova sample area, which is suitable for this new typology, support these discourses. Thus, open-air shopping centres, designed with a synthesis by eliminating the deficiencies of the earlier two configurations, appear as a novel approach that responds to the desires and needs of today's consumers. In this study, it was demonstrated that the landscape impact elements that most affect the liking of the users were **green area** and **water**. The users preferred the natural elements in open-air arrangements of Forum Bornova over the artificial elements of Kule Site. Spaces with natural elements made people feel as if they were in a real city centre and increased their interest and attraction towards the place. Southworth (2005) regarded the integration of streets in enclosed, box-like shopping centres as a healing process with the help of urban design elements and tools. He also said that design of a well-functioning shopping centre should consider users' desire to experience cities and the real streets. Thus, the layout of shops, elements (clock tower, streetlight, façade components, etc.), green areas and water as a design item should remind people of streets and make them feel like they are in an urban environment.

According to Harvey (1989), the reason for the association of ideas is the effort to respond to the impetus of postmodernism's nostalgia. Individuals of the postmodern age yearn for the past and the traditional substances. Individuals who yearn for history are interested in recreated history and revitalization of it today. He states that compression and integration of time and space are lived in these spaces. In these new consumption spaces shaped by global capital power, the context and boundaries have disappeared, the sense of belonging has been destroyed, and global medium that built a new world have emerged. Locality, that has been transformed a concept that serves economic expectations as a consumption tool, was hereinafter created with simulations in these new consumption spaces (Süer and Sayar, 2002). This pursuit for locality moves away shopping centres from the case of non- place as defined by

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Auge (1995). The users connect with the space through the historical images in the memory of them. Thus, the placelessness is broken, the place turns into space and gains an identity. In also semi-open shopping centres, it is observed that cultural codes and spatial experience in the subconscious of society, nostalgia and the search for identity have led to the development of semi- open shopping centres as a new typology in Turkey. The influence of the bazaar culture in the development process of shopping spaces has led to the formation of a shopping centre typology of Turkey's own. The historical images of the traditional bazaar and the city such as squares, courtyards, inns, rows of shops, streets with arcades are simulated and gained its own identity. When the development process of semi- open shopping spaces in Turkey is investigated, it is observed that the history and culture are essential factors.

This study found that the relation of current shopping centres with the city does not have a significant effect on the transportation modes people use to get to them but additional functions such as cinema did have a large effect on choice of shopping centre. As a result of changing needs and preferences, the youngest participants unexpectedly began to choose traditional shopping centres instead of contemporary centres as shown in this survey. Open-air shopping centres should have strong design layouts that allow users to walk around comfortably in open spaces even when the weather is not suitable and should make people choose them as places to gather in public spaces, even if they are not shopping (Field, 2006). Designers argue that contemporary users desire for main street configurations in shopping centres, and that they should be designed like stages for memories (Brookman, 2004). This study found that the shopping centres' most attractive elements are squares and atriums for the participants. Another study also found that the most significant spaces in defining the profile of a shopping centre are atriums, corridors and open food courts (Kusumowidagdo, et al., 2015). These findings show that users prefer to experience urban open spaces in shopping centres and like to gather and meet in them.

Analyses have shown that users visit shopping centres for similar reasons such as shopping, visiting shops, passing time and so forth. This explains why brand range and convenience of access are among the main parameters for shopping centre selection. Similar findings were obtained for the three shopping centres in this study, where the users' order of preference was Forum Bornova, Bedesten Bazaar and Kule Site Shopping Centre, respectively. This difference was caused by the participants' perceptions. Spaciousness and liking were similar, which shows that the openness of spaces reinforces the feelings of spaciousness and liking. Forum Bornova was also selected as the most attractive and entertaining centre thanks to its semi-open arrangement.

The results of this study draw attention to the issue of user perception that real estate developers and shopping centre designers should focus on. Looking to the future, it seems likely that the need for space to perform the shopping will substantially disappear. The online shopping

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habit is rapidly spreading with the accelerated increase of technology and digitalization, the expanding of smart devices and internet penetration, the development of the logistics sector and especially the outbreak of the pandemic nowadays. It is almost impossible to imagine the generation Z and especially the generation alpha, the consumer of the future, independent of technology. At this point, designers need to solve a problem for new shopping spaces. If people do not need to go to the shopping spaces to shop in future, why will they go? Here, of course, lots of work will fall on sectoral developers. The shopping activity can be physically sustained through methods such as experience-oriented merchandising, technology-supported shopping, omni-channel shopping, hybrid stores, advertising managed by algorithms. However, the shopping space will need to be changed and developed, too. Although human who wants to touch, experience and socialize is an ever-evolving entity, his/her needs and desires are basically the same. The designer should focus on the user 'human', the most important invariable, following all these changes. For example, what they really should focus on is why the user prefers traditional forms such as courtyards and squares. Regardless of the form, material, and equipment of the space, human perception tends towards to be directed the desired structure, which is coded in the subconscious. From this point of view, this study aimed to study the human perception. This study is essential due to forming a basis for determining the likely design criteria for future shopping centres, creating spatial configurations and fictions according to user requirements, and future theoretical studies related to this.

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Prospective Aspect of Topography: The Example of the Grand Bazaar (Kapalı Çarşı) in Istanbul

Emre Demirel *
Soufi Moazemi Goudarzi **

Abstract

The Grand Bazaar was constructed, there have been significant changes in shopping practices. Particularly the spread of Global trade boosted the opening of new shopping centres, high-street department stores and shopping malls. Despite all these changes in shopping habits, the Grand Bazaar still continues to be an actively used shopping area; it has never lost its customer interest and its socially vivid atmosphere. This research explores the reasons why the Grand Bazaar has not been lost its social dynamism over the course of time? This question has various answers, but this research argues that one of them is particularly related to its peculiar spatial formation that encourages social interactions. In this account; this research methodologically focuses on two main components, these are: how the Grand Bazaar was spatially constructed and how it was experienced by users. These purposes will be accomplished by the analyses of the writings and drawings of the important Western travellers. It is revealed that articulated in topographical account, the Grand Bazaar eliminates the boundaries between the spaces and thus between the people. This continually enhances the mutual relationships between inside and outside. This study focuses on the main interest of the topographic approach which is not much the representative qualities; re-expression of the exterior appearance of the building in shape and profile or any stylistic display, but it is more to create an open venue or a stage which enhances the spatial and social connectivity between interior and exterior worlds, ergo between individual and collective lives. As a result, the study demonstrates how the Grand Bazaar's topographical attitude lends a 'formative' aspect to an architectural context. The Grand Bazaar tries to abolish borders by emphasizing topographical aspects such as permeability, spatiality, and delay in order to create an in-between environment, and also a common social ground.

INTRODUCTION

Words and gestures beckon the visitor on all sides. The Greek merchants call out loudly and gesture imperiously. The Armenian, quite as cunning, but humble in manner, solicits you obsequiously; the Jew whispers his offers in your ear; the silent Turk, seated cross-ledged on a cushion at the entrance to his shop, just catches your eye. A dozen voices call you: "Monsieur! Captain! Caballero!... At every turn, you glimpse arches and pillars stretching away through every side door, long corridors, narrow alleys... everywhere there are shops, merchandise piled up or hanging from wall and ceiling... there are a hundred little bazaars contained in one great one, and opening one into the other...each bazaar at the same time a museum, a passageway, a market and a theatre, where you may look at everything without buying anything, drink coffee, enjoy the coolness, chatter away in ten languages...(Amicis,1877, p:53).

In the quotation above the Italian traveller Edmondo De Amicis (1846 – 1908) addresses to the very vivid and colourful atmosphere of the Grand Bazaar in İstanbul which reflects the Ottoman's multicultural social life. In that sense Amicis emphasizes how this historic site architecturally persuades the social interactions between the people from different cultures, societies and religions. For him the Grand Bazaar in İstanbul was shaped like an open stage that invites the gathering of the members of different ethnic and religious groups.

As Amicis noted, the Grand Bazaar is not a single block or a self-isolated building; it is spread across the land with its small streets, passages and alleys. It has grown organically as new streets or spaces are added to the existing one (Amicis,1877, p:53). This led the Grand Bazaar to expand horizontally on the ground and to have a land-following character. Overall the whole complex comes out like a huge urban structure with its ground-like form which incorporates the form of the terrain on which it was constructed. Built in this manner, each space in the Grand Bazaar unveils itself as an extension of the previous one. Spatial Integration and connectivity became main principles that directed the formation of the Grand Bazaar (Cezar, 1983). Hence, the boundaries between the spaces are blurred. The Grand Bazaar does not attempt to put strong boundaries and divisions; instead, it makes the spaces open to mutual dialectics. In this regard Amicis draws attention to the reciprocal relations between the spaces, streets and alleys which in turn leads to establishment of the mutual relations between the people and the communities (Amicis,1877, p:53). As he noted even the absence of shop front (or vitrine) in front of the shops eases the communication between the seller, customer and neighbouring merchants.

Since Amicis made all these observations in the 19th century, there have been significant changes in shopping practices and places in İstanbul. Particularly the spread of Global trade boosted the opening of new shopping centres, high-street department stores and shopping malls (Durakbaşa & Cindoğlu, 2002; Işın, 2008; Pamuk, 2006). Despite all these changes, the Grand Bazaar sustains its existence as a social and

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commercial venue which continuously persuades social interactions, meetings, gatherings and communications. As Amicis underlined, the Grand Bazaar carries potential for the construction of new social relations (Amicis,1877, p:53). In order to understand how the Grand Bazaar continues its existence as an active social and commercial venue in the present time, it would be useful to have a look at its organization process.

ORGANIZATION OF THE GRAND BAZAAR

According to the Turkish historian Mustafa Cezar, the construction process of the traditional Turkish bazaars starts with the construction of the bedestans. All these spaces - mainly in a rectangular form - come out like an open courtyard or a venue and four doors are located opposite to each wall. Having access from four sides – they symbolize a central meeting point. After bedestan are constructed, they are connected to each other through their four doors and then the streets, passages and small alleys cluster around these central spaces (Cezar, 1983).

Linguistically, in the Turkish language the term used for shopping place, 'çarşı', originates from the Persian word, 'çihar/çar', which means 'four'. Although this term has a Persian origin, in Persian language there is no term as 'çarşı' to address to bazaar or bazaar-like trading places (Bazaar means Çarşı' in Turkish based on 'Çar' (چهار) and 'Su' (سو) in Persian.). 'Çarşı' was made up by Turkish people by using the Persian words 'Çar' (چهار) and 'Su' (سو) to explain the Turkish type bazaars (Cezar, 1983). When we look at the meaning of these two words, we can see that 'Çar' comes to meaning as 'four' and 'Su' signifies 'side'. Hence the word 'çar-su' or 'çarşı' simply means 'four sides'. Mustafa Cezar (1983) noted that the term 'çarşı' suggests the central open spaces in the Turkish bazaars which are also named 'bedesten' (bedestan). Hence the term 'çarşı' - which emphasizes 'four' or 'four sides' - addresses the four main doors which open to a central meeting point in 'bedesten' (bedestan) (Cezar, 1983) (figure 1).

Figure 1. Bedestans (central meeting points) covered by the grey domes (Url-1)

As the renowned Ottoman traveller Evliya Çelebi (1611-1682) noted in his book Seyahatnâme (book of travels) before the Grand Bazaar in İstanbul takes its complex form, initially İç Bedesten or Cevahir Bedesten

(also named as Old Bedestan) was built by the order of Mehmet II (Mehmet the Conquer) in 1453 (857 according to the Islamic calendar) (Çelebi, 2003). This building has four main doors and each were given different names according to the business group that it represents; the one on the north called Sahaflar Kapısı (the door of booksellers), the other door opens to the west called Takyeciler Kapısı (the door of hat sellers), the next one on the south named Gazazlar Kapısı and the last one opens to the East called Kuyumcular Kapısı (the door of Jewelers) (Çelebi, 2003). All these names show that the four doors made a pathway for the meeting of the different sellers and craftsmen, at the same time they serve as a basis or guide that governs the development of the all complex (Edgü, Ünlü, Şalgamcıoğlu, Mansouri, 2012). Çelebi noted that in later times another bedestan - which was called Yeni Bedesten (New Bedestan) - was built 100 steps away from the old one. Later on these two bedestans were connected to each other and they were circled by the streets, passages and alleys which intersected each other at certain points (Lewis, 1971). Eventually, the whole bazaar complex was intertwined by these small meeting points surrounded around the bedestan.

Arriving at one small meeting point evokes curiosity and the desire to reach the next one and then another journey starts towards the following destinations. The linkage of meeting points through organically winded narrow streets and alleys forms the Grand Bazaar (Gülersoy, 1980). This configuration was the natural result of a bodily movement from one meeting point to another, which encourages the Grand Bazaar to expand in a horizontal direction and take a land-like form (figure 2, 3).
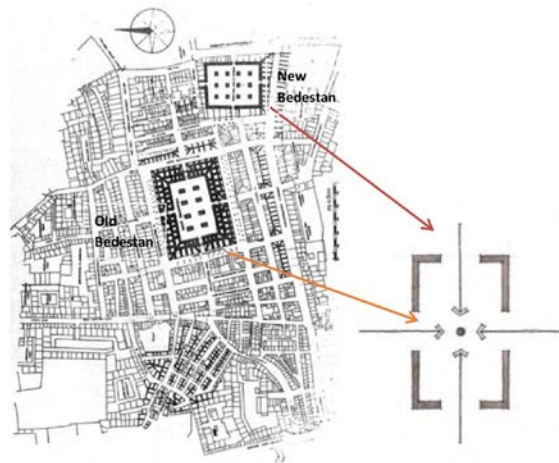
Figure 2. Bedestan and intersection of four directions (Author's drawing based on drawing by Mustafa Cezar in Cezar, M., 1983).

Figure 3. The small meeting points clustered around these bedestans and spread accross the site (Cezar, M., 1983).

There are smaller commercial units in the Grand Bazaar which is called in Turkish language 'dükkân' (shops/stores). All these units are lined side by side along the street or in some cases the alley or the passageway. They are like tiny vaulted spaces without any vitrine or façade. The original meaning of 'dükkân' is based on the term 'dagana', which was first encountered in Sumerian language. 'Dagana' does not indicate any architectural structure but a table, a platform or any raised flat top object. Although in some resources 'dagana' is associated with a kind of bench to sit on, most commonly its function was related to commercial purposes, devised for exhibiting products on sale (Botterweck, Ringgren and Fabry, 1995). The surroundings of the 'dagana', a table-like platform was completely open. Neither the platform itself nor the products exhibited on it were covered. Even the platform itself was not located inside an enclosed architectural space; this way, 'dagana' allowed a person to come closer to this selling platform freely and inspect the exhibited item that was intended to be sold (Davies and Faulkner, 1947). Encountering no physical boundary between the selling platform and the customer enabled a person to feel whatever was exhibited from a distance which was close enough to touch; she/he was encouraged to touch, smell, grasp, taste and move around the product. 'Dagana' in that sense offers direct social and tactile contact; openly exhibited items / goods also encourage the customer to have direct social inter-personal contact with the shop-owner and other customers as well.

It can be said that the Grand Bazaar continued this Sumerian 'dagana' concept and there is a tendency not to change this way of exhibiting the products (Wortley, 2001; Pardoe,1856; Cezar 1983). Accordingly, almost the all current 'dükkâns' (shops/stores) in Turkish bazaars have no front window or vitrine separating inside from outside (there are very small number of shops which have shop fronts). Even in many cases the selling stands are set up in front of those small shop units. This permeability between inside and outside spaces in 'dükkâns' (shops/stores) reminds Le Corbusier's term 'breathing' which he used to describe the Turkish

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architecture during his journey to the east in 1911 (Corbusier, 1991; Corbusier, 2007). What Le Corbusier implies with this term is the reciprocity and connectivity of each space. Eliminating the boundaries between 'dükkân' and the street allows these two spaces to be interlaced each other and doing so enhances the possibility of direct social engagements. This gives the idea that the primary concern of 'dükkân' is not much the outer appearance of the shop's façade but the social interaction between outside and inside communities – between the shop owner and the customer, and the other neighbouring sellers as well (figure 4, 5).

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All these details regarding the organization of the Grand Bazaar show that it was constructed on the spatial and social connectivity. Creating a common ground for the people became a main emphasis in the formation of the Grand Bazaar. In this regard, it responds to the David Leatherbarrow's concept of topography. Thus, in order to formalize some principles, we will take the Leatherbarrow's ideas as a main reference.

CONCEPT OF TOPOGRAPHY

As Leatherbarrow (2004) pointed out in his book Topographical Stories as well as in his other works such as The Roots of Architectural Inventions and Uncommon Ground the relationship between a building and its surrounding site still remains as an important issue both in architectural theory and practice (Rykwert, 1982; Frampton, 1995). He claims that there are two approaches about this subject matter which also effects the way of conceptualizing architecture. Accordingly, while one approach considers the building design to be separated from its landscape and the subject of different discipline, the other idea proposes that these two are not distinct, but are complementary of each other. For Leatherbarrow

(2004) this first approach gives more account to the building form and the pictorial aspect of the buildings facades, however the second reminds that architecture is not only a three dimensional entity with its external walls or physical boundaries but at the same time a territorial issue.

According to this idea any space on earth has a floor or a ground layer which comes out as the part of its surrounding land. Therefore, 'the task of landscape architecture and architecture, as topographical arts, is to provide the prosaic patterns of our lives with durable dimension and beautiful expression.' In that regard, Leatherbarrow draws attention to the territorial or topographical aspect of architecture. He underlines that building has a ground-like organization or in other words, a landscape that carries all bodily and social occupations; performances of everyday life (Leatherbarrow, 2002). He noted that 'the nature and task of designing buildings and cities, [...] is territorial, environmental and topographical, [...], not only architectural' (Leatherbarrow, 2011). This Leatherbarrow's statement is quite parallel to the one that made by Kenneth Frampton; 'situated at the interface of culture and nature, building is as much about the ground as it is about built form' (Frampton, 1995).

As Leatherbarrow explained the term topography refers to the physical aspect of land, the graphic expression of the shape of the ground. In many cases we encounter it as a numerical reading of contour lines which gives us an idea about the changing altitude of the land. However, for Leatherbarrow topography goes beyond this physical definition, it associates with terrain or ground (it could be a ground of an architectural space) upon which we bodily move and act. Therefore, topography also addresses to footprints, enactments, performances, lived experiences and associations – in short, temporal unfolding of human events that all take place on the surface of the land, earth, stage or floor. The human subjectivity staged by the ground is the topic of topography. Thus, in a topographical sense, the main concern of architecture is not much the boundaries of a building or its physical form, but more primarily to articulate a terrain which provides a setting for ongoing pattern of life. As Leatherbarrow exemplified; 'in drama, the action not the actor is primary; similarly, in architecture the situation (such as greeting, gathering, or resting), not the object (a motif, shape, or element), is the radical basis of human significance.' So topography draws attentions to the social and emotional occupations of human body and suggests all these references as a main orientation for the formation of our environment.

Topography also evokes a way of conceptualizing architecture or a manner which addresses to a land-like articulation. For this point, some qualities such as permeability, spatiality and latency that need to be considered for topographical expressions.

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Permeability:

In terms of permeability Leatherbarrow (2002) addresses to eliminating any separation between inside and outside by opening the walls of the building and thus, allowing one space to overlap into the other, bringing out the openness. The building has boundaries, external walls and frontal facades that conventionally define its limits and separate it from its landscape. However, eliminating these boundaries allow the landscape to interlace with the building ground. Integration of exterior and interior spaces in that way provides a topographical continuum. In that sense eliminating boundaries means eliminating the frontal exposure of the building, making it less frontal and more territorial and thereby more topographical (Leatherbarrow, 2002). For Leatherbarrow the building in such manner comes into being not in the sense of limitation or demarcation, exposing frontal walls which rigidly separate inside and outside spaces, but, in the sense of extension or continuation of a land from outside to inside and inside to outside (Harries, 2000; Leatherbarrow, 2004). He underlines that when more emphasis is given to the boundaries of the building, the attention is drawn more to the object-like (physical and representative) presence of this architectural setting (Leatherbarrow, 2004).

Amicis' observation about permeability was quite similar to the one by Montagu. Montagu first explains the interior organization of the Grand Bazaar, she talks about inter-connected alleys and mentioned that most of the shops are handsome squares and are admirably well provided (Wortley, 2015).' Accordingly, the 'dükkân' (shop/store) in the Grand Bazaar attracts direct involvement. Having no boundary (between inside and outside) it introduces itself as an open stage where you can possibly meet your friend, talk with other people, have your drink and watch others' performance while more freely engaging with the goods (figure 6-7). Hence the 'dükkân' (shop/store) comes into being in the sense of an open platform and in this case, the openness enhances the possibility of inter-personal contact.

Figure 6. Cesare Biseo, shoe shop in the Grand Bazaar, 1877 (Amicis, ED.,1877)

Figure 7. the 'dükkâns' (Shop/stores) in the Grand Bazaar in İstanbul (Url-4)

Topography on the other hand is not in favour of 'frontalism' (Leatherbarrow, 2004). Therefore, the main interest of the topographic approach is not much the representative qualities; re-expression of the outer appearance of the building in shape and profile, but it is more to create an open venue or a stage which enhances the spatial and social connectivity between interior and exterior worlds, ergo between individual and collective lives. Constructing society and culture through constructing relations is the key point of topographic articulation. For this purpose, Leatherbarrow suggests topography as an alternative to the approach that tends to favour frontality and pictorialism (Leatherbarrow, 2011).

Spatiality:

Spatiality is the other point that we need to consider for topographical articulations. As Leatherbarrow noted, topography has a continuous character; geographically ground extends from one place to another and this extension gives it a continuous form that leads ways, routes or paths for connecting different locations, habitations and destinations (Leatherbarrow, 2002). In other words, topography offers a journey or an expedition that takes us from one space to another, it acts like a bond that enables transition between different realms. Having continual aspect, topography suggests connectivity, an interconnection of spaces. Looking from a topographical point of view, space is not a self-contained, individual entity which encloses itself against its surrounding premises; it rather acts as a reference for the formation of the next one. Hence, one space comes into being as an extension of another.

The strong linkage between the spaces also encourages bodily movement; one space dissolving to the next one, paves the way for the progression of the sentient body in depth. Topography constructs spatial continuity which underlines spatiality and movement in the space (Leatherbarrow, 2004). It attributes that space is not only a three-dimensional geometric figure, therefore, it is not only pictorial but also territorial and situational: We move throughout the space(s) and doing that we experience the spatial and environmental changes. Changing our position from one location to another, we encounter different spatial qualities such as low and high, dark and bright, warm and cool etc. Each of these qualities evokes sentimental stimulus (Leatherbarrow, 2004). As a result of that, space becomes constructed mentally as the collection of all these experiences in a duration of time. Such approach suggests

approaching space from a corporeal aspect; it offers a mode of spatial perception which is gained by movement, touch, and other active bodily involvements (O'Neill, 2001). In that sense, space is not only meant to be seen but also meant to be experienced through a body in movement.

Latency:

Topographic articulations are horizontally extended structures; they continually direct themselves towards the back and thus tend to recede into a condition of latency (Leatherbarrow, 2002). As Rudolf Arnheim explained, when the objects take upright position, they gain more frontal character, they repose their frontal face and become more discernible with their facades or external surfaces (Arnheim, 1977). However, when they lie down, they eliminate their frontal exposure and become less frontal and more territorial. In the case of taking ground-like horizontal position the objects are directed towards a destination at the back. In other words, their frontal face is drawn towards the back and this withdrawal creates a land-like empty space in their front. The objects in this position do not characterize themselves as a frontal barrier but as a plane, a passage or a pathway that evokes a desire to arrive to a destination at the back.

Leatherbarrow (2004) likens this situation to a natural phenomenon: As we proceed horizontally on the ground we approach to the horizon but whenever we approach, it goes farther ahead and keeps itself remote like an unreachable target. As the horizon moves back, it gives us a piece of ground which continually drives us to move towards this final destination. Leatherbarrow underlines that in topographic articulations, the frontal façade is always withdrawn or hidden at the back. Latency is more important than any frontal exposure. Considering the main concern of topography is not picture-like display of representational shapes, styles and motifs, it is rather to create ground-like spaces, open platforms that invite bodily movements and occupations (Leatherbarrow, 2004).

TOPOGRAPHY IN GRAND BAZAAR

Permeability, Spatiality and Latency are highlighted by Leatherbarrow as the qualities that bring us a ground for understanding the topographic (land-following) manner in architecture. All these qualities respond to the western traveller's observations, writings and paintings about the Grand Bazaar, it is possible to encounter the similar aspects as noted in their recordings regarding this long-standing historic structure. In that account this chapter will analyse the memories of Lady Mary Wortley Montagu (1689-1762), Julia Sophie Pardoe (1806 – 1862) and Edmondo De Amicis (1846 – 1908) - who are well-known in the western literature with their observations about the Ottoman city life and the engravings made by the British artist William Henry Bartlett (1809 – 1854) – who created the illustrations of the Pardoe's Book the Beauties of the Bosphorus.

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Experiencing Permeability in the Grand Bazaar

Lady Montagu stayed in İstanbul 1717-18 as the wife of Edward Worthley, British Ambassador to the Ottoman Porte. She was the first English woman to write about her travels in Ottoman Lands, she recorded her observations in her letters which had been collected and published later on under the title The Turkish Embassy Letters (originally published in 1763). Montagu's letters became inspiration for the other English writer, Julia Sophie Pardoe who stayed in İstanbul from 1836 to 1837, as the daughter of a British Army Officer Major Thomas Pardoe. Like Lady Montagu, Pardoe collected all her travel notes, observations and memories and published them in her book The Beauties of the Bosphorus in 1838.

Montagu mentioned the Grand Bazaar in her letter numbered 42 as follows: 'The exchanges are noble buildings, full of fine alleys, the greatest part supported with pillars […]. Every trade has their distinct alley […] and people walk here as much for diversion as business (Wortley, 2015).' Montagu reveals the Grand Bazaar's organization, long pathways and then 'the greatest part supported with pillars' which is 'bedesten', and after addresses to the diversity of people walking and gathering in the Grand Bazaar. This is not so different from Pardoe's observations; however, Pardoe gives more detailed information about her experience in the Grand Bazaar:

The interest of Tcharchi exists in its great extent, its peculiar arrangement, and the picturesque effects constantly produced by the shifting groups who people it, and whose diversity of costume, countenance, and national character, tends to arouse the admiration and curiosity of every visitor (Pardoe, 1856).

Pardoe underlines the two important parts of the Grand Bazaar; one is the spatial arrangement of the building and the other is the dynamic social atmosphere produced by the crowd of people constantly moving from one place to another. At first glance, the text gives the impression that it is the peculiar arrangement of the building that facilitates the gathering of different ethnic people – whose diversity reflects upon their gestures. Pardoe continues her description as follows:

It must not be imagined that the bazaars of the East are vast apartments filled with rows of trim counters, over strewn with toys and trinkets, and all the gaud and glitter which are the charm of such lounging-places in London. There is no prettiness in the great commercial mart of the Moslems; their Tcharchi is composed of a cluster of streets, of such extent and number as to resemble a small covered town, the roof being supported by arches of solid masonry (Pardoe, 1856).

Similar to Montagu, Pardoe implies that the Grand Bazaar is not a single block building where the all goods are stored. The spaces in the Grand Bazaar stretched like a street and all the buildings are dispersed across the surface of the land-like a small town. In a similar way Bartlett emphasizes the topographic disclosure of the Grand Bazaar. He made four very well-known engravings about this traditional building for Pardoe's

book and none of them focuses only a single 'dükkân' (shop/store) or a single part of the building. They particularly showed how the interior spaces of the Grand Bazaar were extended in a ground-like manner and how these extended spaces were infilled with the crowd of people (figure 8).

In these engravings the dark, gloomy archways (street or passage ways) are followed by the (comparatively) brighter ones and in some engravings a very bright doorway (probably the exit door) which was located at the far end. It gives the impression that after walking along the dark archway you encounter the new (brighter) one. It is like each time you approach to the end (or the exit), you are given another way to walk on. In Bartlett's engravings each space in the Grand Bazaar opens itself to the next one or a new world. In addition, the brighter space following the darker one draws attention to the back. What we understood from Bartlett's engravings is that the Grand Bazaar tends to present itself as a backdrop setting; it withdraws itself into a condition of latency.

In one part of the text Pardoe (1856) notes that '[...] all the gaud and glitter which are the charm of such lounging places in London. There is no prettiness in the great commercial mart of the Moslems; their Tcharchi is composed of a cluster of streets [...].' For Pardoe the Grand Bazaar does not introduce itself in a visual attraction; there is not much gaud and glitter that pleases the eyes. In a similar way Bartlett depicted the interiors of the Grand Bazaar as a dark, gloomy atmosphere. Although the details were precisely elaborated, in major parts of the paintings they were obscured in shade and shadow; it gives the impression that the Grand Bazaar is embedded in a mysterious ambiance.

It seems Bartlett gives account of the emotional state created by the dim environment. In his engravings the Grand Bazaar tempts to hide its object-like physical presence and offers itself more in an emotional mode. In addition, he draws attention to the darker spaces counterpointed by the (comparatively) brighter one. The sequence of these opposite spatial qualities (having brighter space just after the darker one, and vice versa) creates a transitional effect between the spaces. Each passage introduces

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itself as a threshold that paves a way to the next one, constructed in an opposite spatial quality (figure 9).
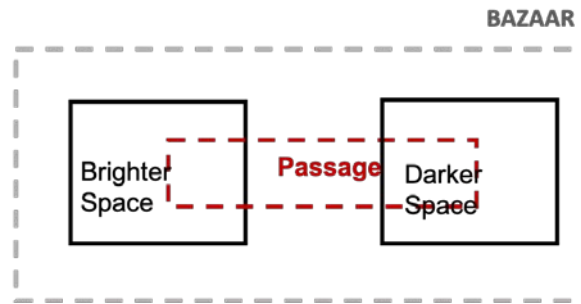
Arriving from narrow and dark passages into open and light places gives the visitor a sensation of spaciousness. The numerous roles and sections of the covered bazaar (which can also be the entrance areas of other venues such as squares, mosques, or courtyards) are represented by these crossing points.

Experiencing Spatiality in the Grand Bazaar

The other fact depicted in the drawings is the moving people which were displayed along with these changing spatial and emotional qualities. It is as if Bartlett tried to show how the transitional effect and the changing spatial mood (from darker to brighter space, and vice versa) promote the movement of people. It can be seen in his paintings that changing spatial mood creates a rhythmic order that narrates the topographic structure of the Grand Bazaar. This at the same time converts such a cumbersome structure into a socially active place. Looking from Bartlett's point of view we can see Pardoe's words: 'There is no prettiness in the great commercial mart of the Moslems; their Tcharchi is composed of a cluster of streets […]' (Pardoe, 1856) - which draws attention to the topographic account of the Grand Bazaar that prioritizes the experiential and social qualities of the space. In the following part of the text Pardoe underlined how densely the Grand Bazaar was populated:

A narrow gallery, slightly fenced by a wooden rail, occasionally connects these arches: and it is extraordinarily to look down from one of them upon the changeful and motley crowd below; nor is it, perhaps, less singular to the stranger, when he has gained this giddy elevation, to find himself surrounded by numbers of doves, whom his vicinity fails to disturb, and who appear to be so habituated to human contact and human turmoil, and to have suffered both so long with impunity, as to have become regardless alike of the one and the other (Pardoe, 1856).

Again it might be helpful to read Pardoe's explanations through Bartlett's engravings. As seen in his works, Bartlett's interest is focused more on the spatiality of the Grand Bazaar; he particularly showed how spatial organization in this traditional premise situated human events; greetings, gatherings, areas of resting. In these paintings there are no

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spaces parcelled out as isolated locations. Neither of them have rigid boundaries that internalize or externalize people. At almost every corner the Grand Bazaar unfolds itself as an open platform for hosting the possible social encounters. As evident in the paintings, as a result of this openness people stay and stand together, and participate in different activities. It is also possible to see the socializing people who are clustered around the openly exhibited goods in front of the 'dükkâns' (shops/stores). In short, Bartlett's engravings show how the topographic qualities permeability, spatiality and latency hold potential for re-structuring social relations (figure 10).
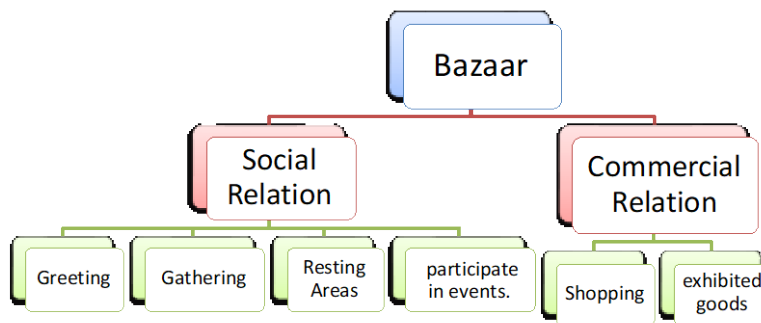
Figure. 10 The Schema of Spatial- Functional Configuration of Istanbul Bazaar (Author, 2023)

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In Bartlett's engravings the interior of the Grand Bazaar is depicted as a dark ambience, in most part its object-like presence was presented in an unclean and weary appearance. This gives this setting an aged impression. It is unavoidable that with its physical (object-like) presence the Grand Bazaar already took its place in the past as an old building. On the other hand, Bartlett created a contrasting effect against this dark, frozen and weary look of the Grand Bazaar by putting actively moving people. As if the environment of this old and tired setting was re-energized by the people in the act of moving, greeting and socializing. Even today it can be seen that the Grand Bazaar provides common and sharable ground that enables to re-structure social relations – it still delivers an equal ground for everyone, inviting gatherings and meetings. The same social density and integration can be found in the present Grand Bazaar although many things have been changed in this traditional premise since 1830. In this regard, both Pardoe's text and Bartlett engravings suggest us to re-consider the topographic structure of the Grand Bazaar, making this setting promising for the future as it continuously allows and encourages social engagement.

Edmondo De Amicis, the Italian novelist, journalist, poet and short-story writer, shared the same ideas with Montagu, Pardoe and Bartlett about the experience of the Grand Bazaar. Amicis visited İstanbul in 1874 and makes very detailed observations about the city's daily life and its architecture; important public spaces, locations and squares. Later he collected all his notes and published them in a book under the title of Costantinapoli in 1877. Later publications of this book were enriched by

the illustrations by the Italian painter Cesare Biseo (1843 – 1909) who accompanied Amicis during his travel to İstanbul and Morocco.

The Grand Bazaar was one of the places that attracted Amicis attention. In his book he so often underlines that Grand Bazaar is the heart of İstanbul as it offers a ground for the gathering of different ethnic, religious and social groups that dwelled in the city. After this notation he begins to narrate his experience of the Grand Bazaar with his arrival to the complex:

The outside of the Grand Bazaar has nothing to attract the eye, or give an idea of its contents. […] The principle entrance is an arched doorway of no particular architectural distinction; in the streets outside you hear no noise from within at all – even when you are standing just in front of the door it still seems that there's only silence and solitude within those fortress walls. But once inside you stand wildered. You find yourself not in a building, but a labyrinth of streets under vaults and flanked by carved columns and pillars; a veritable city, with its mosque, fountains, crossroads and little squares, dimly lit like a thick forest into which no ray of sunlight penetrates; and filled by a dense throng of people (Amicis, 1877).

Experiencing Latency in the Grand Bazaar

As Amicis claimed, the gates of the Grand Bazaar are not conspicuous and thus not very distinctive from the built environment. The other common point of these gates is that the entrance is provided through an arched doorway and their heights are lower than the height of the arched vault or ceiling in the inside of the building (figure 11) (Kuban, 2016; Gülersoy, 1980). To enter the building, someone passes through a (comparatively) quiet street and then is faced with an arched doorway with light grey colour due to its limestone cladded surface. After walking through this doorway with the lower ceiling, one is startled suddenly by a very high, noisy and dark interior space and thus the building itself makes people aware that they are actually inside. As Amicis noted, in the Grand Bazaar you feel your entrance by experiencing the changes in the atmosphere of the spaces while bodily moving on the ground.

Figure 11. The entrance of Grand Bazaar (Url-5).

In line with Amicis' perception, the Grand Bazaar tends to introduce itself more in a spatial and experiential way, giving it a more topographical account.

Each street is a bazaar and almost all lead out of one main street, with an arched roof of black and white stone, […] At every turn, you glimpse arches and pillars stretching away through every side door, long corridors, narrow alleys, distant and confused views of the bazaar, and everywhere there are shops, merchandise piled up or hanging from wall and ceiling, […] Each kind of merchandise has its own particular quarter, its street, its corridor and its public square. There are hundred little bazaars contained in one great one, and opening one into the other […] (Amicis, 1877) (figure 12).

Figure 12. Latency in frontal section of Istanbul Bazaar (Pardoe, J. S., 1856)

As understood from Amicis' text, each street (or passage way) – which in a way specializes in one particular merchandise – comes out as the extension of the previous one. As Amicis noted, 'At every turn, you glimpse arches and pillars […]' (Amicis, 1877). This means when you arrive to the end of one street surprisingly the next one appears. Each of these streets, arranged in a rhythmic order, prolongs the curiosity by delaying arrival to the final destination. Hence each arrival to one street evokes a desire to reach the distant one. In that sense, Amicis' experience of the Grand Bazaar is quite parallel to what Le Corbusier observed about traditional Turkish architecture during his journey to the east in 1911. In his notations, he mentioned that Turkish architecture comes into being in the account of 'back' (Corbusier, 2007). As David Leatherbarrow explained, back is less frontal. It is never a destination that comes into being as just a frontal aspect; rather it is part of journey yet to be completed. From another perspective, 'back' means emptying; drawing back the frontal façade of a building to create an open platform in the front that invites bodily movement (Leatherbarrow, 2002). In a similar way, in the Grand Bazaar one street opens to the other one and thus arrival to the final exit is delayed. This delay encourages someone to move throughout the streets. In that sense the Grand Bazaar narrates itself as a chorographical experience; it expects someone to communicate

with the space by moving from one point to the other and to have active bodily participation with the environment.

In the following parts of his writings, Amicis explains his shopping experience and the 'dükkân' (shop/store) in the Grand Bazaar as follows:

[...] and each bazaar is at the same time a museum, a passageway, a market and a theatre, where you may look at everything without buying anything, drink coffee, enjoy the coolness, chatter away in ten languages, and make eyes at the prettiest women in the Orient. [...] There are two rows of glittering shops, making the street look like a room in a palace, or like one of those gardens in Arabian tales, where the trees have golden leaves blossoms of pearl. [...] The walls are stacked with slippers; in velvet, in leather, in brocade, in satin, in the most startling colours and the oddest shapes [...] (Amicis, 1877).

Amicis resembles the passageway and the shopfronts to a theatre or an open stage where one can encounter social acts and performances. He emphasizes that these are the places that not only the products are exhibited at, but also where social interactions happen. What we understood from Amicis' notes are the products are not stored inside of the 'dükkân' (shop/store), they are taken out and hang on the outside walls – therefore they look like leaves of an arched tree branch. As mentioned before this way of arrangement provides unobstructed access to the goods on display.

The analysis of these western scholars' works reveals that the Grand Bazaar addresses to the topographic qualities of permeability, spatiality and latency. It is also portrayed that these qualities play important role in converting this old setting into a socially active location. It can be said that its unbounded character enables itself to unfold for the performance of the everyday events.

Politics of the Grand Bazaar

This topographic account can also be read from the perspective of Ottoman Economic Policy. As the Turkish historian Halil İnalcık's (1916-2016) outlined in his book titled An Economic and Social History of the Ottoman Empire 1300 – 1914, the Ottoman Empire had autocratic centralist government and a command economy: 'The Ottoman Sultans endeavoured to indicate to the masses that the sultan was their ultimate protector against all manner of local abuses and injustices' (İnalcık, 1994). Hence the purpose of this central power was to provide equilibrium in the state and the society which is necessary to maintain this multi-cultural empire, united and whole. Regarding this approach İnalcık showed the reign of Mehmed II (Mehmet the Conqueror) as an example. After taking over İstanbul, he repopulated the city with Turkish, Greek, Armenian and Jewish colonies from various parts of the state. He also invited the Greek and Armenian patriarch to take up residence in İstanbul and proclaimed himself as a protector of equality among these communities (İnalcık, 1994; Işın, 2008).

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All these ethnic people were skilled in a particular craft and were used to maintain their life as tradesmen. The idea was that giving those tradesmen and artisans equal status would gather them on a common ground, encourage them to cooperate and share their knowledge and experiences. This would pave the way for the establishment of reciprocal relations and cultural exchanges which was all necessary for reviving the economy and creating a highly skilled universal society (Işın, 2008).

Looking from this perspective, construction of the Grand Bazaar just after the conquest of İstanbul was not a coincidence. As Montagu, Pardoe and Amicis noted, bazaar was populated with the Turkish, Greek, Armenian and Jewish tradesmen and artisans. Accordingly, the Grand Bazaar was used as a device to facilitate reciprocal relations among those different ethnic and religious communities. As discussed above, the topographic structure of the Grand Bazaar unveils the boundaries, homogenizes the spaces, unifies and binds together almost everything that strives apart. From this point of view, the topographic manner in the Grand Bazaar cannot be thought independent from Ottoman social and economic policy which was set up on the purpose of creating a universal empire.

CONCLUSION

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The analysis of this study highlights that, owing to its topographic character the Grand Bazaar intends to open its doors to the members of all classes – supply the needs of everyday life of all the society at the same venue; while removing the boundaries between inside and outside it provides a more homogenous ground that does not suggest to distinguish the consumption norms and practices based on the income of upper and lower class. Along with that the Grand Bazaar exemplifies that the main concern of topographic mode is not much the aesthetic display of the commercial goods or the attractive appearance of the façade of the shops but the social connectivity which eradicates the social barriers between the societies.

The topographic manner in the Grand Bazaar fulfils the cultural desire of social connectivity; it shows the unchanging temptation to be open to all social interactions.

The Grand Bazaar underlines the topographic qualities of permeability, spatiality and latency – all of which are constructed with the notion of the reciprocity between the spaces and the people. They intend to eliminate the boundaries to give space for constituting an in-between realm, or a common world.

In this regard, the Bazaar is an important topographical example that strengthens both socio-cultural and commercial linkages, developing human relations, bringing people together, and bringing them into a partnership or dialog. At this point we can say that the Grand Bazaar consistently fulfills this need as putting reciprocity in its central focus. This permits this historic environment to sustain its existence in a fast

changing modern world while maintaining the same dynamic atmosphere.

Moreover, the Grand Bazaar shows how the topographic manner gives an architectural setting 'formative' aspect; with its external appearance, stylistic motifs, construction techniques and materials the Grand Bazaar represents to a particular period in history. However the topographic qualities – permeability, spatiality and latency – continually encourage new social engagements and dialectics through the course of time. Charged with all these qualities the Grand Bazaar remains promising for the construction of new relations in the future. This gives this old setting a 'formative' and thus a prospective (future-directed) vision. In that sense we can say that topography offers a renewable ground that takes setting beyond the representational, pictorial and historicist limitations.

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Resume

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Research Article

Evaluation of Optimal Criteria for Designing Solar Greenhouses in Cold Climate Residential Buildings (Case Study: Tabriz, Iran)

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Abstract

Since a major part of energy in cold climates is spent on heating, using alternative methods to heat buildings is of particular importance for buildings. Solar greenhouses are inactive building solutions that absorb solar energy to provide heating in the side spaces. Greenhouse efficiency depends on several factors. The research carried out so far has used these factors in the design of a solar greenhouse to reduce energy consumption, which has finally been compared with the non-applied state of this system. The purpose of this study is to investigate the physical characteristics such as "depth", "protrusion", "roof slope", and "orientation" of solar greenhouses and the influence of each factor in different modes and hours in the cold climate of Tabriz. For this purpose, a simulation has been made using "Energy Plus" software. In the next step, the optimal modes of solar greenhouse design are presented by comparing the different states of each physical factor on the first and the middle day of each month in a 6-hours period. Research results show; increasing the surface while the sun is shining and using more depth when there is no sun will maintain indoor temperature. Also, using two or three-way greenhouses (east and south) increases the efficiency of the greenhouse by 30%. The roof slope has no effect on heating the room adjacent to the greenhouse. Also, the absence of protrusions helps adjust the room temperature relative to the outside environment by up to 20 %. No significant effect on temperature was observed in calculating the ratio of greenhouse area to room area in summer. But in the cold season, a large greenhouse area greatly impacts by up to 15 %.

INTRODUCTION

In today's world of technology, due to the growing population of the world and the increasing level of welfare of societies, which in many cases leads to an increase in energy consumption, the crisis of supplying energy in a way that is consistent with sustainable development is one of the most important concerns of countries (Hashemi and Heydari, 2012). Iran's per capita energy consumption is more than 5 times that of countries like India and Pakistan and a little less than 2 times. Also, countries like Korea and Japan, whose GDP is several times higher than Iran's, have a per capita consumption of only 16 to 26% more than Iran (Parsa and Sajjady, 2019). Iran's final energy consumption per capita was 13.69, 14.15, 13.96, and 14.22 barrels of crude oil equivalent in 2008, 2009, 2010, and 2011, respectively (Vidadili et al., 2017). In 2009, due to the implementation of the subsidy targeting plan and the sudden increase in the price of energy carriers, the per capita consumption decreased to a small amount. But it has been increasing again since 2010 (Barimani and Kaabi, 2015). Since in developing countries such as Iran, more than 40% of total energy consumption belongs to the construction sector, with the advent of various technologies (IEA, 2020), implementation complexities have increased and decisions on choosing the best strategies and Energy consumption reduction strategies in buildings has become more important (Fathalian and Kargarsharif, 2020).

The average energy consumption in Iranian buildings per square meter is about 310 KW hours per year, which is about 120 KW hours per square meter in a similar situation in European countries. Therefore, energy consumption in Iranian buildings is about 2.5 times that of European countries (Hashemi and Heydari, 2012). Currently, in the building design department, saving energy consumption by paying attention to the placement of spaces in the plan based on matching the pattern of space occupation, choosing the shell suitable for the climate and environmental conditions, dimensions of opening and glass (single pane, double pane, etc.) and finally, appropriate methods are used to replace renewable energies instead of non-renewable energies (Abounoori and Gholizadeh Eratbeni, 2022). In the future, the building design and construction community will be faced with regulations and standards that aim to reduce energy consumption to zero in the building. Thus, in order to meet the new expectations, the need to change the design and use of the building is considered inevitable (Bakhtyari and Fayyaz, 2019). One of these types of energy that can be easily used in buildings is solar energy (Moghaddasi et al., 2016). The use of solar energy in the construction industry creates sustainability that somehow responds to the needs of the current generation without limiting the ability and facilities of future generations to meet their needs (Pourdarbani, 2020).

Achieving this definition is not an easy task and requires the explanation of policies, goals, and strategies through which sustainable designs can be realized in the future (Ghouchani et al., 2021). With 300

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sunny days in more than 2/3 of its area and an average radiation of 4.5-5.5 kilowatt hours per square meter per day and 2800 sunny hours per year, Iran is one of the most important centers of solar energy production in West Asia and in the world (Shahsavari et al., 2018). According to available reports, there are about 700 hours of sunlight in spring, 1050 hours in summer, about 830 hours in autumn, and about 500 hours in winter in Iran (Khorasanizadeh et al., 2014). Therefore, the total energy required by Iran can be provided by using only one percent of the country's area. Since Iran is the second producer and exporter of crude oil and natural gas in the Organization of the Petroleum Exporting Countries (OPEC) (Gorjian et al., 2019), less attention has been paid to renewable energies such as solar energy.

There are several passive and active systems for using solar energy in a building. Each of the solar systems has capabilities and if they are designed and used in spaces and architectural elements, they can reduce the heat load. Obviously, for the optimal use of these systems in architecture, the necessary study must be done to determine the best option (Gilani and Kari, 2011).

Passive solar systems are systems that collect and store solar energy without the use of equipment such as a pump or controller to be used at the right time (Esmaeli and Roshandel, 2020). In this way, the various components of a building simultaneously meet the expectations in the field of architecture, providing stability and safety and optimizing energy consumption in a building. These systems will be among the most efficient systems among other solar systems when energy collection, equipment reduction, and implementation costs are the main design priorities (Hassanien et al., 2016). These systems can be classified into direct receiving, indirect receiving, and separate receiving (Huang et al., 2021).

One type of separate receiving system is the solar greenhouse system. This system receives solar energy directly and absorbs and stores it in walls in order to transfer it to adjacent spaces. This system can be considered an expanded type of thermal wall (Han et al., 2021). Because the glass wall in this system is located at a greater distance than the thermal wall system. Heat transfer from the solar greenhouse to the adjacent space can be done by a common wall, through conduction, or by openings in the common wall, with convective current (Pakari and Ghani, 2019). In fact, the solar greenhouse system is a solar collector that can meet a part of the thermal needs of adjacent spaces and respond to other building functions (Hassanien et al., 2018). The proper functioning of the solar greenhouse depends on the correct design of this space. Optimal solar greenhouse design criteria can eliminate the need for complex thermal calculations by designers.

In this study, the performance of solar greenhouses in a cold climate (Tabriz city in Iran) that requires indoor heating for at least five months of the year has been investigated. In fact, this research is a scientific, analytical, and practical agenda for designing and using solar

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greenhouses specifically in the city of Tabriz and its suburbs. Therefore, this study seeks to answer the following questions:

What are the physical properties that affect the efficiency of a solar greenhouse space? How much does each of these factors affect the efficiency of a solar greenhouse?

RESEARCH BACKGROUND

In the early 1930s, solar homes became popular in the United States. The North American Indians built solar complexes in the 11th and 12th centuries (Huang et al., 2020). The city of "Aluma" is one of those examples, which has three large terraces that extend south of the building from east to west to absorb the maximum heat of the sun in winter. In Iran, the first solar building was constructed in the north of "Science and Technology University" in May 1998 to study and research in the field of energy efficiency, which has reduced the consumption of fossil fuels and environmental pollution (Mohammadpour et al., 2013).

So far, several studies have been conducted in the field of solar greenhouses, some of which are mentioned:

Motard and Fissure (2007) proposed a model for the distribution and reflection of long-wavelength radiation waves inside a connected greenhouse (assuming a uniform air temperature in the greenhouse). They compared the simulation results of their model with the results of measuring a real sample. Using their model, air temperature, greenhouse surface temperature and heat flux to the spaces adjacent to the greenhouse can be obtained. In their research, Oliotti et al. (2008) presented a simple model for evaluating the absorption of solar energy in the greenhouse, using the "Derbelt" simulation program. The most important variables studied included latitude, orientation, geometry, and visual characteristics of opaque and glass surfaces. Using their proposed model, the amount of solar energy absorbed in the greenhouse can be estimated with sufficient accuracy.

Mihalakaku et al. (2000) investigated the effect of factors such as orientation, glass material, greenhouse floor boundary conditions, and underground pipe system on its thermal performance in buildings in four European cities, using the "Transis" simulation program. The results of their research showed that the greenhouse attached to the building significantly increases the indoor temperature in the colder times of the year. But most of the time, it causes the indoor space to overheat during the hot times of the year. But most of the time, it causes the indoor space to overheat during the hot times of the year.

Of course, this phenomenon occurs when the performance of the greenhouse is the same in hot and cold times of the year and no arrangements are made for the release of hot air during the hot times of the year. Mihalakaku (2002) continued the research by examining the effect of three methods of passive cooling, including canopies, underground pipes, and night ventilation. He then offered a way to prevent the greenhouse from overheating in the summer by using the

"Transis" simulation program. The results of this study showed that using all three methods can improve the thermal behavior of the building connected to the greenhouse. But the most effective way to cool and prevent the building from overheating during the hot times of the year is to combine all three measures. Gilani et al. (2011) concluded that although the greenhouse system reduces radiation to the wall attached to it, acting as a barrier between indoor and outdoor spaces as a result, it causes heat loss in the building reducing the heating load of the building. Fayyaz and Montaser Kouhsari (2013) studied the refrigeration and heat load of a room adjacent to a greenhouse in Tabriz and concluded that in winter the presence of a greenhouse can save up to 30% of heating energy. But This feature is reversed in summer and will cause up to 25% cooling energy loss.

The research studies so far have generally concentrated the form of designing a building utilizing a solar greenhouse in order to reduce energy consumption, which has finally been compared to the unapplied state of the system. In fact, previous studies have been conducted to identify the factors affecting the quality of this system. From the studies conducted in this field, it is possible to extract the factors affecting the executive quality of solar greenhouses. This study, while confirming the accuracy of the effect of these factors, deals with the effectiveness of each factor in different situations and hours. Then, it provides instructions for the optimal design of a solar greenhouse for the city of Tabriz.

RESEARCH METHOD

The aim of the present study is to an applied type, which ultimately leads to the presentation of architectural solutions for reducing the energy consumption of the building. The research method in the present study was a combination of qualitative and quantitative approaches. In different stages of research, descriptive, analytical, simulation, and finally, logical reasoning methods were used. Architectural design is an independent variable and the degree of influence of physical design factors is the dependent variable. This semi-experimental research aims to examine the relationship between independent and dependent variables, to objectively and qualitatively describe the content of concepts, and to collect, classify and analyze the elements and contents. In the first stage, the physical components affecting its thermal performance in the building of qualitative data with an open questionnaire and through interviews and the review of documents and quantitative data used numerically and through the weighting of Delphi questionnaires were prepared.

In this research, 12 professors, experts, and specialists in the field of energy and architecture from the five top universities of Tehran in Iran (Tehran University, Sharif University of Technology, Amir Kabir University of Technology, Tarbiat Modares University and Shahid Beheshti University) Level of activity and field of study and using random sampling, they were selected as the expert team. The validity of the
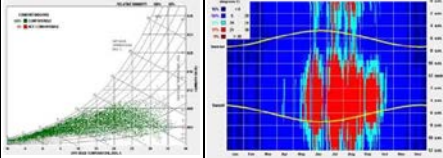
questionnaires has been confirmed by expert experts and their reliability through Cronbach's alpha coefficient (0.818).

The first stage includes an open questionnaire, in which the most important effective factors in the optimal design of the greenhouse were provided to the group of experts, and finally, 10 criteria were selected as indicators of the optimal design of the greenhouse. In the second stage, the questionnaire was completed to determine the key factors through weighting in the form of pairwise comparison and systematic analysis (the degree of correlation of variables with numbers between 0-4).

The physical factors selected in this study are: "change in the depth of the greenhouse", "protrusion of the greenhouse from the adjacent space", "slope of the greenhouse", "ratio of room area to the greenhouse", and "orientation of the greenhouse". In the next step, due to the numerical and comparative nature of the research, the simulation method was used with the help of Energy Plus software (version 9.2). Energy Plus Simulation was developed by the US Department of Energy in 2011 and is recognized as one of the most reliable energy modeling software (Amani and Moghadas Mashhad, 2020). The validity of Energy Plus software has been confirmed based on Bestest and ASHRAE 14 standards (Zomorodian and Tahsildoost, 2015). All situations on the first day and half of every month and repeated every 6 hours separately in terms of the amount of solar energy received and daylight have been reviewed and presented in separate charts.

Climatic region studies

The city of Tabriz (latitude: 38.05 / longitude: 46.17 / altitude: 1361 meters) is the capital of East Azerbaijan province. The climate of this region is mostly unstable in spring and the air is in transition and most of the precipitation due to the low-pressure dynamic system of the Mediterranean occurs in the western part of Iran. In winter, the weather is very cold, with a sharp drop in temperature and snowfall, and is hot and dry in summer. Studies show that the city of Tabriz, due to its special geographical location and location in cold climates, has a climatic comfort ratio hour to numerical climatic comfort hours of 17.7%. This means that energy must be consumed to create a climate balance for human physiological conditions (Ghobadian, 2021). The climatic conditions of Tabriz are such that in some months of the year, in order to achieve thermal comfort, in addition to inactive measures, active heating measures are also necessary. National Building Regulations number 19 considers the buildings of Tabriz to be in the group of buildings with high energy consumption and need predominant thermal heating (Rouhizadeh and Farrokhzad, 2020). (Table 1)

City Name	Latitude	Longitude	Above sea level	Construction group	Range of comfortable conditions of the city	The annual temperature of the city
Tabriz	38.05	46.17	1361	Buildings with high energy consumption and the predominant thermal requirement is heating		

Average monthly air temperature											
December	November	October	September	August	July	June	May	April	Mars	February	January
- 1.2	5.2	16	22.9	28	27.2	22.1	14.8	11.2	0.6	- 0.9	1.4

Assumptions

In the process of entering the initial data required for the simulation, an attempt was made to consider assumptions that are as close as possible to the actual operating conditions in Iran and the city of Tabriz. A room with dimensions of 10 * 10 * 2.8 M3 with a greenhouse of 4 * 4 * 2.8 M3 was considered the basic model. The wall of this room faces the solar greenhouse, which has a window 2 meters wide and 1.5 meters high. The other three walls of this room are adjacent to other buildings. The height of the adjacent buildings is the same as the room. Therefore, they do not create shadows. A number of 5 people were using the room. On weekdays throughout the year, from 4 pm to 8 am the next day, everyone was considered living in the room. But from 8 am to 4 pm, only one person was considered living in the room. On weekends throughout the year, everyone was in the room round-the-clock. It should be noted that the calculation of heat production from individuals, assumes standing and relaxation.

Exterior walls were double-layer clay block walls with 50 mm polystyrene insulation in the middle layer, a 10 mm cement facade in the exterior view, and 15 mm gypsum plaster inside. The inner wall was a clay block lined with plaster. The floor and ceiling were made of reinforced concrete. The room space window facing the solar greenhouse had two layers of 6 mm and 4 mm glass, and a layer of 12 mm air between the two layers.

But the solar greenhouse wall was provided with a layer of 6mm glass. On all days of the year, depending on what time the sun rises and what time it sets, a 250W lamp was used from sunset to midnight, and from midnight to sunrise, no lights were used. Due to the fact that in the day

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only 20% of people are in the room, less ventilation is considered. It is worth mentioning that this reduction of ventilation is both to reduce energy consumption and the effect of receiving solar energy through the greenhouse. At times of the year when the outside air temperature exceeds 25 ° C and the indoor space needs to be cooled, 200m / h of fresh air enters the solar greenhouse from outside, of which 45m / h is used for indoor ventilation and 155m / h is used for solar greenhouse ventilation and the extra heat dissipates. Also, at times of the year when the outside air temperature is less than 21 ° C and the heat of indoor space needs to be raised, 45m / h of fresh air enters the solar greenhouse from outside. This amount of fresh air is used for both solar and indoor space ventilation.

RESULTS

In this section, the physical factors affecting the performance of the solar greenhouse have been simulated in different conditions taking into account the research hypotheses. Each of these situations was simulated on the first and a half day of each month and repeated every 6 hours in Energy Plus software. The results of the study were as follows.

Depth to Facade Ratio (Fixed area)

Situation 1 (more depth): At 6 o'clock in the morning, the presence or absence of a greenhouse does not have much effect on improving the heating conditions. At 12 noon, the temperature of the greenhouse itself is higher than the adjoining room in the cold seasons of the year. Therefore, by installing a ventilation valve, heat can be directed into the environment. At 6 pm and 12 pm, the thermal effect of the greenhouse is felt. (Figure 1)

Situation 2 (equal depth and surface of the facade): At 6 o'clock in the morning, the presence of the greenhouse heats the room more than usual. Since the temperature of the greenhouse is lower than the neighboring room, it turns out that at this time of day (especially in winter), the greenhouse needs insulation. At 12 noon the temperature of the greenhouse is much higher than the adjoining room in the cold seasons of the year. Therefore, by installing a ventilation valve, heat can be directed into the environment. 6 pm and 12 pm are similar to 12 noon. (Figure 2)

256
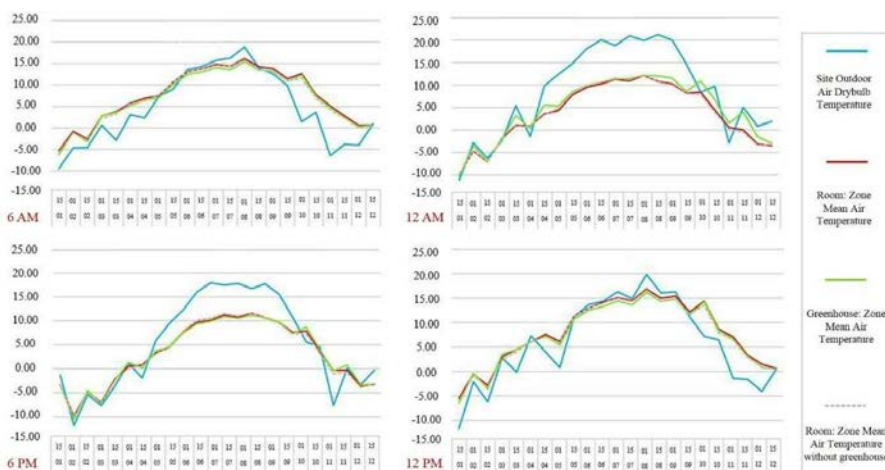
Figure 1. Comparison of temperature at different hours of the situation 1 in depth to facade ratio
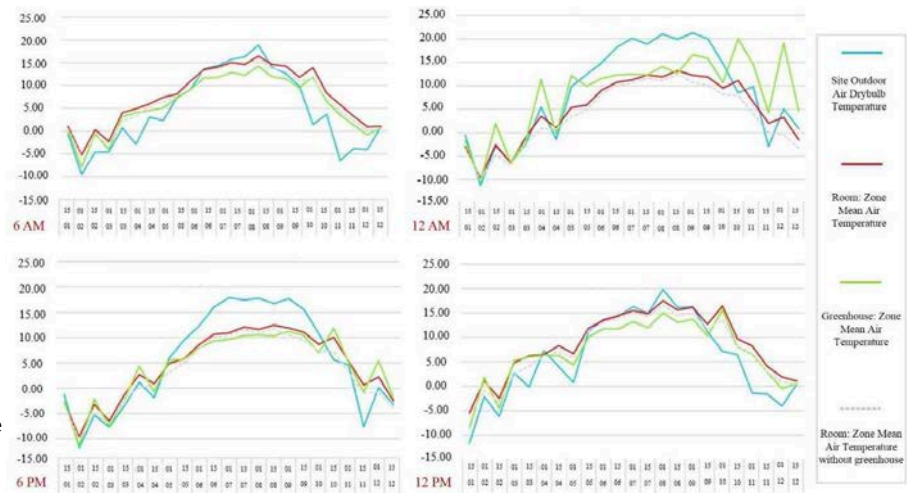
Figure 2. Comparison of temperature at different hours of the situation 2 in depth to facade ratio

Situation 3 (more facade level): At 6 o'clock in the morning, the presence of the greenhouse causes relative heating of the room, more than normal. At 12 noon, the temperature of the greenhouse is much higher than in the adjoining room in the cold seasons of the year. Therefore, by installing a ventilation valve, heat can be directed into the environment. 6 pm and 12 pm In the cold months of the year, the greenhouse and the surrounding area create higher temperatures than usual. Therefore, this mode is recommended. (Figure 3)

257
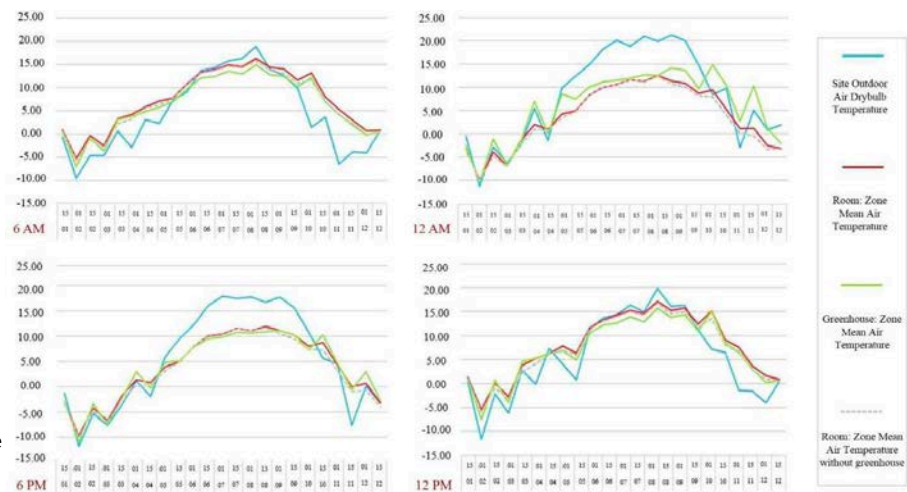
Figure 3. Comparison of temperature at different hours of the situation 3 in depth to facade ratio

Orientation (while maintaining the dimensions and proportions the greenhouse)

West: At 6 o'clock in the morning, the presence of the greenhouse causes relative heating of the adjacent room, more than usual. It does not get too comfortable in the summer, but it is recommended to open the greenhouse windows. At 12 noon, the greenhouse was warmer than other spaces. Similarly, the temperature without the greenhouse was lower than all other conditions, which is a warning for the use of thermal

insulation during these hours. The situation was the same at 6 pm and 12 pm. **(Figure 4)**

Southwest: At 6 a.m., the description was the same as before. In addition, in the cold season, thermal comfort was provided to some extent. At 1 o'clock in the afternoon, the greenhouse was warmer than other spaces. Similarly, the temperature without the greenhouse was minimum. The downside here is the cold season. At this time, the room temperature was lower than the greenhouse, which is the same temperature as the environment. At 6 pm and 12 pm at low temperatures, good heating performance was observed in winter. In half of the summer, the greenhouse should be exposed to sunlight and its temperature should be avoided as much as possible. **(Figure 5)**

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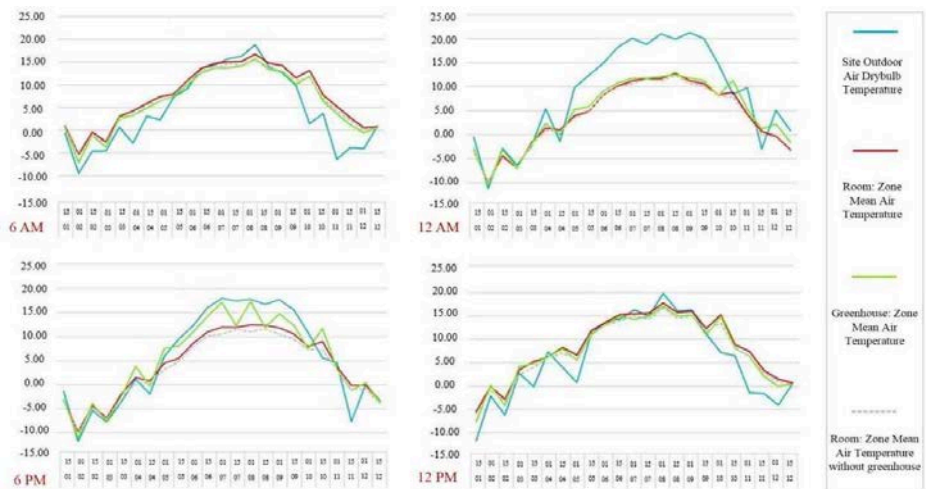
Figure 4. Comparison of temperature at different hours of the West
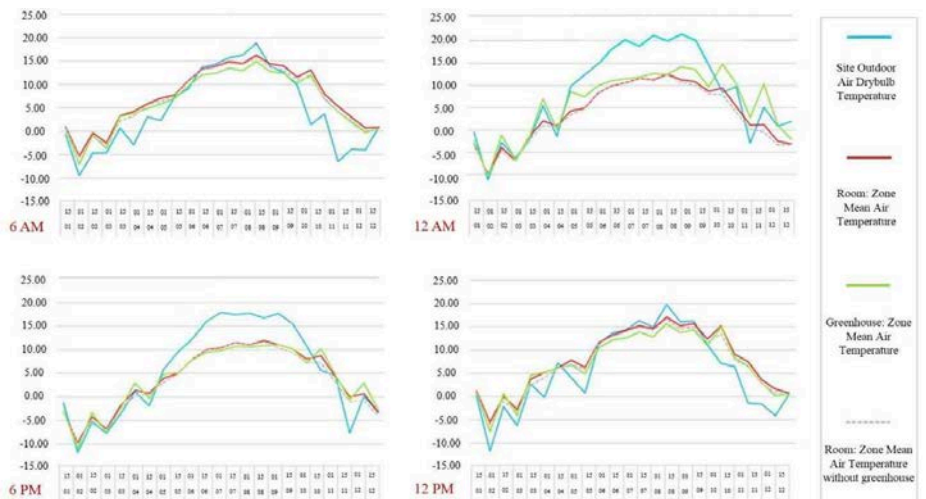
Figure 5. Comparison of temperature at different hours of the Southwest

South: At 6 o'clock in the morning, the presence of the greenhouse causes the relative heating of the room more than usual. Of course, the coolest space is the greenhouse. At 12 noon, the greenhouse temperature was higher than the adjoining room during the cold seasons of the year. Therefore, by installing a ventilation valve, heat can be directed into the environment. At 6 pm and 12 pm in the colder months of the year, the

greenhouse and the surrounding area had higher temperatures than usual. (Figure 6)
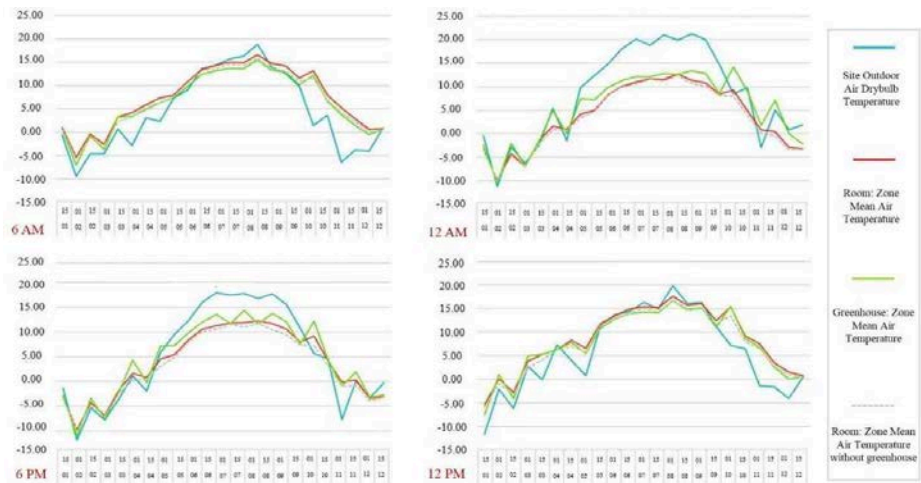
Figure 6. Comparison of temperature at different hours of the South

Southeast: At 7 o'clock in the morning, the presence of a greenhouse in the cold season heats the room. But on summer days, the lack of a greenhouse provides cooler air, which indicates the need for insulation. At 12 noon in the cold season, the greenhouse was warmer than the environment. But the next room is colder than outside. Therefore, an inlet valve is required. In the warm season, due to the low temperature in the state without a greenhouse, it is possible to prevent it from heating by covering the greenhouse. At 6 pm, the greenhouse does not affect heating and cooling. At 12 o'clock at night, the greenhouse is quite effective in the cold seasons. (Figure 7)

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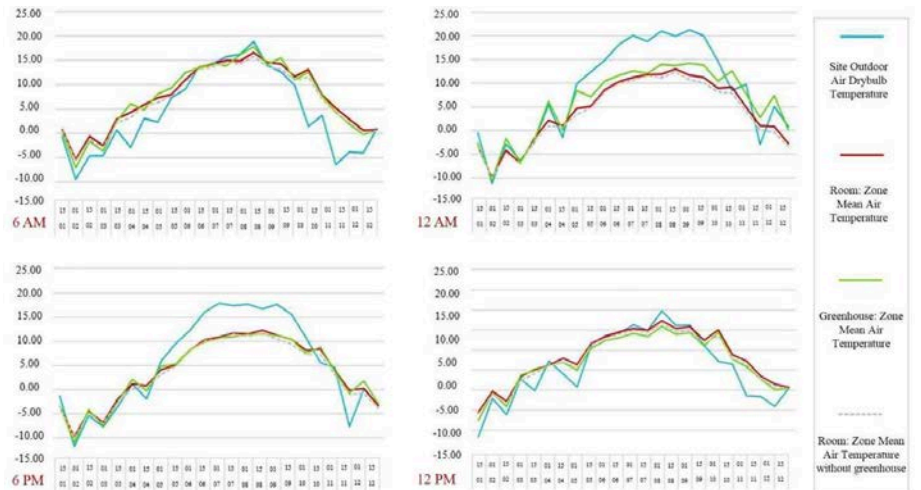
Figure 7. Comparison of temperature at different hours of the Southeast
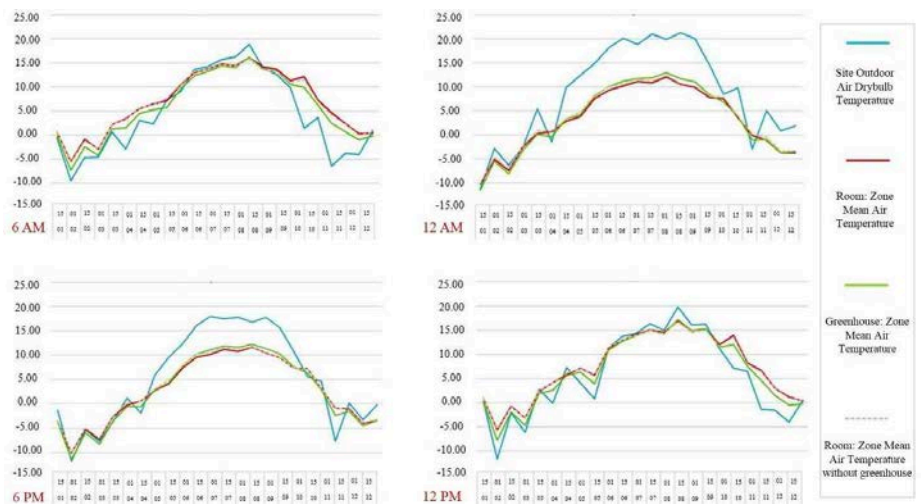
Figure 8. Comparison of temperature at different hours of the East

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East: At 6 o'clock in the morning, the presence of a greenhouse in the cold season heats the room. But on summer days, the lack of a greenhouse does not affect the temperature. At 12 noon in the cold season, the greenhouse is warmer than the environment. But the next room is colder than outside. Therefore, an inlet valve is required. In the warm season, due to the low temperature in the state without a greenhouse, it is possible to prevent heating by covering the greenhouse. At 6 pm, the greenhouse has no effect on heating and cooling. At 12 o'clock at night, the greenhouse is quite effective in the cold seasons. **(Figure 8)**

Greenhouse protrusion relative to the room

Situation 1 (fully protruding): The greenhouse temperature in the hot season at 6 am is very cool and can ventilate the interior. At 12 noon, increasing the greenhouse temperature should be prevented by thermal insulation. This increase in temperature at noon is very annoying. At 6 pm in summer, the greenhouse temperature is still higher than room temperature. Therefore, preventing greenhouse ventilation into the space or even blocking radiation to the greenhouse can be effective. At 12 o'clock at night in the cold seasons of the year, the greenhouse is at the same temperature as the environment. Therefore, greenhouse insulation must be provided to minimize heat dissipation. **(Figure 9)**

Situation 2 (3/4 protruding): At 6 o'clock in the morning, the presence of the greenhouse in the cold season heats the room. But on summer days, the lack of a greenhouse provides more cool air. This indicates the need for insulation. At 12 noon in the cold season, the greenhouse is warmer than the environment. But the surrounding space is colder than outside. Therefore, an inlet valve is required. In the warm season, due to the low temperature in the state without a greenhouse, it is possible to prevent it from heating by covering the greenhouse. At 6 pm, the greenhouse has no significant effect on heating and cooling. At 12 o'clock at night, the greenhouse is effective in the cold seasons. **(Figure 10)**
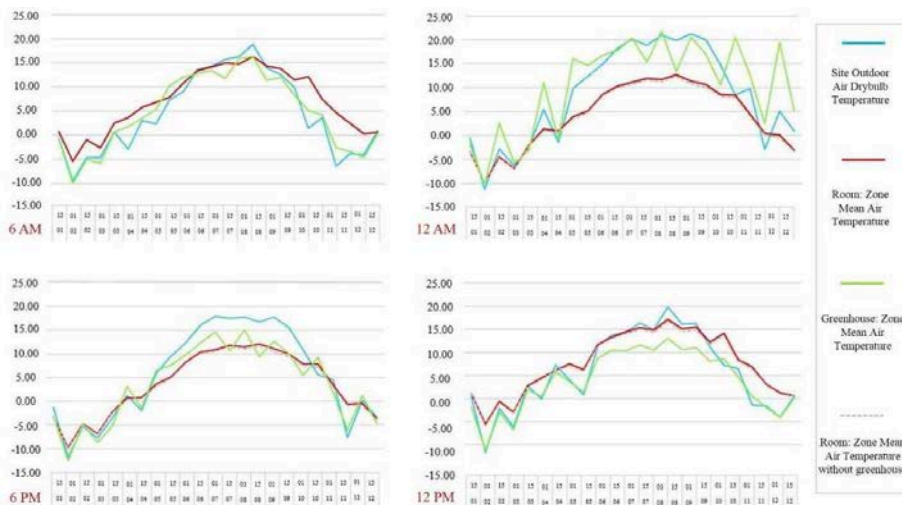
Figure 9. Comparison of temperature at different hours of the situation 1 in greenhouse protrusion
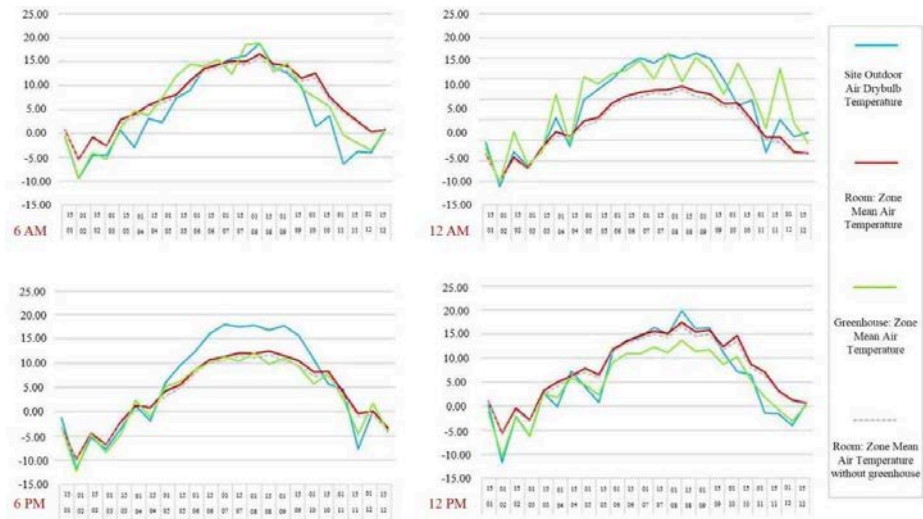
Figure 10. Comparison of temperature at different hours of the situation 2 in greenhouse protrusion

Situation 3 (1/2 protruding): At 6 o'clock in the morning, the presence of a greenhouse in the cold season heats the adjoining room. If the temperature of the greenhouse is higher than the environment, but the room temperature is still in warmer conditions, ventilation between these two spaces is not recommended. At 12 noon in the warm season, the greenhouse was cooler outside and the adjoining room was cooler. Of course, the lowest temperature was provided by the conditions without a greenhouse. In the warm season, the greenhouse temperature rises which emphasizes the need for heat exchange with indoor spaces. At 6 pm and 12 pm in the cold season, the room temperature was warmer. Due to the lack of radiation, greenhouse insulation was required and ventilation exchange with indoor space is not recommended. **(Figure 11)**

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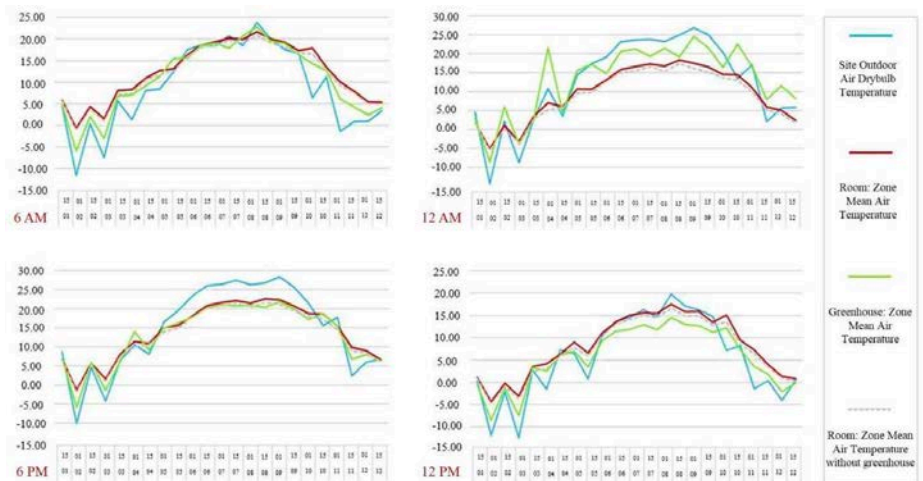
Figure 11. Comparison of temperature at different hours of the situation 3 in greenhouse protrusion

Situation 4 (not protruding): At 6 o'clock in the morning, the presence of a greenhouse in the cold season heats the room. Of course, ventilation in a greenhouse environment is not recommended during this period. It is better to use greenhouse cover insulation during the night. At 12 noon in the cold season, the greenhouse was the hottest part. At this time of summer, the coolest space is the room next to the greenhouse. Of course, the lack of a greenhouse provides a lower temperature. At 6 pm in the

cold season, the greenhouse provides considerable heat that can be ventilated. At 12 o'clock in the evening in the cold season, the room next to the greenhouse was warmer and the greenhouse needs to be insulated. Therefore, ventilation between the greenhouse and the room was not recommended. **(Figure 12)**
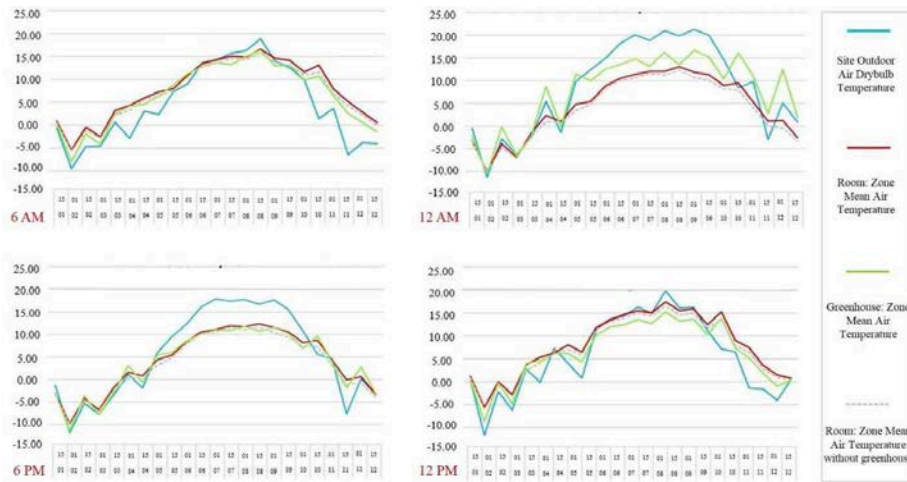
Figure 12. Comparison of temperature at different hours of the situation 4 greenhouse protrusion

Greenhouse roof slope

Situation 1 (15%): At 6 o'clock in the morning, the presence of a greenhouse in the cold season heats the room. Of course, ventilation with a greenhouse is not recommended during this period. It is better to use greenhouse cover insulation during the night. At 12 noon in the cold season, the greenhouse was the warmest space. At 6 pm and 12 pm in the summer, the coolest space was the room next to the greenhouse. Of course, the lack of a greenhouse provides a lower temperature. **(Figure 13)**
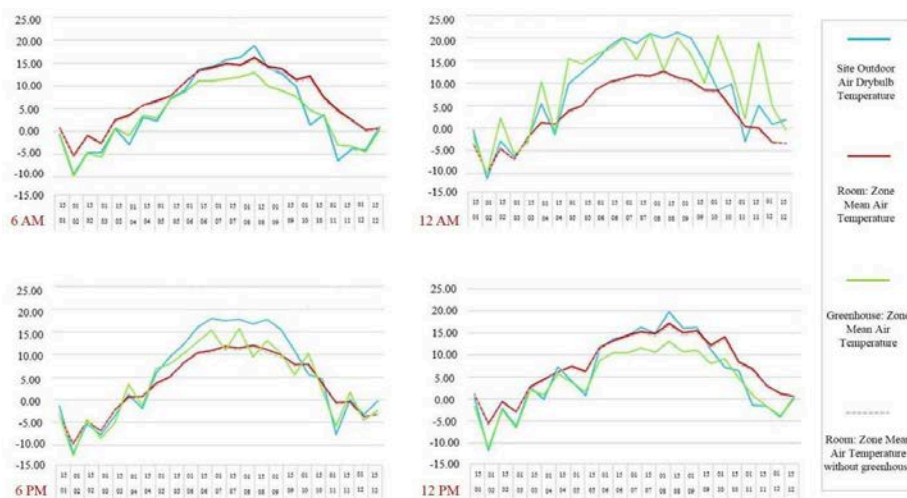
Figure 13. Comparison of temperature at different hours of the situation 1 in greenhouse roof slope

Situation 2 (30%): In this item, all modes are similar. At 6 pm, the greenhouse provides considerable heat in the cold season, which can be ventilated into the room. On 12 nights in the cold season, the room next to the greenhouse was warmer and the greenhouse must be insulated from the environment. Ventilation between the greenhouse and the room

is not recommended, because the greenhouse is almost the same temperature as the outside environment. **(Figure 14)**

Situation 3 (45%): All situations are the same in this item. **(Figure 15)**
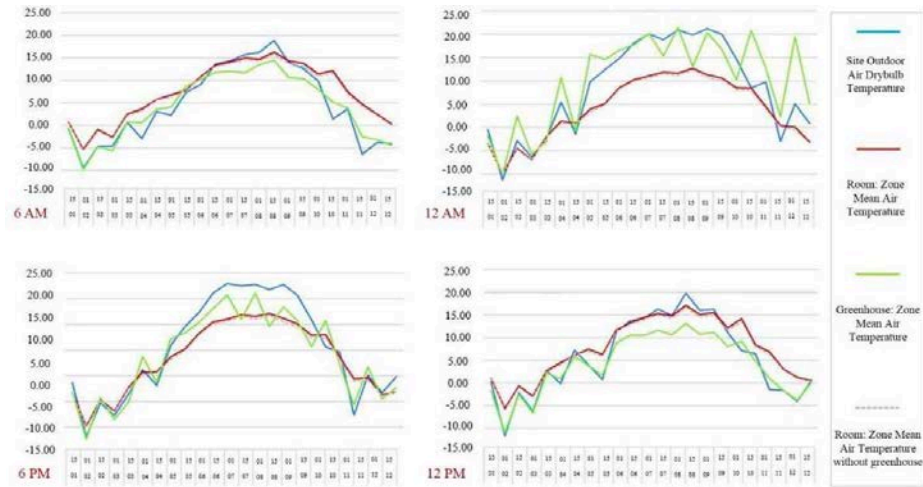
Figure 14. Comparison of temperature at different hours of the situation 2 in greenhouse roof slope
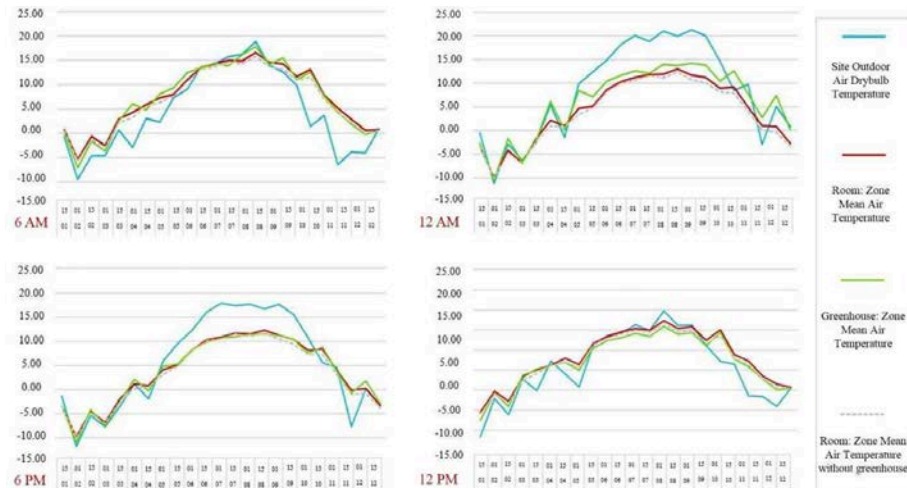
Figure 15. Comparison of temperature at different hours of the situation 3 in greenhouse roof slope

It is important to note that the results are based on Energy Plus software modeling. Although the output of this software has a relative error, it has a lower error rate than other energy analysis software. On the other hand, in the analysis of this research, a comparative study of different states of each feature with the sample case was considered and the amount of energy was compared to the basic model. As a result, the possible errors are equal in all cases and do not have a major effect on the energy consumption of the building in different cases.

DISCUSSION

By examining different conditions of depth-to-facade ratios, it can be concluded that at 6 o'clock in the morning in all seasons, the higher the ratio of façade-to-depth, the higher the temperature of the room adjacent to the greenhouse. However, in the cold season, which is more important in this study, this difference is not significant at this time. At 12 noon, this happens completely differently, and the deeper it is, the more it raises the

temperature of the adjacent room. Therefore, this mode will be widely used in the cold season. At 6 pm, similar to 12 pm, depth still affects heating. But unlike 12 noon, there is no significant change in the summer season. At 12 o'clock at night and in the cold months of the year, the first mode with more depth provides more temperature. But in the summer, there is no significant change between different situations. Finally, it can be concluded that the higher the depth of the greenhouse, the warmer the space adjacent to the greenhouse during the hours when the sun is in the sky. But during the hours when the sun is not in the sky, the heat is usually provided by increasing the level of the greenhouse. Therefore, an average is recommended throughout the year. The results of the research of Abdolkhaleghi et al. (2021) also show that the maximum length, i.e. 5 meters, has the highest amount of energy intake due to the increase of the south-facing front. But the desired depth is equal to 1 meter, and with its decrease or increase, the absorbed solar energy decreases.

Comparing the temperature of the room adjacent to the greenhouse in different directions of the sun, it can be concluded that at 6 am in the cold season, the directions of west, south, and southeast provide the highest temperature. But in the warm seasons of the year to the east, the conditions are more favorable. Of course, since there is no significant difference compared to the situation without a greenhouse, it is possible to integrate the greenhouse with the interior space during this period. At 12 noon on all days of the year, the coldest temperature is measured in the east. In the cold seasons of the year, more heat is provided towards the south and southeast. At 6 pm in the warm seasons of the year, the lowest temperature can be observed in the east. This temperature is lower than the absence of a greenhouse. At this hour and this season, the warmest temperature is created in the western direction. But in the cold season, they still work better in the south and southeast and have higher temperatures.

At 12 o'clock at night, the coolest temperature is in the east in all seasons. Therefore, due to the lower temperature without greenhouses in summer, the lack of greenhouses in this season is preferable. In the cold season, as in the previous hours, they have better performance for the south, southeast, and west. The results of the research of Mobtaker et al. (2019) also show that the single-span greenhouse in the east-west extension and the south front has received about 8% more solar radiation in all months of the year compared to other forms.

In terms of protrusion and its effect on greenhouse temperature, it can be said that the more protrusion, the less impact in winter. At all hours in all seasons, the absence of protrusions helps to moderate the room temperature more than the outside environment. Of course, in summer, the absence of a greenhouse in all cases provides a cooler temperature, which can be used by measures to remove the greenhouse or combine the greenhouse with other indoor spaces. The temperature difference between the states during the hours with radiation is less than when there is no radiation. It is beneficial to use thermal insulation during these

hours to maintain the internal temperature. The results of Bakhtyari and Fayaz's research (2020) show that increasing the length of the greenhouse protrusion leads to an increase in receiving solar energy. This difference is because Bakhtiari and Fayaz's research was conducted in a hot and dry climate. While the present study was investigated in a cold climate.

According to the diagrams at different time intervals, it can be concluded that the slope of the roof has no effect on the room heating adjacent to the greenhouse. Of course, this result is contrary to the prediction. Because it was predicted that based on the change of slope, the angle of radiation would change and affect the temperature of the room. This issue is due to the angle of radiation in the city of Tabriz. Because the weather is cloudy and cold on most days. The results of the research of Moghaddasi et al. (2022) based on the simulated model of the solar greenhouse in the Kermanshah region (cold climate) show that the angle of the roof slope is 50 degrees. This difference is due to the radiation angle in Tabriz city. Because on most days of the year, the weather in this city is cloudy and cold.

In the investigation of the ratio of the effect of the area of the greenhouse to the area of the room in the hot season, there is no significant effect on the temperature. But in the cold season, the larger the area of the greenhouse, the greater the effect. This trend can be seen at all hours of the day and night. Areas higher than 20% can be included. The research results of Çakır & Şahin (2015) also show that rectangular and pyramidal greenhouses, which have a larger area than cylindrical and oval greenhouses, increase productivity in cold regions.

According to the analysis, the following can be used as a guide for the optimal design of the greenhouse in the climate of Tabriz and Sardsir climate in general:

- During the period of the presence of the sun during the day due to the radiation, the wide surface on the facade provides more heat, and when there is no radiation, the greater depth helps to maintain the internal temperature. In fact, the surface causes thermal energy loss. As a result of this observation, reducing and increasing the depth of the greenhouse in different seasons can be helpful.

- The south, southeast, and southwest directions have provided the most heat in the summer season, which was predictable. But the east direction in summer moderates the heat. Using 2- or 3-way greenhouses helps to improve the efficiency of the greenhouse in different seasons.

- The larger the surface of the greenhouse, the higher the amount of heating produced. This process is characterized by a linear rise, but the slope of this rise is different at different times. Choosing the size of the greenhouse, depending on the area of the interior, can be chosen under the influence of other factors.

- Protrusion of the greenhouse means increasing the contact surface with the environment and reducing the contact surface of the greenhouse with the internal environment. As much as the increase in surface area

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increases the temperature of the greenhouse, the temperature of the room adjacent to it has not increased significantly, which is obvious if ventilation is installed between these two spaces.

CONCLUSION

The results of this study show that in the climatic conditions of Tabriz, comfort conditions are limited without any measures. Also, in the cold seasons of the year, solutions for using internal heat receiving and direct passive solar receiving are suggested. So, in half of a year, the use of solar greenhouse heating in that climate is justified. Based on the literature review as well as analysis of residential buildings in Tabriz, in response to the first research question (What are the physical characteristics affecting the efficiency of a solar greenhouse space?), Five criteria were selected for evaluation. These criteria are: "change in depth of the greenhouse", "protrusion of the greenhouse from its adjacent space", "slope of greenhouse", "ratio of room area to greenhouse area", and "orientation of greenhouse".

The results of the analysis of each of these criteria in response to the second research question (What is the impact of each of these factors on the efficiency of the solar greenhouse?) show a large area in the presence of the sun during the day due to radiation. It provides more heat on the facade and helps maintain the internal temperature in absence of deeper radiation.

It provides more heat on the facade and helps maintain the internal temperature in absence of deeper radiation. In fact, the surface wastes heat energy. As a result of this observation, reducing and increasing the depth of the greenhouse in different seasons can be helpful. The south and southeast directions provide maximum heat in summer. But eastward in summer is a moderator of heat. The use of two- or three-way greenhouses helps improve the efficiency of the greenhouse in different seasons.

The higher the area of the greenhouse, the more heat is produced. This process follows a linear ascent. But the slope of this ascent varies at different times. The greenhouse area can be calculated depending on many factors mostly depending on the interior area. Greenhouse protrusion means increasing the level of contact with the environment and reducing the level of contact of the greenhouse with the indoor environment. Increasing the area will raise the greenhouse temperature, but the temperature of the adjacent room has not increased significantly. If ventilation is installed between these two spaces, the temperature difference will be determined. The slope of the greenhouse roof in this climate has been studied in different situations and according to the software outputs, it has no effect on the rate of receipt. In addition to the presence of a greenhouse to heat the building, how to use it, including the use of cover insulation and ventilation restrictions to improve the efficiency of the greenhouse, is mandatory. This is where the user's role in inactive systems comes into play.

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To design a greenhouse that can meet expectations accurately, these five criteria must be considered along with other factors such as "type of translucent glass", "heat transfer method", "insulation", etc., which could be studied in future research studies. Although these characteristics have been analyzed and evaluated for the climate of Tabriz, the results may be different for other cities. By comparing these features in different climates, a better greenhouse design can be created.

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Resume

Arian Babaei is an architect who graduated in Architectural Engineering from University of Guilan in 2019 with his research-based thesis project focusing on bio architecture methods. Since then, he has started to keep his concentration on his favorite field, and he has been researching in energy efficient design and ecological retrofitting of existing buildings. Now, He has several international work experiences in this area which makes him an expert in sustainable design.

Dr. Pari Alavi is an expert of architecture and Official member of the road and urban department. She has obtained her Ph.D. with an average of 19/43 in 2022 from the Islamic Azad Zanjan University. Her major research interests are in architecture and urban regeneration. She has cooperated as a reviewer for several scientific journals such as IJEE, IJBP, FoAR …. She has presented more than 60 articles on related subjects at national and international conferences and published more than 10 papers in several journals.

Mohammad Almardani graduated as an architectural engineer in 2022 from Tabriz's technical and vocational university in Iran. His thesis was in the field of energy and culture with a title of Designing a cultural and musical building with the approach of optimizing energy consumption. He is very interested in clean energy and has research experiences in sustainable architecture and efficient methods in construction.

Nasrin Jamei graduated in Architectural Engineering from Roozbeh Institute of higher education in Zanjan. Her thesis was focusing on zero energy methods. She was deeply interested in optimizing energy in buildings and since her thesis she tried to focus more on it. From 2 years ago she has started to research and also has professional experience in this area.

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Application of Digital Urban Memory Transmission Model for Sustainability of Cultural Heritage

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Abstract

In this study, a model for preserving and maintaining the memory value of cultural heritage was put forward and the application of the model was made in a designed digital environment. The model can be applied in teaching, transferring and keeping the memory values carried by tangible and intangible cultural heritage values of the world. Digital Cultural Heritage Memory Model (DCHMM) aims to transfer and interpret the urban memories of the settlements to a wide audience on the web and thus raising awareness on the protection and maintenance of these values. The cultural heritage values of the sample villages selected for the application of the model are aimed to be realized with the participation of the interactive user in the transfer of verbal, written and architectural memory values, the interpretation in the asking questions and giving ideas section, and the success of the application in the questioning section. Nine historical buildings that must be preserved and transferred to memory in three settlements of Niğde with a common historical past and that stand out with a variety of building types with significant urban memory value were selected for the field study. To provide data for the digital environment that evaluates DCHMM's applicability, the urban memory values (written-verbal-architectural memory elements) collected during the field study in the selected sample (three exchanged villages in Niğde- Yeşilburç Village, Uluağaç Village, Hançerli Village) were digitized according to the model's information, participation and questioning sections. 452 users from different age and occupation groups made the application of the model in the web environment in a six-month period. The digitized values obtained as a result of the study were interpreted in line with the targets in the sections of the model, and the model was brought to the literature with its application.

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INTRODUCTION

Cities, with their historical accumulations, provide ideal conditions for conducting research into the memory of the changing society's present and future movement. The causal relationship between the formation of the city's memory and the formation of the citizen's (society's) memory is inextricably linked. Rossi (2006) asserts that the flow of memory in human life and the concept of unity between the past and future of the city are intimately bound; indeed, the city shapes both. In essence, two main components are required for the formation of cities and urban memory. The first is the space for the formation of memory and the second is the humans who will remember and experience this space, ensuring its continuity. In this study, urban memory is limited by focusing on the human and space component in order to develop goals that will contribute to the discipline of architecture and urban conservation.

Every city has a memory like a living organism (Poete, 2010; Rossi, 2006). Cities transfer the traces of the past to social memory. A city's streets, monuments and architectural structures all contain significant historical narratives, while the planners and architects who organize the city embody society (Boyer, 1994; Özak, 2008). With time, memory accumulates in space and remembers. Due to the perceptual use of space in human memory from temporary memory for a long period of time, it passes to permanent memory with a variety of meanings such as social sharing, communication, and interaction. Memory spaces are places where people can relate to one another, connect, feel a sense of belonging, remember and reminisce. Monuments, squares, monumental structures, rituals and behaviours that are designed to preserve an experience become a repository of memory (Nora, 2006).

Space serves as both the product and the mentor while transferring social, cultural, communicative memory. The primary issue addressed in this study is the existence of settlements that are incapable of transmitting the values of urban memory to future generations over time. This central problem is composed of many sub-problems. The elderly population, which ensures the transmission of verbal memory values within settlements, disappears over time, and the traditions disappear with it. Due to the changes in human habits brought about by developing technology, the new generation has developed an apathy toward memory and its maintenance. Due to lack of awareness of original architectural values, memory spaces either cease to be used or become idle as a result of the meaning value imposed by the community in the settlement.

Indeed, all of these artificial memory elements can be used to transfer digital memory. Digital materials such as digital photographs, films, music, visuals, sound recordings, texts, museum objects, and manuscripts are recognized as part of national historical and cultural heritage and archiving activities for the protection and accessibility of digital cultural heritage are underway on a national and international scale (Özbağ, 2010). According to Öztemiz and Yılmaz (2017), the digitalization applications explained by the transformation of cultural heritage

products in analogous media into computer-understandable forms eliminate the requirement for time and space in accessing information, thus laying the groundwork for the unobstructed accessibility and usability of cultural heritage.

If an open access platform for the systematic transfer of written, verbal and architectural information about settlements is created, urban memory values can be transferred to every segment of society, particularly the younger generation. Socially, economically and culturally sustainable planning can be accomplished simply by considering community decisions regarding settlement protection. Given people's rapid consumption habits in the digital age, the rate at which they use the virtual environment to see and explore a place, -and the expectations of the new generation in this regard-, traditional memory transfer methods should be replaced by web-connected platforms.

Nowadays, access to digital memory items for transferring urban memory values in a web environment is widely available. However, no web application based on a user-oriented model has been developed to facilitate the transfer of this data. The Digital Cultural Heritage Memory Model (DCHMM) was designed with the goal of bringing urban memory values to the digital environment, while also achieving the objectives of bringing people together, raising awareness and evaluating this, as well as involving the user in some decision-making. The primary objective is to rapidly reach large numbers of people and to interactively process the information stored in their memory.

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MATERIALS AND METHODS

The main structure forming the study's method is based on identifying the problem, putting forward a hypothesis, proposing a new model to test the hypothesis's validity, testing the model's applicability, and evaluating the data obtained from users for transmission space memory (Figure 1). In order to test the model's applicability, a sample was selected to provide data, and a field study was conducted involving the preservation-oriented determination and documentation of selected cultural heritage items. The hypothesis was accepted and suggestions were made based on the numerical data obtained following the application of the model. The DCHMM presents the user with the oral, written and architectural memory values of intangible and tangible cultural heritage assets with a protection-oriented focus, "Information", the interpretation is "Participation" and the evaluation is made through the "Question Asking" and "Game" sections.
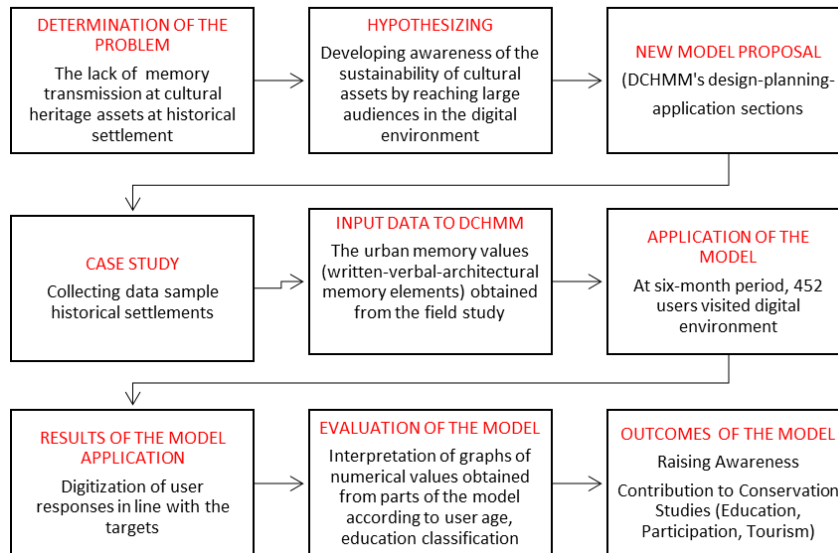
Figure 1. Flow Chart of the Method of Study

Nine historical buildings that must be preserved and transferred to memory in three settlements of Niğde with a common historical past and that stand out with a variety of building types with significant urban memory value were selected for the field study. To provide data for the digital environment that evaluates DCHMM's applicability, the urban memory values (written-verbal-architectural memory elements) collected during the field study in the selected sample (three exchanged villages in Niğde- Yeşilburç Village, Uluağaç Village, Hançerli Village) were digitized according to the model's information, participation and questioning sections. Three architectural memory structures were selected from each village. These were the Yeşilburç Church, which is distinguished from the other churches in Niğde by its bell tower and was later used as a mosque, the Yeşilburç Baths, some of which have been demolished, and Taş Mansion, which exemplifies Greek civil architecture through its façade, plan scheme and ornamental features throughout the village. In Uluağaç, the symbol of the village, the old Greek School, the Church and the civil architectural example known as Çatal Fountain, and the building memory location were chosen. The Greek School has survived to the present day, but a large part of the church was destroyed during a period of time and both structures are now inactive. Hançerli Village is a well-known village in Niğde with its water. The Hançerli Mosque (Church), the fountain on the church's retaining wall, and the nearby laundry all have a connection with water and are examples of religious and civil architecture that depict the daily lives of the Greeks at that time. To collect data for verbal, written and architectural memory transfer and to test the hypothesis of transfer, a field study on the memory of people and places in settlements was conducted in three sample settlements. In the verbal memory transfer section, it is aimed to transfer information about the life style, traditions and language of the people living in the settlements after the common population exchange. Those who migrated to Yeşilburç Village from Krifce have been

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continuing their traditional halva festivals since Thessaloniki in Yeşilburç Village, where they settled. Information about this halva festival, which is a common memory element, was conveyed with information about the village and its past values in the interviews made in the information part of the study. An example of the folk songs that convey the Greek language they spoke after they migrated to Uluağaç Village, the video listened to by Arzu Bakır (1921-2019), one of the first-generation immigrants, is given in the information section in Uluağaç village. Information about the habituation processes and changing lifestyles of those who came to the village were obtained. In the interview with the 3rd generation immigrant Erdem Beyazıt (1938-) who came to Hançerli Village, the video about the first people who came to the village, the Dermuson beans, which is called the old name of the village, their livelihoods after the migration, their lifestyles and cultures were shared. Prior to the field study, the official inventory was scanned, and all relevant information and documents were provided. The surveys of the memory spaces in the settlements under the architectural conservation discipline were conducted, and documentation studies were conducted by taking general environment, indoor and outdoor photographs, also using aerial and satellite photographs. 3rd generation individuals in sample settlements were interviewed verbally.   During the interviews, the participants' private photograph archives, letters and diaries, all of which are considered written documents were also considered. The oral history study for immigrants to Greece was examined, and Stavros Anestidis' speech on "Shared Memory of Asia Minor's Greek Orthodox Population" was considered (After the archive?, 2017).The Asia Minor Research Institute's oral history study for immigrants to Greece was examined, and Stavros Anestidis's speech on "Shared Memory of Asia Minor's Greek Orthodox Population " was taken into account (Afterthearchive?, 2017). Restitution projects were derived from interviews and traces identified in the documentation of the structure for the original conditions of these spaces, and alternative functionalization suggestions were presented for the restoration projects' selection. After the generated data was input, DCHMM's web application was completed in the web environment. After the data entry, the application of the model in the web environment was not aimed at a certain user group. The main purpose is that users of all ages and education groups experience the application for the target desired to be reached as a large user mass. Therefore, a distinction is not required between those who know and those who do not know the settlements and historical buildings selected as samples in memory transfer. The findings of the results obtained according to the age and education level of the user were interpreted according to the memory transfer.

DESIGN, PLANNING AND APPLICATION SECTIONS OF DIGITAL CULTURAL HERITAGE MEMORY MODEL (DCHMM)

DCHMM's digital application environment follows a three-step procedure. The initial step is to design the model. The problems of common urban memory values that were not conveyed in the sample historical settlements selected in the field study were first determined at the planning stage, and a hypothesis for their solutions were formed. The solution method was then determined and the model's application process was implemented utilizing various computer programming languages.

Designing Digital Application Environment of DCHMM

All of the research on the transfer of common urban memory values are focused on the concept of a web application that can be used to test hypotheses. Conceptual studies on learning techniques and the memory-perception relationship were examined to determine which transfer technique (passive, active) could be more effective for the user in the interfaces created, studies were conducted on how to digitize and present the urban memory values that will provide targeted memory transfer and ideas were exchanged with expert computer engineers.

Planning of DCHMM's Section

DCHMM's planning approach is based on in the exchange of ideas, with the assumption that architects and computer engineers can collaborate and communicate simultaneously. The process from designing the model to execution and evaluation is divided into five stages because a process management method is required based on planning (Table 1).

Table 1. Planning stages of DCHMM

Main Stages	Information	Allotted time
a. Model design and software	Designed digital memory model transfer to web application software	1-6 months
b. Case Study	Collection, documentation and practical classification of verbal, written and architectural urban memory elements of selected settlements	1-9 months
c. Data input to the model	Digitization of collected verbal, written and architectural urban memory elements	9-12 months
d. Application process of the model	Introducing and implementing DCHMM on the web after it is ready after data entry	12-16 months
e. Evaluation process	Grouping the information obtained as a result of the model applied and used in the web environment for 6 months, evaluating them graphically and with the feedback received	16-18 months

Design and software of DCHMM

The model's first stage, which was based on the idea of transferring urban memory to people in a digital environment, included illustrations of how this may be accomplished in a methodical manner. The drafts of three settlements that are unable to transfer the value of urban memory have been developed in order to address the issues of how the qualities of memory spaces (architectural structures, exchange people, their rituals) can be improved in the three settlements selected among the Niğde settlements that have lost or are in the process of losing their architectural memory values. It was attempted to answer the questions of how the information from each settlement may be presented together in a flow chart, reinforcing it and what evaluation techniques will be used to assess the level of awareness of the presented information. Preliminary web application drafts were produced to give diversity in evaluation based on user interaction, and the most suitable software and interfaces were discussed with computer software experts in order to convert the drafts on paper to the computer environment.

Case study for collecting data

Data on verbal, written-architectural memory aspects of each settlement selected as samples were obtained in the field study. A drone was used to take aerial photographs of the settlements, as well as general documentation of the study area. Following the completion of preliminary research on the memory spaces of each settlement with a history of population exchange, the documentation of the buildings was completed in accordance with the discipline of architectural protection. Buildings were surveyed and indoor and outdoor photographs were taken as part of the documentation. Verbal interviews were conducted with the people in the settlements to obtain the data using questionnaires that had been prepared in advance and the interviews were audio and video recorded.

Data input to the model

It is necessary to digitize the verbal, textual and architectural urban memory elements collected for the settlements in order to enter data into DCHMM software. The old photographs of the settlements collected during the digitization stage were scanned by the .jpeg extension and the memory locations were named. The dimensions of each memory space reported by the survey were transferred to the computer environment in two and three dimensions using the AutoCAD and ArchiCAD drawing programs. Oral interviews were recorded either by writing the transcript using Word or by filming it on video. Old inscriptions and documents were scanned and saved in .jpeg format. Following that, the data was entered into the areas designed in the software of the developed web application.

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The application process of DCHMM

Afterward, within four months, the application would be made available on the internet with each user's responses to questions on what the new roles of the structures should be today being recorded in the database of the last section.

Evaluation of the data obtained in DCHMM

The application process concludes with a game-based evaluation section that assesses how successful each user's urban memory knowledge is transferred. It is also desirable that the user responds from multiple-choice functions as a participant to the structure's future function after the passive experience of each memory structure.

The outputs obtained from this application, which was written for DCHMM and made available on the internet for urban memory transfer, were evaluated. These outputs are:

• How many people have visited the application (profiles: age, education)

• Re-functionalizing the memory space in which the user is informed by providing data for conservation planning by responding to multiple-choice questions

• At the end, correct answers to multiple-choice questions in a game format are provided for achievement performances in memory transfer over time

• The in-game section's proportional success rate.

Application Sections of DCHMM

The web application was implemented on the internet for six months. The data on the admin-controlled panel was frequently backed up for the evaluation process, and any interruptions was addressed. The user's position of the model within the application; passive information, the participant (presenting ideas), and active questions after the general assessment were provided with the sections in the game format. Each section featured a flow chart with data that corresponded to the data that was to be transferred in and between them (Figure 2).
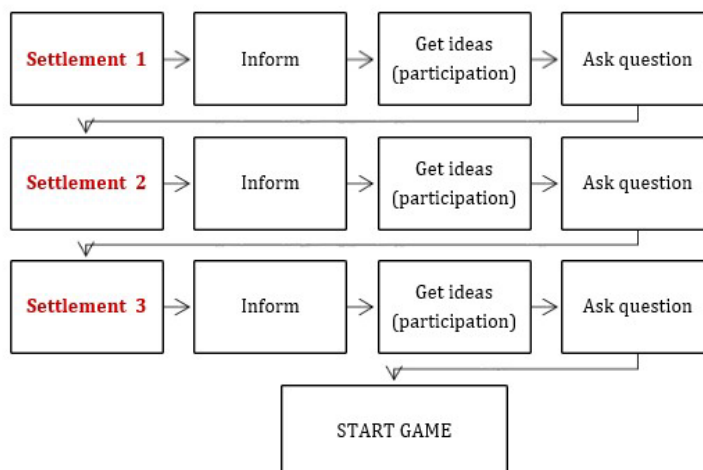
Figure 2. Flow chart of the application process of the DCHMM

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Information processing and memory transfer are treated as parallel cases in the model's construction. Questions regarding urban memory elements, which consist of verbal, written, architectural memory elements related to a settlement, are asked in the Ask Questions section, with the goal of reinforcing the given knowledge with the questions and storing it in long-term memory. The game section coincides with the efficiency stage in the information processing process in digital memory transfer (Figure 3).
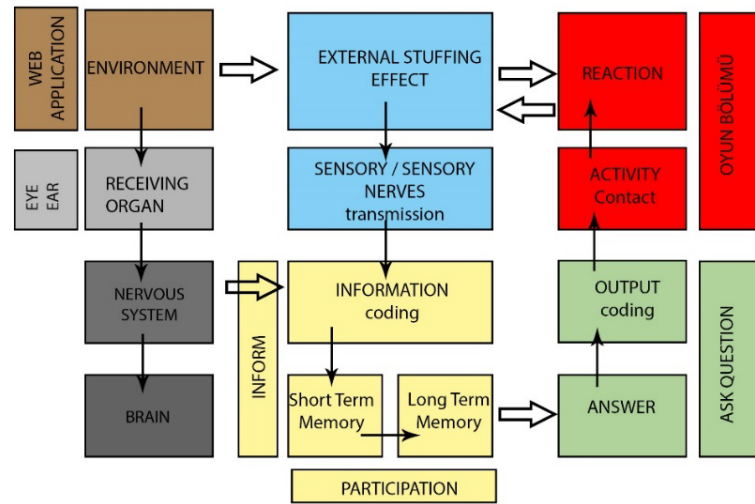
Figure 3. Flow practice of the DCHMM in the Information Processing Process (The stages of the information processing process are adapted from Aydınlı (1986)

The urban memory elements were transferred to the user in three stages (informing-engaging-questioning-asking), (Table 3). How much information the user retains at this point will be determined by the success rate in the answers. In fact, the game section is the enticing final phase, allowing users to evaluate the designed digital memory model while also allowing them to use the application repeatedly.

Table 2. Descriptions of the implementation stages for a settlement

INFORM		GET IDEAS	ASK QUESTION
General information about settlements	Population Exchange date of settlement	Selecting reuse recommendations for memory spaces	Multiple choice questions about urban memory data given during the information phase are asked. If 3/5 (three-fifths) is provided according to the number of correct answers given by the user, it is requested to visit the settlement again if it is not provided to move to the new settlement.
	Important memory spaces		
	Elements of oral memory (Oral interviews, traditions)		
Information about memory spaces	History of the building		
	Architectural Features (Plan, Facade, Construction Technique)		
	Past functions		
	Current usage status (Interiors, special accessories)		

Information section

The information section is designed to transfer the urban memory elements that were originally intended to be transferred to short-term memory in a way that appeals to sensory memory through visual and auditory means. "Coding" refers to a set of control operations in which information to be remembered is placed in the context of additional, easily retrievable information, such as a reminder sentence (R. C. Atkinson & Shiffrin, 1971). The first stage of memory is defined by R. Atkinson, Atkinson, Smith, and Bem (1990) as the parts of written, structured, and vocal urban memory that are unique to each settlement.

While preparing the presentation of the content in the information section, the statutes, declarations and legislation of many studies (The Nara Document On Authenticity (ICOMOS, 1994), ICOMOS International Cultural Tourism Charter Managing Tourism at Places of Heritage (1999) ICOMOS Convention for the Protection of the Intangible Cultural Heritage (2003), ICOMOS Charter on the Interpretation and Presentation of Cultural Heritage Sites (2008), and ICOMOS Turkey Architectural Heritage Conservation Charter (2013)aimed at protection and survival were accounted for.

The memory cards of each village selected as a sample are available in the web application's "traveler" tab. A generic snapshot of the settlement and the logo of the village's key memory space (building) are on the front of each card. Behind these cards are the names of important architectural memory spaces at settlement (Figure 4). Villages are presented as a card abstraction, allowing the user to select and acquire information in a specific order.
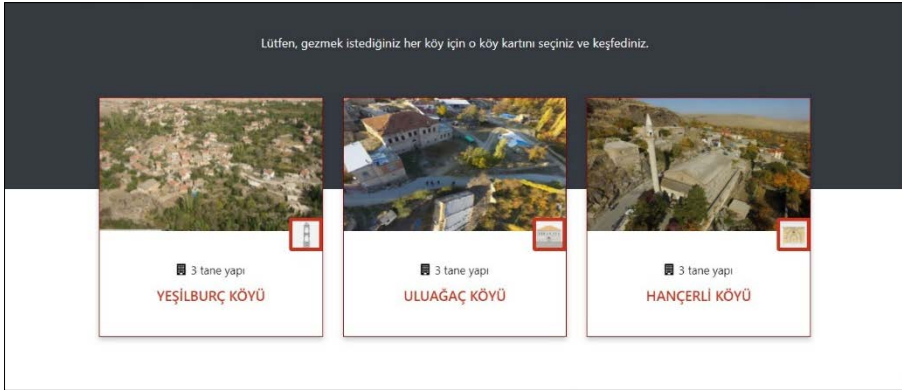
Figure 4. Traveler part implementation of DCHMM -memory (information) cards

The general information about the village, verbal memory of settlement interview video and the information map of the memory structures placed on the aerial photo of the village appear when you click on the settlement card (Figure 5-6-7). Aerial photography containing the village's main architectural structures was preferred in the interface design for those with a strong visual memory, and a plain simple design was preferred in the interface design for users of all ages (Figure 5).

Figure 5. Traveler section-information part on the place's history, language, population and verbal memory (sample settlements-Hançerli

Interviews with the living for oral memory transfer are presented in the explanatory texts alongside the interview video and are intended to provide interaction with the community without visiting the village (Figure 6).

Figure 6. Traveler section- verbal memory of settlement interview video- an interview with one of the oldest living in the selected settlement about the history of the village, its historical structures left from the Greeks, the village's history of population exchange (sample settlements-Hançerli Village)

Figure 7. Traveler section- map of 3 historical buildings selected for memory transfer in the village, interactively over the aerial photograph, marked with pins that the user can select (sample settlements-Hançerli Village)

The user has the option of choosing with the freedom to start from whatever historical building they want by hovering over it with the marked pins (Figure 7). When the settlement's memory structure is selected, an information screen about the building (history, plan, construction technique, facade, old function, current function) is displayed step by step (Figure 8-9-10).
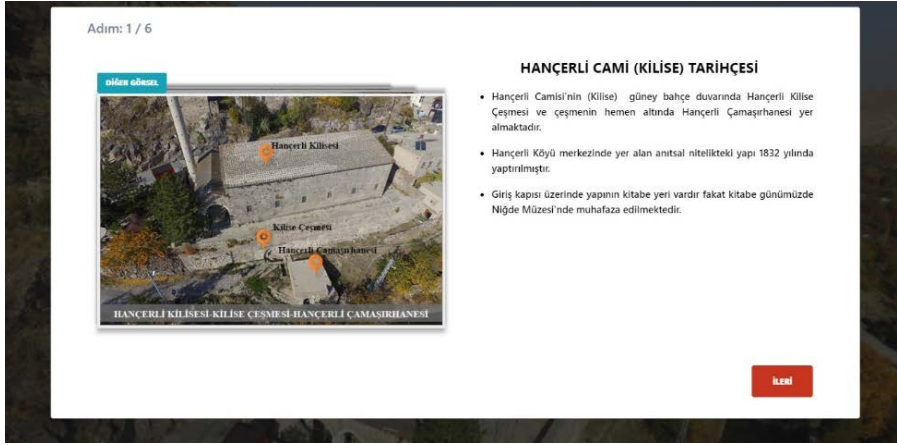
In the design of each stage detailing the architectural features of the historical building, plans, sections and views are schematized in a way that all users can understand. The ones that are intended to be conveyed on the image are marked and coloured on the right, and the information given on the left is retransmitted as text (See: Figure 8-9).

Following the presentation of important memory values of the historical building, the user is given information about the current state of the building and its historical worth (Figure 10). Additionally, when the user hovers over the images on the right, the user reinforces this situation by selecting multiple images (blue button), strengthening the building's current information about the use case (Figure 10).

Participation (getting ideas) section

Purely legislative limits and propositions will not be sufficient to ensure the preservation of architectural heritage. Success in this issue is directly related to the adoption of the notion of protection and making it an integral part of one's identity (ICOMOS Turkey Architectural Heritage Conservation Charter / 2013). The adoption and promotion of this notion by all segments of society can help to ensure the preservation of architectural heritage. Therefore, non-formal education should be aimed to promote public awareness (ICOMOS Turkey Architectural Heritage Conservation Charter / 2013) . According to the Charter on the Built Vernacular Heritage /1999, interventions can be made within the framework of a society-accepted code of ethics if traditional architectural forms are still maintained in the implementation principles incorporated in the adaptation to the new use. The use-value incorporated in the conservation values is defined as the value-added to the building by the original use of the building or the new use foreseen by the society (ICOMOS, 2013) This is closely linked to user opinions, i.e. public opinion. After giving information about the history, culture and oral memory values of the settlement to the user in the selected settlements, the architectural information (plan, facade, building material and technique, ornamental features, architectural reinforcements), the preservation status of the building, and its use in the past and present value information is transferred in the application step by step. Then, the user is presented with three different new function options to transfer the past memory values of the historical structure over their reuse potential. With these three different options, it is desired to show the user that the memory values are sustainable over the future use potentials of the structures, and this situation provides clear data in terms of evaluation in terms of results. The user must choose a new function between three options that they deem appropriate for the structure in the participation section.

Each building identified in Niğde with a history of population exchange must to be re-functionalized to meet the social, architectural, cultural and economic needs of today's environment. Many of them have disappeared because they are not used, while others are in danger of extinction. The process of structure conservation should include not only a documentation and registration process, but should also participate in society's existence with common elements of memory, each of which reflects the Turkish-Greek population exchange. To this end, the user's awareness of the assets of these structures obtained in the information section will be reinforced by considering the functions of their status in the future. Three new functions will be proposed for the memory spaces in each selected settlement (Figure 11).
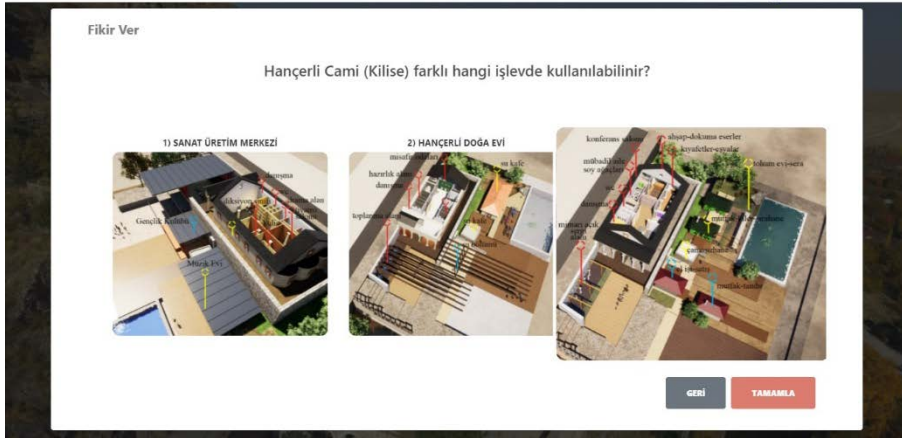
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These functions will help to promote the existence of other memory spaces in light of the settlement's socio-cultural, economic characteristics and history. The user must respond to the function that they deem appropriate for the structure in the participation section. Thus, they will be actively involved in conservation decisions.

Asking question section

After completing the information and participation stages of each settlement in the DCHMM web application, users move to the question section to collect data on how successful they are to be transferred. Users who want to move on to another settlement are required to answer at least three of the five questions correctly (60% success) . Users who fail to do so will return to the information section in another placement, concentrating on answering the questions. It is hoped that users who view the question would be aware of elements of urban memory that they did not consider in their first investigation.

Five fixed questions concerning the urban memory elements that are to be transferred after each settlement were asked in the asking questions section. The goal is to have a minimum of a 60% success rate for users of the urban memory elements to be transferred. First time users who fail to accomplish so will be requested to visit the settlement and their success rates would increase. The analysis of the urban memory element in which settlement is achieved will be assessed based on each user's answers in the first try. Success graphs were created for each placement in the first attempt. The results obtained in this way would be demonstrate their ability to be transferred to the user between placements.

Game section

The games are defined as an immersive, voluntary and entertaining activity in which a challenging goal is pursued according to the rules (Kinzie & Joseph, 2008; Zyda, 2005). Learning and memory transfer various sorts of learning and instructional relationship. Many studies have examined the effects of computer games on learning and it has been claimed that playing is a more effective new and modern method of

learning than traditional methods and applications (Cassidy, 2003; Hwang, Sung, Hung, Huang, & Tsai, 2012; Vogel et al., 2006) have been developed for this (Ebner & Holzinger, 2007; Sung & Hwang, 2013; Zin & Yue, 2009).

The game section of DCHMM aims to enable the user to re-encounter urban memory elements in an interactive setting by having fun and motivation for high scores after information, questioning and participation sections. Based on this, 15 of the urban memory elements listed in the information section will be presented in the DCHMM game.

The information provided in each image about the location and name of the structure will refresh the user's memory. The user will then be asked to find the correct response from each of the three answer options based on each question visually within the time limit that will start the game (Figure 12). The user will be able to use 3 tips if they wish.

Figure 12. Game section interface

The user will be able to see the percentage of success proportional to the number of correct answers and outcomes at the end of the game (Figure 13).
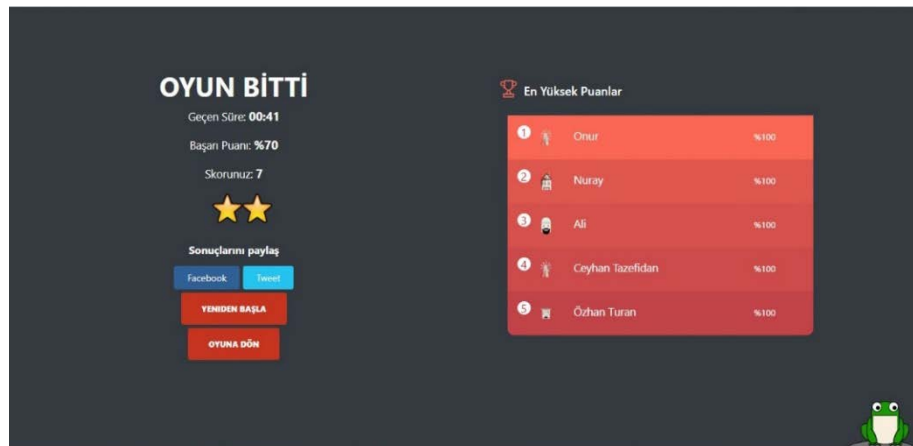
Figure 13. Game section results

Results of after Application of DCHMM

The application of the model was carried out by 452 people over the course of six months. The answers given by users registered in the system

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in the participation and asking questions section of the traveler's part, where the cultural heritage memory structures are processed, are saved in the database for each user, as well as a general evaluation according to age and education level (Table 3). The data acquired from the user was digitized and interpreted in line with the ones that were to be evaluated alongside the graphics during this process.

Table 3. Percentage distribution and numbers of users registered in the system
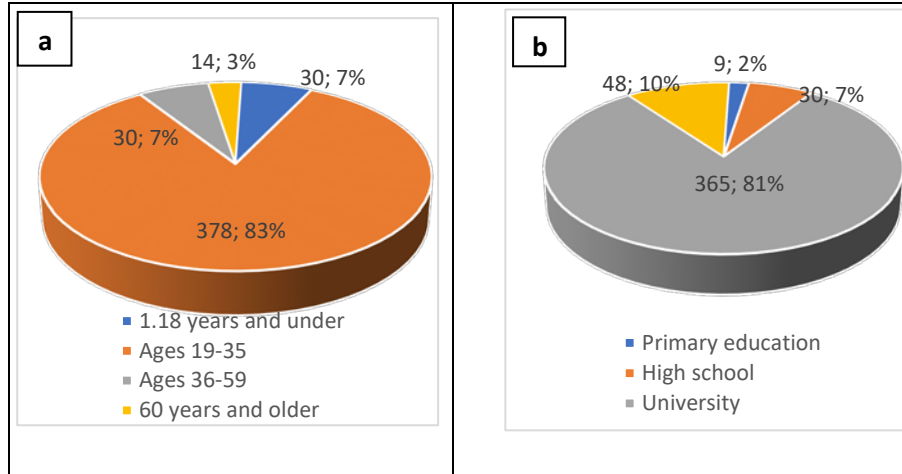
The circumstances in which the user visits the memory cards (Yeşilburç Village, Uluağaç Village and Hançerli Village) and gets an overview of the memory structures on these cards:

•Yeşilburç Village Mosque (Church): 342 people gave ideas: 342 people provided ideas (58.8% of the users who made the participation part of Yeşilburç Mosque (Church) wanted it to be given the function of Niğde Population Exchange Museum.)

•Yesilburc Stone Mansion: 349 people provided ideas: Mansion, the most preferred one was Yesilburc Guest House with a rate of 46.7%)

•Yeşilburç Hamam: 343 people provided ideas: their opinion (46.36% of the users chose the Turkish Bath, 33.5% as the Walking Way Stop and 18.8% as Yeşilburç Winery)

•Uluağaç Greek School: 320 people provided ideas: Uluağaç Village Association-Craft School was the most preferred among the functions offered to Uluağaç Greek School with a rate of 53.7%.

•Uluağaç Church: 322 people provided ideas: Users' preference rates for the functions suggested to Uluağaç Church were 43.5% Art History Campus-Main Building, 29.8% Uluağaç Village Association-Guesthouse, and 26.7% Primary School Students Education Building-Tale Workshop.

•Çatal Çeşme: 319 people provided ideas: Of the functions proposed for Çatal Çeşme and its surroundings, Uluağaç Village Association-Exhibition and Sales Area was preferred with a rate of 30.1%, Art History Campus-Semi-Open Cafe with a rate of 40.8%, and Primary School Students Education Building-Playground with a rate of 29.2%.

•Hançerli Mosque (Church): 311 people provided ideas: 311 people gave ideas. (59.8% of users chose Niğde Ethnography Museum, which is

recommended for the Hançerli Mosque (Church), 23.2% chose the Hançerli Nature House, and 17% chose the Art Production Center-Main Building.)

•Hançerli Church Fountain: 310 people provided ideas: 53.9% of users opted for Niğde Ethnography Museum-Retroactive animation

•Hançerli Laundry: 308 people provided ideas: Of the three functions suggested Hançerli Laundry, the users preferred the most with 55% as Niğde Ethnography Museum-Laundry Animation

The settlement that attracted the most attention, according to the digitized results, is Yeşilburç Village. The village that digitizes the data in the information section is the most densely populated village in terms of text and visual richness in the presentation of the data to be transferred. In addition, being the first card lined up from the left in the interface is observed to be beneficial in the selections. Some of the users did not visit all of the memory structures in the settlements, hence did not provide an idea. Users who register to the system during the process have a tendency to build villages in the traveller section at regular intervals.

To preserve the continuity of memory in society, users' the choices among the three new functions proposed for each historical structure were digitized according to age and education level for each building; thus, digitized data was obtained by ensuring the user's participation in conservation planning. (For an example, see Table 4: Yeşilburç Taş Konak participation section results).

Table 4. Age grouping numbers and percentages of the answers of the choices made to the user age and education groups to the functions proposed to Yeşilburç Stone Mansion

Suggested new functions	Age Groups							
	18 years and under		Ages 19-35		Ages 36-59		60 years and elder	
Yeşilburç Pastry Shop	7	%9.21	6	%86.84	3	%3.95	-	-
Yeşilburç Guest House	8	%4.91	45	%88.96	5	%3.07	5	%3.07
Yeşilburç Handicraft Station	8	%7.27	5	%86.36	5	%4.55	2	%1.82
	Education status							

Suggested new functions	Primary Education		High School		University		Postgraduate	
Yeşilburç Pastry Shop	3	%3.95	10	%13.16	59	%77.63	4	%5.26
Yeşilburç Guest House	-	-	3	%1.84	147	%90.18	3	%7.98
Yeşilburç Handicraft Station	2	%1.82	7	%6.36	90	%81.82	1	%10

The data of the successful and unsuccessful percentages determined according to the 60% success score of the users who tested themselves were acquired in Yeşilburç Village's questioning section. In the questioning section, if a user's success rate in answering the questions is below 60%, he/she is asked to answer the second round of questions in order to answer the questions again. But in the system, some users may exit the system instead of responding in the second round. Here, 50 people out of 333 people for Yeşilburç Village were not successful in the first round, but 28 of these 50 people answered again in the second round. Of these 28 people, 64.3% were successful in the second round. This success achieved in Yeşilburç Village was greater than predicted, where the most data with cultural heritage value is provided from distinct building groups for the three settlements and the technical term is used. A total of 316 people attended the questioning section of Uluağaç Village. In the first round, 85.8% of these 316 people were successful and 14.2% were unsuccessful. Twenty-seven of the forty-five people who made it to the second round tested themselves in the second round. 66.7% of users who made the second round were successful. 89.8% of the 303 people who tested themselves in the questioning section of Hançerli village were successful in the first round and 10.2% were unsuccessful. Twenty-one of the thirty-one who failed in the first round tested themselves in the second round. 47.6% of the users in the second round were successful and 52.4% were unsuccessful. The data obtained from the user as a result of using DCHMM in the designed digital environment demonstrates that the targeted memory transfer was accomplished in all three villages in the questioning section. More than 80% of users also demonstrated the success of the model. The user wants the settlement's memory value to be reflected in the present, according to the preferences stated in the functions proposed for the selected sample architectural memory structures. Furthermore, user preferences have demonstrated that the common main function given to three key architectural structures in a settlement will provide a sustainable level of protection, and a public participation poll has been conducted to put it into practice.

CONCLUSION AND RECOMMENDATIONS

In the discipline of architectural and urban conservation, particularly in the discipline of architectural space and time on the sustainability of spatial memory, debates, theories, and trends have arisen over the ages.

Riegl (2004) describes the characteristics of a structure that require protection; and grouping them as nominal values (old age value, memory value, designed nominal value) and actual values (usage value, art value) and stated the time and other qualitative values of the structure separately among the structure's protection criteria. These criteria demonstrate the significance of the structure's memory value within the discipline of conservation. DCHMM was created to raise awareness about the transfer of the naturally inherited (memory spaces) and elements of intangible cultural heritage (verbal traditions) to the next generation and ensuring their sustainability. In the information age, architects and planners should respect digital memory as a tool for storing, processing, interpreting and shaping the future, rather than storing the past.

The application process and evaluation of DCHMM, including questions asked at the end of the information to provide evaluation in the web application, the time response system in game format, and option to opt for multiple-choice functionalization options of the memory structure, will be presented to the users both with repetition of the information requested and the settlement and it is expected to be included in the decisions. DCHMM's results will be used to support the hypothesis proposed by the success of urban memory in the digital world. Simultaneously, the responses to the protection of historic structures in the city memory were analysed following the adoption of this model, which allowed the user to make an active and participatory choice. After this evaluation, the data provided vital input for future urban planners and architects. While transferring memory places to users in the settlements of Niğde Province, the decisions of users in the web environment were learned in the new functions that are suitable for today's conditions, and the suggestions will be developed by evaluating these settlements through their desire to visit in person.

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The preservation of architectural heritage cannot be guaranteed solely by legal constraints and propositions, and success in this regard is directly related to the adoption of the conservation concept and making it an integral part of its identity (UNESCO, 2003).The increase of public awareness on the importance of the protection of architectural heritage can be achieved through formal and non-formal education for people of all ages and educational levels. By developing the same approach and flow chart, DCHMM and cultural heritage elements of architectural heritage have created a system that will be used for educational purposes in schools. Improvements can be made in this direction based on the data collected throughout the application process and evaluation of DCHMM. Interactive web application models like the DCHMM can be used by elementary school and high school curricula in Turkey and around the world.

The UNESCO World Memory Program strives to ensure that the documents and information that constitute mankind's historical, cultural and social memory, and which are in danger of disappearing due to various natural disasters or social reasons, especially wars, are shared as

common values of humanity and shared in the digital environment as one of the measures of this protection. To this end, the program's three main objectives are to facilitate the protection of the earth's documentary heritage using the most appropriate techniques, to assist in universal access to documentary heritage, and to raise worldwide awareness about the existence and importance of documentary heritage. DCHMM can be used to turn data obtained from many historical settlements in Turkey into a project with the wide-scale support of local institutions and every city authority on this subject.

Urban memory values continue to exist as elements providing economic input. Measurable studies can be conducted using tourism activities aimed at targeted and intangible heritage sites in the sample settlements whose data is used to test the DCHMM's widespread impact after implementation and application evaluation. With the support of universities, local governments and the Ministry of Culture and Tourism, these studies can be developed via platforms that will be developed by architects, engineers, educators, sociologists, economists, city planners and all segments of society.

In line with all these results, suggestions for the use of the model (DCHMM) in education, tourism and public institutions show that an improvable approach is presented for future studies to ensure sustainability in the protection of cultural heritage.

ACKNOWLEDGEMENTS/NOTES

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Resume

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Research Article

Deciphering of the Architectural Program and Reprogramming: The Taşhan Region as a Critical Urban Point

Ş. Ebru Okuyucu * (iD)
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Abstract

This study discussed the deciphering of the architectural program, and the relevant concept of intermediate space within architectural production, and it questioned reprogramming through the concept of intermediate space. The study covered the Taşhan Street and neighboring locations in the Turkish city of Afyonkarahisar. It was based on assessing and discussing the existing programming and reprogramming dynamics in the Taşhan Region, which is functionally developed for craftsmanship, and contributes to the art and culture of the region. At the end of all these discussions, the program, 'depending on the venue and the user; It was defined as the 'sequence of frozen events occurring in moments' and the moments when these events occurred, their potential situations in places were revealed by reprogramming method. In the context of taking momentary sections in Taşhan Region; The methods of observation made in certain time periods (on weekends with high visitors, between 12:00 and 17:00, in the evening when the jazz festival is held) in the spaces in the region and interviewing with the users of the space were used to decipher the architectural program. Another scientific method used in the study is to make content analysis of the space theories put forward in the conceptual context and to reveal the evaluation criteria of the architectural program of the Tashan Region with the sub-concepts obtained within the framework of the text-based analysis method. While deciphering the architectural program, the conceptual analyses of the space theories proposed were conducted in parallel with the aim of the study, and the assessment criteria for the architectural program in the Taşhan Region were presented by using the sub-concepts revealed following the analyses. In conclusion, based on the momentary sections from the actions that occurred in the Taşhan Region, spatial flexibility in meeting needs to be increased and the relationship between users and spaces was enriched with reprogramming.

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INTRODUCTION

In the present-day, urban and spatial designs in architecture are not only shaped by local attributes, such as climate, topography and physical context; cultural attributes, such as user profiles, requirements, aesthetic values, and sociological infrastructure also shape them. To be effective in the design of cultural attributes made it is necessary to consider once again a configuration system, such as programming. According to all these factors, the relationship with the fact of program in the architecture of the space production is connected to how the program was constituted in architecture, spatial transformation, and deciphering of the program.

Tschumi (1996) emphasized the importance in the present-day of the designer questioning the program, function, forms of use, or events. To design a space only connected to materialistic attributes would remain insufficient in the plane of relationships between program – space. In addition, it would be more correct to produce spaces that place importance on the participation of users and that are supported from the actions of users. The concept that emerges in the Space-Action-User relationship found a response as "Intermediate Space." Hertzberger (2008) and Hill (2003) explained this concept as situations that could present an optimum solution in a manner that would include all kinds of activities for a form that could remain without changing itself.

In the study, the "Intermediate Space" concept presented a base about the relationship established between the response and the reprogramming at the conclusion of deciphering the architectural program. It also stresses the importance of threshold spaces that exist in space productions, and that is open to interactions among programs. According to the method of the study, the space concepts in response to statements, such as the definition of the relationship established by the events and program in space by Tschumi (2000), the fact that space is an economic asset by Lefebvre (2015), that space establishes an independent infrastructure from the program by Le Corbusier (2017), the fact that the experience about space is based on time by Till (1996), the transformation of production practices in space to consumption practices by Debord (2012), the fact that spaces are fluid by Van Eyck (2008), the motive to change the established order in spaces by Bergson (2007), and the fact that there is multi-functionality in spaces by Žižek (2011), and by revealing sub-concepts, a concept map was constituted. A model was prepared from the sub-concepts obtained by relating them to the deciphering and reprogramming of the architectural program in the Taşhan Region.

This study was conducted within the region covering the Taşhan Street and neighborhood in the city of Afyonkarahisar. Functionally, the study was developed connected to trade, the careful study of the existing programs, and the dynamics of the reprogramming in the Taşhan Region that sustains artistically and culturally the region with the restoration projects realized recently and moreover, covers the discussion. It was

determined that another method used in the study was to follow the traces by taking momentary sections in the different time segments from the movements of users within the region and encountering concepts of space in the Taşhan Region in particular. The program is a connector of the relationships of use or of the structure with the city within the Taşhan Region by analyzing within time and taking the status of dissolution and becoming flexible within definite and rigid boundaries. The region is used by the tradesmen and craftsmen who are the routine users in the region and with the arrival of different users in time, opportunities were provided for different spatial programs. Every encounter brought together different program formations. It was claimed that the moments were reshaped and produced according to the needs of the present moment in the region. The process that started with questioning the critical status at the urban scale in the Taşhan Region through the program, continued with the deciphering of the programming dynamics in the region. During these investigations, program definitions were sought that would provide a greater meaning from only a functional architectural construct. In the deciphering of the architectural program in the Taşhan Region, sub-concepts, such as "events, users, space memory, timely experience, consumption practices, flow, and movement," the following components were used: "culture point, user types, daily use dynamics, functional clashes, routine operation, user movements, and producing factories" that emerged from being associated with the space-user dynamics. The program, at the end of all these definitions, was defined as "the series of frozen events occurring in moments connected to space and user" and it was thought that the moment that these events were realized, the on-site potential situations emerged with the reprogramming method.

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Every unit analyzed that was analyzed according to the Taşhan Region and Taşhan functions were examined in detail within itself and subsequently were once again brought together. The careful studies that started with the assessments on space, deciphered spaces where production was made, for the daily actions of people, or the spaces used when passing by. After careful studies of space, user-focused analyses were made. The region was reassessed through the functions and movements of the existing regional users. Accordingly, a reprogramming perspective was developed through intermediate spaces in the Taşhan Region. The reprogramming and having the attribute of the extension of deciphering in the Taşhan Region and Taşhan was assessed in the scales of "users of the region, actions of users, form of use of spaces, new function, plan layers, needs of the moment, and transformations focused on space and users." These discussions were not only as reprogramming envisaged in a city location in the Taşhan Region and Taşhan, at the same time, it emerged that they had a place, which programmed the moving and transforming layers within themselves and the status of forming potential spaces in the regions made the study original and significant.

DECIPHERING OF THE ARCHITECTURAL PROGRAM AND REPROGRAMMING: CONCEPT OF INTERMEDIATE SPACE

Programming in architectural terminology sets forth standards related to the production of spaces that can answer the functions for which users have a need. It is important for an architect to question the program, function, use or events in the process of space production. Vidler (2003) mentioned that the program is the total of the spatial dimensions, relationships and other physical conditions, which are required for achieving a certain bodily activity, and indicated that these bodily movements are realized within a certain time sequence. This situation is possible with newly established relations, and not with static relations. While Preiser (1985) defines programming as providing information on the missions and targets of an organization, group or individual and that renders systematically to the action-person-thing relationships integrated to these, and with this means, as a process that obtains a functional building or facility, Hershberger (1985) used the expression "programming is design."

When the deciphering of the reprogramming is done on the user, the resulting sections are when different types of users entering the region have the routine functioning of the region; reveals that it reveals reprogramming attempts at space and user scale, potential moments and thus spaces. The change and transformation that emerged with the intersection and encounter of different experiences in the region both blurred the border between the public and the private, and was evaluated by the fact that the built environment is exposed to an intervention or adaptation at any moment. Movement and event phenomena arising from user movements and activities constitute a threshold between indoor and outdoor spaces. The common point of deciphers is that they are evaluated over instant situations. Based on all these arguments, in the context of deciphering the existing architectural program of the region and analyzing the reprogramming dynamics; The concepts of "space, body, time, memory, moment, event, movement, experience, image, flaneur" were the first concepts that came to mind. In this context, architects, sociologists and theorists who question the concepts, divide the concepts into sub-components and associate the concepts with architecture, space and each other have been selected.

Tschumi (1996) defined the most important attribute of architecture is the adaptation of the space to the existing socioeconomic status. Lefebvre (2014) said that the space is political, that it is an economic value that can be bought and sold, and that individual productions shape the space.

According to Dinç (2002), Hershberger defines an action that goes beyond being useful, functional and effective and can participate in the field of art as quality architecture and opens a doorway from the programming discipline to the poetic dimension of architecture. In this case, programming becomes a process in which values and goals are articulated and pointing to a high-quality architecture. The name of this

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value-centered approach is "Architectural Programming". Lefebvre (2015) says that social productions and bodily needs shape the space and therefore the program. In this context, the program of a space or building starts from the needs of bodily use necessary for social production. The architect has to put the data obtained from the environment into a meaningful form and establish the relationship between the components that make up the program while producing the space. The space shaped by human social productions and the built environment created should not be considered separately from technological developments, changes in the fields of culture and art, and current activities. The programmatic change and transformation in the designed space is in parallel with the developments in these areas and the new relations established. According to Şentürer et al. (2015), the ideal situation is that the concepts of harmony, systematic and rationally produced space enter into a dynamic relationship with the space produced in an intuitive, chaotic and irrational way, and spaces are constantly reprogrammed with the mentioned dynamics.

The aims of the use of spaces by users are in continuous change with the activities and actions realized in the space. The change of space provides the opportunity for different forms of use at different times. These relationships, which re-establish this new construct between what is required of the environment (technological, social, and political) and what is proposed by the standard and what is desired by the user and designed by the architect, created the fact called "intermediate space," the interface of the space-user communication (Yalgın, 2016). Intermediate space has been treated under different headings by many intellectuals and urban scientists. They are treated as social space and heterogeneous space.

According to Bergson (2007) in response to relationships that are restrictive and taken for granted and the fixed images, the intermediate space is the existing single movement and development space. (Grosz, 2001). Acting from this assertion, the program boundaries dissolve in the framework of spatial perception and it is observed that they start to overlap with each other. Moreover, an intermediate space approach occurred, which becomes active from the actions, activities and social events, which are the threshold between the city and the actual space.

Tschumi (2000) stated that the program was based on social behaviors and habits, whereas events are based on unexpected actions. He asserted that without an event, space could not be mentioned. It was thought that with the diversification of the relationships established by event and program, previously undesigned, automatic usages could be developed. As an example of this situation is shown to prepare food in the bathroom and to sleep in the kitchen (Tschumi, 1996).

Le Corbusier (2017) in the study "Towards a New Architecture" explained new concepts, such as free plan, free facade, raised floor and by being inspired by machines, said that buildings are one each life machine. Consequently, just like other products, it was necessary to produce them

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industrially, and to be designed with machine principles. This approach of Le Corbusier's (2017) is important for the formation of an infrastructure independent from the program that is easily applicable and can be multiplied. As a reaction to this situation, Bernard Tschumi defended the movement of people and space. It was claimed that architecture is transforming in a continuous manner by multi-events realized within and in the surroundings (Tschumi, 1994).

Van Eyck (2008) stated that the functions of architecture did not consist of a total, and that it was necessary to provide opportunities for the realization of the activities of people and to work in a manner that would increase the social interaction. Accordingly, the intermediate space concept produced between spaces by being connected to other spaces takes an open and interpretable condition. Boettger (2014) emphasized that a defined limit was formed between people and spaces, but later they want to reconnect them and to pass from a space to another related space. A need is felt for an intermediate space, that is, a threshold, for providing this flow between spaces. Threshold spaces, as intermediate spaces, by providing for the establishment of relationships of buildings with the city, assumes the duty of a buffer between the internal program of the building itself and the events happening in the city. Intermediate spaces, by providing boundaries, space configuration, and continuousness between the city and building, while pedestrians walk around and in the basic concept attribute of Benjamin (2002), are transferred to the space of Flaneur depicted in the meaning of the thought-producing person with the impressions of the environment. The building has turned within itself, and isolated spaces in the concept of understanding the spatial relationships established with other spaces and functions, needs to be analyzed for the entire program belonging to the building and to the built environment.

According to Calvino (2002) a city has many layers and has the potential to be more than one thing. Consequently, it is a place that is the most open to experience and personal interpretation. According to Debord (2012) the aim of the restructuring of the space in a city is to change the place of the production practices with the consumption practices realized at the city center.

According to Şentürer et al. (2015), spaces that can establish an organic relationship with the city and the individual in the dynamic fiction of the city are the places where collective production takes place. In such spaces, reprogramming occurs through gaining awareness, experiencing and establishing a one-to-one relationship with the environment. In reprogramming, the mobility of the space becomes possible with the interaction of the spaces with strict rules and the dynamics of the spaces that emerge with pure intuition.

With the thought that time and space are connected to each other, Till (1996) emphasized that assessing time through architecture would only be possible spatially, because the experience of space would be realized based on time (and memory). It was observed that in these spaces that

were standardized by being deciphered in time, dissolution was realized and within the framework of the reprogramming, approaches were bent, and boundaries were exceeded.

Žižek (2011) drew attention by mentioning the boundaries in the architectural parallax text and between the boundaries and that definitions tightly wedged them between definitions. The attribute both being able to include everything with the status of not being able to include anything, that rejects the boundaries and intermediate concept, presents multi-functionality, spatial-temporal fluidity and different experiences to spaces (Žižek, 2011).

It is important to be able to construct intermediate sections that could form for constituting a space in the field of architecture, for constructing interactions with the surroundings, and for becoming integrated with the users in the space designed. Theoretically, even if it appears that a person who establishes a space is an architect, the space happened as an area that exists itself with the user, environment, and function, and that can change and transform. How it is interpreted by users and how it is kept alive with the actions of the users plays a significant role in the production of the space. Unexpected events and formations that are unexpected previously is surprising and momentary (Lefebvre, 2015). Every event realized momentarily upsets the construct of the space and is an attempt for reprogramming that is re-established, because the moments follow another different environment or bring the possibility onto the agenda (Tschumi, 2000). Whereas these moments can be defined as the breaking points that bring reprogramming onto the agenda.

Within the framework of the Istanbul Technical University Architectural Design Master's Program, reprogramming was experienced in a selected region within the scope of the workshop titled "In Search of the Dancing Space" conducted in collaboration with Tuğba Yalçın, İpek Kuran and the Design Workshop Kadıköy (TAK). In the "Namazgah", which was selected from the insufficient areas determined in the light of field research and interviews with the residents of the neighborhood, on-site design studies were carried out to strengthen the individual-space relationship and to create a sustainable program in line with collective decisions. The workshop process started with the search for a place in line with the needs determined after the theoretical background was given to the participants. In this direction, in order to define a meeting point to be actively used, the place where the "Namazgah" is located among the public spaces with high potential was chosen (Şentürer, et al., 2015).

A historical site, Namazgah is an unused public space for the region, with the adjacent Ahmet Haşim Culture House, which is in the process of restoration. Following the selection of this square in order to ensure that it is used actively in line with the stated purposes, the participants presented their own experiences and took the opinions of the people around. In the created platform, ideas were shared as a collective and

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work on the transformation and reprogramming of the space was started. Participants were guided to a process that would reveal the dynamics of the space in intuitive ways by being on site. The most striking phenomenon is that the increased potential of the individual simply by being there enabled the space to be reused. It has been observed that individuals who are not actively involved in this platform -street artists, shoe shiners, those who use the place to listen, etc.- contribute organically to the reprogramming of the space (Şentürer, et al., 2015).

In this study, contrary to the mentioned workshop, in the Taşhan Region, which is not empty, but a dynamic and dynamic region where activities and actions take place, where there are instant and continuous users of the spaces; The simultaneous use of space, function collisions and flexible use of space by users of different profiles in Taşhan, which was reprogrammed by deciphering the user-oriented, space-oriented and moment of encounter of the existing region, were analyzed by observation.

Since it is not possible to explain all space theorems within the framework of this study, a general framework has been drawn in which the concepts of decoding the program and reprogramming are discussed. The conceptual analyses were conducted related to the space theories proposed by Tschumi (2000), Lefebvre (2015), Le Corbusier (2017), Till (1996), Debord (2012), Van Eyck (2008), Bergson (2007) and Žižek, (2011) and these concepts were reduced to sub-concepts.

In this context, a perspective was developed for a reprogramming through an intermediate space in the Taşhan Region. It is shaped with the unexpectedness of actions and is deciphered with the simultaneous use of spaces by different bodies. It was envisaged that these intermediate spaces provided opportunities for new and momentary programs in addition to the existing program in the region.

MATERIAL AND METHOD

The fact that the discipline of architecture is multi-layered and at the center of it, the design practice that relates to its own specific structure, and the expansion of the phases of building programming constitute the content of this study. The aim is to go beyond the pragmatic structure of building programming based on the rational basis, to a flexible structure called functional collisions and daily life dynamics, which also includes irrationality, and to emphasize the necessity of this type of flexibility for all sub-disciplines that will take place in architecture. For this reason, the works, which include theoretical and compilation examples in the context of the reprogramming discipline, are discussed with the definitions and content innovations they bring to programming. Relevant terms (space, body, time, memory, moment, movement, image, experience, flaneur) were introduced through a theoretical background and the research structure was outlined, forming a reference to the outline of the study.

Within the framework of conceptual analyzes of space theories put forward by Tschumi (2000), Lefebvre (2015), Le Corbusier (2017), Till

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(1996), Debord (2002), Eyck (2008), Bergson (2007) and Zizek (2011);
a concept map was composed that supported the deciphering of the
architectural program and the process of reprogramming in the Taşhan
Region (Figure 1). In the framework of the analysis method based on the
text, the words that expressed the sub-concepts forming the theories
were transferred to the concept map and to the model prepared.
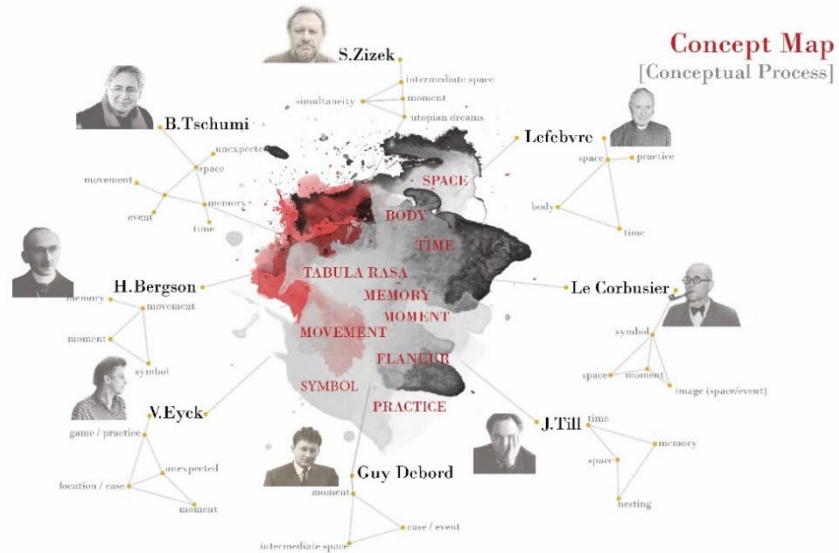
Figure 1. Concept Map
(Conceptual Process)

In the study, related to the space construct through the architectural
production processes in the Taşhan Region, the deciphering of the
architectural programming, and the methods of bringing together the
spaces at Taşhan, reprogramming was conducted with the threshold
space formed with the separation of interior-exterior space and with the
intermediate space approaches, which were shaped with the momentary
events.

The Taşhan Region, which is an intermediate space, has the attribute
of a permeable border and by assuming a threshold duty between these
boundaries, provides for the flow of movement among spaces. When
using architectural drawings, the plan diagram of Taşhan is assessed, the
building programming conducted quantitatively dissolved in time and
established qualitative relationships with the city and it was observed
that intermediate spaces were composed. In parallel with the aim of the
study, with the text-based content of concepts based on space theories
proposed by Tschumi (2000), Lefebvre (2015), Le Corbusier (2017), Till
(1996), Debord (2012), Van Eyck (2008), Bergson (2007), and Žižek
(2011) by making analyzes; Regarding the deciphering and
reprogramming of the Tashan Region; sub-concepts were determined
and evaluation criteria were put forward. In this manner, the sub-
concepts obtained would find a conceptual equivalent in the deciphering
of the program and in the assessment criteria of reprogramming. It was
attempted to make the space configuration, human bodily activities,
actions, movements, daily use practices, routine operation, and spatial

transformations in the Taşhan Region measurable. In this context, observations were made in the Taşhan Region during certain time periods (between 12:00 and 17:00 on two weekends when visitors are busy, and in the evenings when there is a jazz festival), interviews were made with the venue users, and instant notes were taken about the region. With these acquisitions, in order to decipher the current program of the Taşhan Region, firstly, the relations of the spatial structure of the region with the urban activities were observed and discussed at the planning scale. In the context of making the moments experienced in the region measurable, within the framework of architectural drawings; The existing traditional (plan, section, perspective) and innovative (vector) representation tools of the Taşhan Region were used together.

A model was prepared based on all these data obtained in the context of the questionings and dissolutions for the architectural program in the Taşhan Region and of establishing programmatic relationships for social production (Table 1).

Table.1 Deciphering of the architectural program in the Taşhan Region and model proposal for reprogramming.
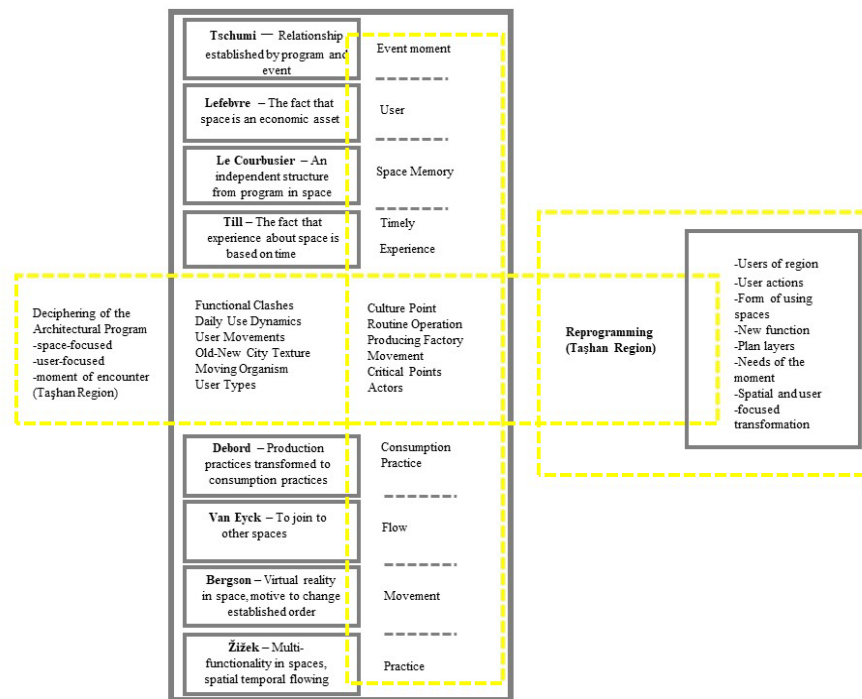
Within the framework of the prepared model, the theories of space put forward by Tschumi (2000), Lefebvre (2015), Le Corbusier (2017), Till (1996), Depord (2002), Eyck (2008), Bergson (2007) and Zizek (2011), deciphering the architectural program; Space-oriented, user-oriented and within the framework of the moment of encounter, various actions were found and the actions were determined by the participant-observation method. This method, in analyzing the dynamics of reprogramming in the focus of space-individual relationship, made it possible to use the dynamic structure of moment and movement readings instead of conveying the process, environment and events on frosty

foundations. The physical and conceptual inputs about the space, together with the movement of the individual in the space in the dynamics of the individual-space relationship and the reprogramming process, formed the keywords. In the analysis process, in order to reveal the variables of the dynamics; The environment is conveyed in its conceptual context and the conceptual components in space programming are associated with the users of the region, user activities, the way they use the spaces, new function, plan layers, the needs of the moment, spatial and user-oriented transformations.

THE TAŞHAN REGION AS A CRITICAL URBAN POINT

Together with the housing texture of the Taşhan Region and its neighborhood located within the historical urban site area in the city of Afyonkarahisar, has shaped the trade and continues its influence in the present-day. This region and its environs were declared as an urban site to preserve and keep alive the original settlement texture in Afyonkarahisar (İlaslı et al., 2004). This area was taken into the status of an urban protected area with the decision of the Konya Cultural and Natural Heritage Preservation Regional Board with the decision of 28.12.1993 and numbered 1861, with the determinations made with the Conservation Development Plan studies. (Figures 2).
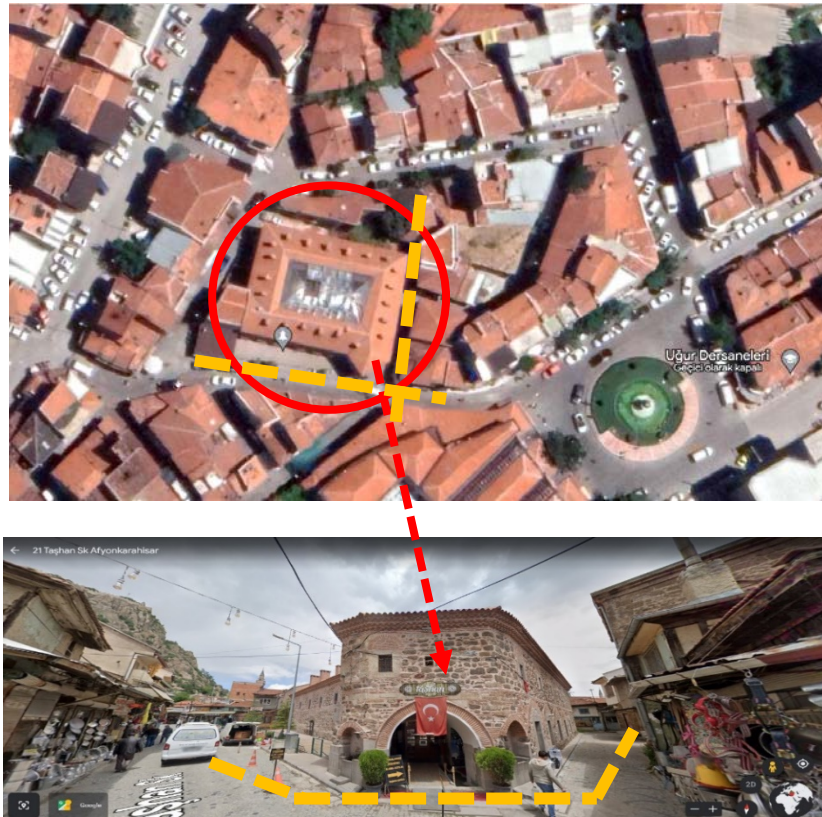
Figure 2. View of the Taşhan Region taken from Google Earth, (Google Earth, 2023)

When the Taşhan Region is thought about by considering the present-day conditions, what comes to mind first is the "contradictory situation" formed from its location and function (Figure 3.).

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Figure 3. Old City Fabric and New Urban Fabric Synthesis inTaşhan Region

The Taşhan Region remains at the center of the former city texture and despite its closeness to the new city texture, it is one of the rare regions that continues to preserve it former function. The location of Taşhan and the region were shown in Figure 4 in the Afyonkarahisar city development plan aimed at preservation.

HISTORICAL TAŞHAN	
PLACES OF WORSHIP	
BEDESTEN MARKET	
TRANSPORTATION ROADS	
SHOPS AND WORKPLACES	
HOUSING	
HAMMAM	
MONUMENT	
HISTORICAL HOUSING	

Figure 4. Location of the Taşhan and region in the development plan aimed at preservation (Afyonkarahisar Municipality, 2020)
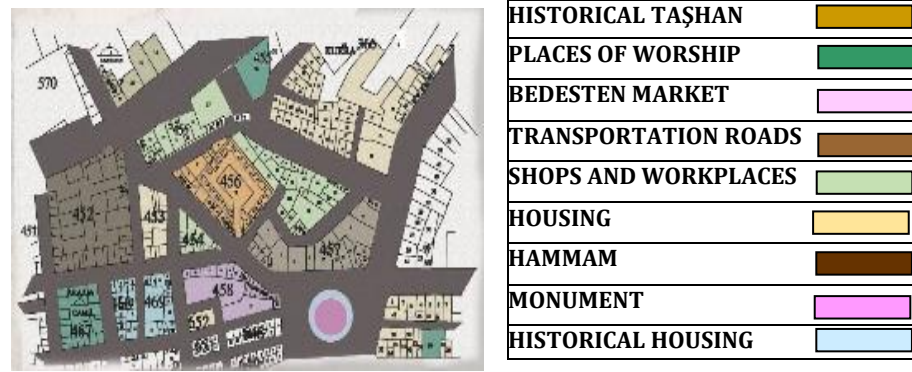
The Taşhan Region remains between the shopping and cultural points within the former city texture, and besides forming a passage area, it is a region where craftsmanship continues. There is the status from the past to the present of being an integrated facility that is only inhabited during the day. There are significant differences between the night and day usage densities. The tradesmen who are the routine users of the region and the users for the day, are the cause of a high pedestrian circulation rate during the daytime hours. However, with the closing of the workshops and shops of the craftsmen in the evening hours, the region takes on the appearance of an "idle and deserted face," which forms a contrast to the integrated facility function during the daytime hours. The Taşhan Region trained many masters from the past to the present, was the craft school of the period, and can be counted as the producing factory of today. It is a city location that deciphers many spaces with potential with the actions, events, and movements realized in its structure and is separated from the other city places with its location. The changing of the built environment user typology and the formation of different sections at different moments has formed thresholds between the public spaces and the private spaces. Moreover, the reprogramming issue considered for the region, beyond treating solely as architectural, the functional space construct needs to be reanalyzed to decipher the potential spaces it includes in the region and to make them visible. In order to decipher the program in Taşhan Region, the region was analyzed by participant observation method and interviews were conducted with the venue users between 12:00 and 17:00 on three weekends when visitors are busy, and on the evenings of the jazz festival. As a result of all these observations and interviews, it was determined that there are existing spaces/changing spaces in Taşhan Region; It has been determined that instant/permanent users roam the region and there are encounters and collisions in places.

Perspective of The Program and Method of Deciphering in The Taşhan Region

The Historical *Bedesten* (vaulted and fireproof part of a bazaar where valuable goods are kept) in the close neighborhood in the Taşhan Region

is supported by the users and at the same time, it is a region that supports the *Bedesten*. As of location, the region starts with the Municipal City shops, and is supported with the shopping spaces in the close environs and is used as a passage (threshold) space. The users in the Taşhan Region are composed of the tradesmen, who are the routine users of the region, and for the day users, who enter for work (Figure 5). As a result of the observations made in the region and the interviews with the users, it was determined that there was a change in the user typology after the restoration of the Historical Taşhan. Taşhan, which provides services as cafés and local gift sales points, in addition to the status of being a passage space brought by its location, it has become a center, which showed hospitality in its structure to different users, and which became a center that started to draw users to the space. User profiles from different socio-cultural classes (such as worker-officer-bureaucrat-academic) and from different age groups (child-young-middle-aged-old) can be seen as a result of observations and interviews held in the region between 12.00 and 17.00, choosing three weekends with high visitors. This space, which has taken on the responsibility of different programs, provides services with different functions for different experiences by users.

When the Taşhan Region reprogramming concept is decomposed into layers, actors contribute to the reprogramming formation and there are users who provided contributions to the space organization and reprogramming as a living and moving organism and deciphered the intermediate spaces, which gave the opportunity for encounters. These actors by taking momentary sections from the movements within the region, will follow their traces. Related to the analysis in the spatial context of this trace following in the Taşhan Region, temporal sections were taken through the critical points from the aspect of pedestrian density about the area, the functional clashes occurring in the historical process and from the aspect of daily use dynamics and different situations about reprogramming were determined.

Figure 5. Taşhan Region and the axes supporting the region (Yandex, 2023).

In this study, the existing traditional (plan, cross-section, perspective) and the innovative (vector) representation tools were used together. Vectors, which provided for the enlivening of events in a certain space by showing the form and direction of movement, were one of the main tools used in the deciphering in the Taşhan Region program. The activity and life included at Taşhan, rather than from boundaries, were described as intermediate space of the void of the flowing extension of the courtyard surrounded by the thresholds. By increasing with various actions, the density of the courtyard, bodily experiences were connected and as Tschumi (2000) expressed, the extension of the courtyard became an intermediate space, remaining between the two specialized casings located on top of each other.

Deciphering in the Taşhan Region Through Spaces/Users and Encounters

First the existing programming varieties in the region should be deciphered for mentioning the construction of a new program in the Taşhan Region. Three different situations were determined about reprogramming in the context of function for this deciphering, by superimposing the sections taken from the past and from the present-day of three points, which are qualified as critical (Table 2).

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Table 2. Three different situations were determined

• Space example that transforms itself (space reprogrammed by the user – space reprogrammed by leaving it alone	
Venue example	**İmage**
Kerem coffee shop-coppersmith at the corner	

• Space example that transforms with an outside force (reprogramming according to the space needs of the users	
Venue example	**İmage**
Coppersmith becoming a shoemaker/seller	

• Space example that transforms independently from the environment (reprogramming independently from the general texture in the region)	
Venue example	**İmage**
Taşhan restoration	

In the three sections studied in detail, the functional architectural changes in the temporal process, just as Yazgan (1996) expressed, the meaning of space is not only from the physical, functional, historical, and symbolical attributes of the space, at the same time, is set forth by being taken from the events within and from the interpretations of people. Events are realized at the breaking points in these changes. Together with the space action emerging, the user concept emerges, which shapes the space according to those who use the space, who experience it, and their own individual productions. The users, with their own space perceptions and experiences designed, reprogram from the framework of a new needs program. In the space trialectically constructed by Lefebvre, the

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social space was described as an action that moves between the space that is perceived, designed and experienced (Figure 6) (Lefebvre, 2015).
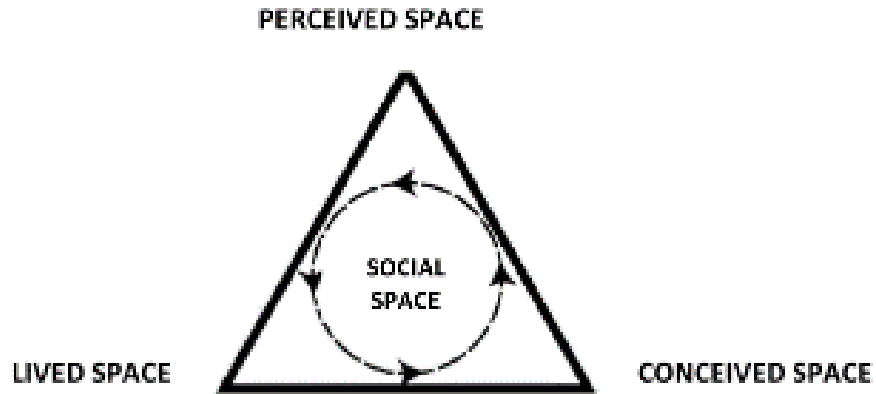
Figure 6. Lefebvre's ternary space diagram (Lefebvre, 2015).

The three different reprogrammed varieties, produced from the change in the historical process of the spaces examined in detail and determined as critical in the Taşhan Region, were deciphered through the user that contributes to the movement within the space, to the establishment of the space and to its reprogramming. The actions of the users and the forms of use of spaces are deciphered through the craftsmen who are the present users and the users for the day. When deciphering was conducted for the users in particular, the spaces and the forms of use were treated (Figures 7 and 8).

- Locals of the space (craftsmen),
- Users for the day (users who have work, and come), and
- Users who use the space as a transition space.
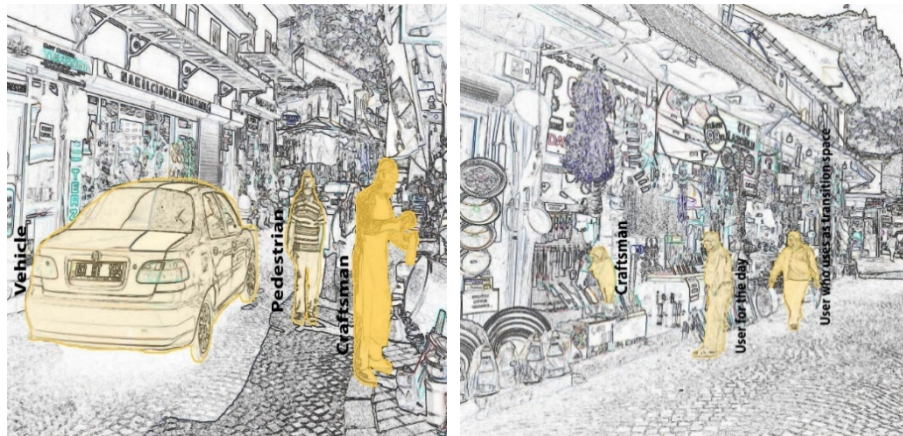
Figure 7. Space use forms by users.
Figure 8. Space use forms by users.

A user who acts like an event establisher organizes, constructs and reprograms the space, breaks off from the context at every reprogramming and affirms with new functions. The responses given to the user's actualities is considered important for users who reproduce the space according to their own actualities, not the production aim of the space. Moreover, an idle city part, by hosting important activities, such as a jazz festival, can change the user typology by a user. An intellectual user

with a local user of the region can constitute different intermediate sections by using the same space at the same time interval with different aims. Users who have different economic levels and sociocultural structures provide the opportunity of sharing the same space at the same moment, in different function planes, not only at the moments when there is a jazz festival, the local people while engaged in routine shopping in the region are encountering tourists who come to discover this region, which is an extension of the historical city center. A tradesman sitting in front of a coppersmith shop and drinking tea, a visitor who takes a photograph and an inhabitant of the city who has come to purchase a copper *cezve* (long-handled pot for making Turkish coffee) shape the space according to their needs at the same moment and simultaneously and provide contributions to the formation of new intermediate spaces. Every intervention of the user to the space is a reprogramming initiative. When the traces of the spatial and user-focused transformations in the Taşhan Region are interpreted through the user, moments when the different user types enter the region are included in the routine operation of the region, and it shows that reprogramming emerges when there are different encounters and with different spatial concerns. The region that was previously used only by the craftsmen in the region, hosted an international jazz festival in the present-day and the guests and artists who came to the festival were able to use the same space simultaneously with the craftsmen and at every encounter, it brought together the formation of different programming dynamics.

The deciphering of the actors in this programming in the Taşhan Region brings into the open the reprogramming initiatives at various scales, the moments with potential, and consequently, the spaces with potential. The intention of the moment with potential and spaces are the spaces that appear with the clashes of different bodies that we could call intermediate space especially in the Taşhan Region (Figure 9 and 10).
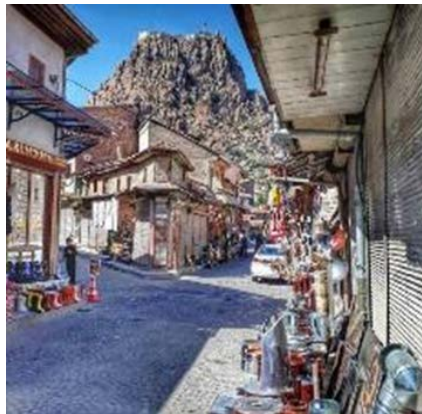
Figure 9. Taşhan Region (Yandeks, 2020).
Figure 10. Moment with potential at the intermediate space

Reprogramming in The Taşhan Region Through the Intermediate Space

Intermediate spaces are open to different encounters and program crossings. In the intermediate spaces, which are a type of infrastructure for social productions, it is possible to have unexpected encounters and

quantitative programs of building-user relationships not envisaged. These intermediate spaces that emerge automatically as the result of designs, and utopic daydreams (Žižek, 2011) for making moments with potential / places visible, are suitable places for other actions, not for direct design. Tschumi (1996) stated by acting from this situation that by thinking about space and events separate from each other, they can overlap each other, or that they can realize activities that appear to be in harmonious in spaces that appear to be inharmonious. This approach by Tschumi, together with a questioning for program, results from the thought of the probability of spaces, which appear inharmonious, led by different actions. Different users and spaces with every use, that is, the emergence of the intermediate spaces, which are a part of the whole with the reprogramming, indicates a dynamic and fluid construct. In other words, common areas are a social relationship that belongs to everyone, built with a collective consciousness, and they are places that allow experience as well as sharing it. In the spaces produced with the possibilities of these encounters, the multi-layeredness of the city becomes a value rather than a chaos. In this context, in the process of reprogramming the Tashan Region, as a result of the interviews and observations with the users of the region; It has been decided that the scales to be discussed are the activities of permanent and instant users and the flexibility of use of the spaces realized within the framework of the needs of the moment. Apart from this, the reprogramming of Taşhan, which continues its physical existence as a historical building, within the framework of a rational approach, has been analyzed in the context of the functions it has had from the past to the present, in the scale of architectural drawings, plan layers and function diagrams.

Reprogramming by the Users of the Region, the User Actions and at the Scale of the Needs of the Moment

If definite boundaries and definitions can be made at the momentary sections of spaces in the Taşhan Region, then the lines for these intermediate spaces belonging to the Taşhan Region are that unclear. At the intermediate times that have become visible with the elements that compose themselves and whose traces can be followed, will exist at the conclusion of the unexpected actions and encounters. It was envisaged that relationships could be established that were not previously perceived in the spaces with the jazz music festival organized every year in the city of Afyonkarahisar. In this situation, the use of the same space by the jazz artists and the craftsmen in the Taşhan Region can constitute an example of intermediate spaces, which are deciphered in the Taşhan Region. The situation of the artists and craftsmen using the same space with parallel actions simultaneously, indicates that at the original space intermediate spaces were composed (Figures 11 and 12).

• When the same space is reprogrammed simultaneously by the jazz artists and the craftsmen what is deciphered is the intermediate spaces.

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- When reprogramming the encounters stemming from different user types being in the same space simultaneously what is deciphered is the intermediate spaces.

Figure 11., **12., 13., 14.** Taşhan courtyard (Archive) and deciphered intermediate space

The bodily actions that have intensive interactions with objects (such as copper Turkish coffee pots, felt-like vests, and leather shoes) in the commercial space at the Taşhan Region, rather than static spaces dedicated to a certain aim, display to us a dynamic space potential that could meet the momentary needs. It was observed that individuals with different profiles who come to the Region for different aims (such as to shop, to walk around, to pass through the street), the moment they encounter a transforming space, the configuration in the space can be adapted as easily as possible. Whereas the Taşhan, which got into motion from the user actions and by the participation of users, is a transformed historical building thought to be important. The Taşhan has a configuration that includes in its structure different functions, is used by individuals with different typologies, such as the workplace owners who are continuous users, tourists who come to walk around, customers who come for shopping, and course attendees who come for receiving education at the workshops. The building program of the Taşhan where both concrete productions can be observed, and is a social space formation, where the visual, psychological, sociological, and biological dimensions of human behaviors can be assessed.

Plan Layers and Reprogramming at the New Function Scale

The user actions, potentials of use, functions, and daily use practices belonging to the period when historical buildings were constructed, can lose their importance in the present-day. Accordingly, if the situation of reprogramming is evaluated for the Taşhan in particular, which is located in the Taşhan Region, it was constructed according to the traditional *han* (caravanserai) typology of historical buildings, was used in the process for trade functions and together with taking on the responsibility of a similar function, it is an indicator of providing opportunities for momentary programs and was connected to the region in the context of intermediate spaces.

Taşhan's location in a commercial region that has not degraded the historical texture, its integration with a market that presents the traditional crafts of the city, such as the blacksmith's market, the probability of realizing undesigned actions in undesigned spaces has presented the opportunity to have actions-users to come together. The Taşhan, which has a unique structure, is interconnected with the situation of being like or the same in the present-day for the functions presented through the centuries. When the plan diagram of the historical building is decomposed, we are confronted with an intermediate space where the old functions and the new functions clash with the original spaces and the designed actions and potential moments are experienced. It is observed that in the framework of the reprogramming of the historical building, where local names are given at the small shops, such as Felt Workshop, Reed Flute Workshop, *Kilim* (pileless carpet) Sales, Second-Hand Book Sellers, Prayer Bead Silver Shop, Bread House, Ethnic Clothing Design, Organic Garden, Hobby House, Soap and Scented Stone Design, Marble and Natural Stone Design, Honeysuckle, Local Gifts, Leather Design, and Art Workshop, the continuous users meet together with the visitors. The realization of actions simultaneously, such as the shop owners and the customers encountering each other at the small shops in closed spaces at the Taşhan, at the semi-open spaces the visitors take photographs or in the courtyard that is an open space where tourists drink tea, is a result of the program crossings. Especially, the porticos, where many functions can intersect, are transformed into intermediate spaces composed automatically that can be encountered by the users of the spaces. In addition to the existing program of the historical building for hundreds of years, providing the opportunity for the same or similar programs, the presentation of sections from historical moments, and at the same time, the establishment of a dynamic space-subject relationship, is an indicator of the diversity of the reprogramming. The transformation to a new function of the existence of the Taşhan as a typological caravanserai structure with a monumental autonomy, finds its equivalent in the expression by Le Corbusier (2017), "an infrastructure independent from the program." Taşhan confronts us with a spatiality that finds life from the transformation and the organization of the structure. The spatial transformation of the Taşhan finds its response in the Taşhan *Alem-i Çarşı*

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spaces. The historical moments in the building intersect, the old and new programs clash and the situation of the subjects of the space encountered with the users of the space were given in Figure 13 and Table 3.
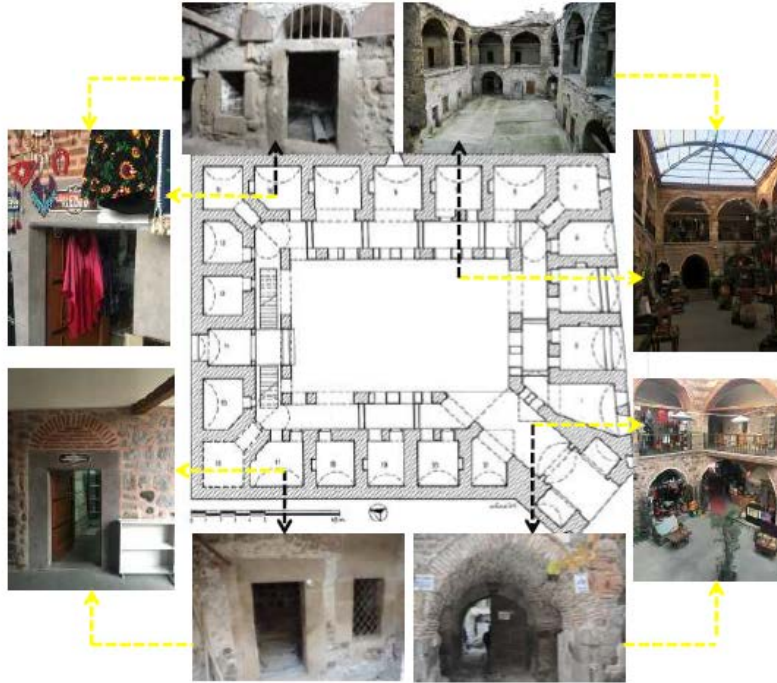
Figure 13. Taşhan ground floor plan (Daş,1997) and visuals for the plan diagram (Archive).

Table 3. Expression of Taşhan's spatial transformation.

Through Plan Diagram	Transformation Expressions	Users	Actions	Status
Space Belonging to Old Program	- - ➤	Shop Owners, Merchants	Trade	A separation between the cover of the building and the inner life
Space Belonging to New Program	- - ➤	Workplace Owners, Visitors, Course Attendees, Customers	Workshop Education, Product Sales, Eating-Drinking, Product Design	Richer for Program-space relationships

Usage Form of Spaces and Reprogramming at the Scale of Spatial and User-focused Transformations

In case the program of the spaces located in the Taşhan Region is flexible, then it shows that every individual who enters inside the space transforms that space. The relationships of individuals with the space in the Taşhan Region are continuously evolving, just like themselves. Whereas this situation of evolution presents the opportunity for an open

programming to probabilities and momentary formations. Spatial and user-focused transformations increase the productivity in the form of using spaces, in answering the needs, and in changing dynamics, provides for enriching without breaking the relationships established by space with individuals. A space (status of the coppersmith's shop on the corner) in the Taşhan Region, which transformed without a physical struggle and that was not designed, meeting with a designed action, increases the probabilities of action-user encounters in the space. Customers who come to the blacksmith's shop transformed by being designed into a shop selling shoes was not in memory, but the moment they encounter the shoe shop located there, bring to light the potential within the space by realizing an adaptable user participation. Whereas at Taşhan, spaces transformed as designed coming together with undesigned actions, constitute potential for momentary and new programs. In these spatial transformations, the fact that the functions are easily reachable, that visitors passing by find themselves within the space, that a fluid circulation is provided, achieved an increase in the diversity of the program in the region (Figure 14).
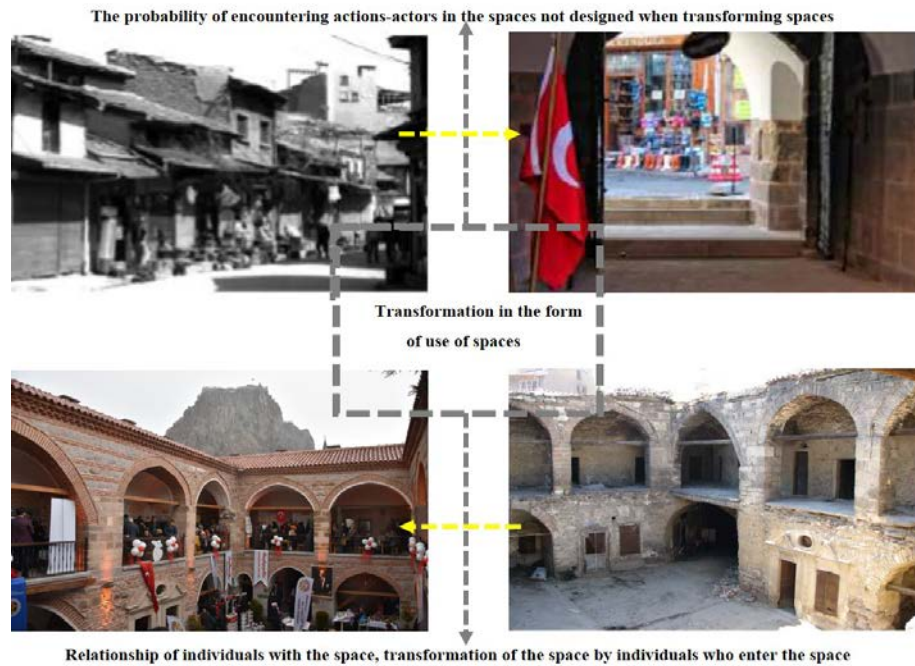
Figure 14. Change in the form of use in spaces inthe Taşhan Region (Afyondayız Blog, 2021, Archive).

Taşhan itself (Hertzberger, 2008), has been transformed to an intermediate space in the region connected to the public-private relationships within the city. Intermediate spaces were formed by the separation of Taşhan with several steps from the region, by Taşhan having an open courtyard that provides the opportunity for activities, by keeping the door open having interactions with the street, by the shoe store located immediately opposite the door, by the establishment of visual relationships with the space, and by diversifying the usage rituals, without breaking off the connections between individual and collective productions (Hertzberger, 2008). At Taşhan, in contrast to the shops in

the region closing in the evening hours, with the spaces where all functions are continued, and with the user activities, has started to transform from the context of "intermediate space" to "original space."

EVALUATION

At the conclusion of the analysis of this reprogramming conducted at the Taşhan Region in particular, it was envisaged that the intermediate spaces, in addition to the existing program in the region, provided the opportunity for new and momentary programming and encouraged the discovery of the potentials it includes. It was observed that the data obtained from these discoveries constituted significant spatial parameters in the interaction with the city of the public buildings. The architectural program of the Taşhan Region:

When it was decipher-focused on space, the three different sections, which were studied in detail, set forth that the architectural changes in the temporal functional process, such as the blacksmith's shop, coppersmith's shop, shoe shop, and Taşhan), not only the physical, functional, and historical attributes of the space, at the same time, stemmed from the assessments of the users, visitors, guests, and city-dwellers, from events, such as shopping, tea drinking, and photograph taking realized there. Events are realized at the breaking points in these changes. It was observed that this situation has the attribute of proofs that indicate unexpected actions of the "event" concept defined according to Tschumi (2000).

It was observed that when it was deciphered focused on users, different spatial sections emerged with the different user types who entered the region, at moments when the routine operation of the region was included, and when there were different encounters. It was determined that the formation of different programming dynamics was brought together by the simultaneous use of the same space by the craftsmen, the tradesmen, by those coming to festivals, by those who come to visit, and by the guests and artists coming. It was observed that clarity was brought to the program crossings in the Taşhan Region by the social productions and bodily needs of space by Lefebvre (2015) and consequently, the assertion that it shaped the program.

When it was deciphered focused on moments of encounter, it was observed that different functions intersected in the region and consequently, moments of potential and spaces became known. Moreover, it was determined that the clashes of different bodies, which could be called intermediate space, appeared in the Taşhan Region in particular. According to Bergson (2007), it can be stated that the thought that encounters were always the motive for changing the established orders, indicated the spaces with potential in the region. Besides these, Till (1996) stressed that experience about space is realized based on time, and it was observed that the spatial transformations in the regional process overlap with the experiences by different individuals.

The reprogramming in the Taşhan Region [intermediate space] was assessed with different scales. When reprogramming was assessed at the Users of the Region, User Actions, and Needs of the Moment scales, the situation of having the jazz artists, city-dwellers, tradesmen, and craftsmen in the Taşhan Region using the same space simultaneously and with parallel actions, showed that intermediate spaces were formed in original spaces. It was observed that users who came to the region with different aims, such as shopping, tour the region, and pass through the road, with different profiles, such as different economic levels and different sociocultural structures, the moment they encountered a transforming space, could easily adapt to the program in the space. When a comparable situation was under consideration for Taşhan, the diversity of function for the spaces in the building were immediately experienced by the users and it was observed that program-space relationship with the spaces open to interaction were flexible. Just as Van Eyck (2008) expressed, the concept of intermediate space produced between those who work and spaces, would increase the social interaction and provide opportunities for realizing the activities of people. The situation of assuming an open and interpretable condition by connecting other spaces, was perceived clearly in this region.

When the reprogramming was assessed at the Plan Layers and New Function scale, in addition to the program of the historical building that existed for hundreds of years, the connection of the same or like programs and that includes the use group at the same time, the existence of spaces open to interaction was thought to be an indicator of the diversity of the reprogramming. Taşhan's spatial transformation as a typological inn structure, found its equivalent in the expression by Le Corbusier (2017), "an independent infrastructure from the program", and it formed intermediate spaces that could establish visual relations between the exterior and interior within a flexible cult building and moreover, it was observed that the building itself was transformed into an intermediate space.

When the reprogramming was assessed at the Form of Using Spaces and Spatial and User-focused Transformations scale, it was observed that in case the program of the spaces located at the Taşhan Region are flexible, every individual who used the space were transforming that space. It was observed in the spatial transformations of the Taşhan, the fact that the functions were easily reachable, that visitors who were passing from the road would find themselves in the space, and that a flowing circulation was provided could constitute a propulsive force to the reprogramming in the context of the existing dynamics of the place and with the potentials presented. It was thought that Debord's (2002) new program emerging with the change in place of the production practices with the consumption practices is one of the dynamics of the Taşhan Region. Besides these, Žižek's (2011) the situation of bringing into the open a great energy by finding a different direction for themselves of the fluidity at spaces and of concepts of experience, was

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observed to have a significant place in the reprogramming dynamics that provided a collective environment in the Taşhan Region and especially at Taşhan.

In the scope of this study, the common point of the deciphering through the space, users and encounters, which are characterized as the actors of the reprogramming of the Taşhan Region, is the fact that they were assessed through momentary situation. The moments and places determined within the scope of this study in the Taşhan Region, covers millions of sections taken through the users. It is thought that this study, which presents sections of the user actions, spatial movements, spatial transformations and function clashes, by deciphering the architectural programs existing in the regions that have historical or cultural assets, which form the interfaces of cities, would shed light for the studies that would be made for reprogramming.

As a last word, cities, which can make one experience unexpected moments, which can establish relationships that were not perceptible previously, which support intermediate spaces that provide for the movement and flow between spaces with coincidental events, with the expression of Calvino (2002) in the book titled *Invisible Cities*, "Cities are collection of many things: memories, desires, signs of a language; [they] are place of exchange, as all books of economic history explain, but these are not only exchanges of merchandise, but exchanges of words, desires and souvenirs as well."

CONCLUSION

In the scope of this study, the common point of the deciphering through the space, users and encounters, which are characteried as the actors of the reprogrmming of the Taşhan Region, is the fact that they were assesed through momentary situation. The moments and places determined within the scope of this study in the Taşhan Region, covers millions of sections taken through the users.

It has been seen that the Tashan Region, which is located at a critical point in the city and is used as a common area, has an important place in reprogramming dynamics due to the fact that it is the ground where sharing, events and shopping are held. In particular, it has been observed that Tashan has been designed as a physical component of the space, as a free space that can contract, expand, transform, and therefore respond to the immediate or permanent needs of the community first, and thus it can be used as a platform on which the entire program will be shaped.

It was observed in the spatial transformations of the Taşhan, the fact that the functions were easily reachable, that visitors who were passing from the road would find themselves in the space, and that a flowing circulation was provided could constitute a propulsive force to the reprogramming in the context of the existing dynamics of the place and with the potentials presented.

It was determined that the formation of different programming dynamics was brought together by the simultaneous use of the same

space by the craftsmen, the tradesmen, by those coming to festivals, by those who come to visit, and by the guests and artists coming.

Awareness of the past of the Tashan Region, as well as the presence of a continuous transformation and change process for its future, indicates that the transformation of space is not only in the direction desired by the individual, but also by society.

It was observed that users who came to the region with different aims, such as shopping, tour the region, and pass through the road, with different profiles, such as different economic levels and different sociocultural structures, the moment they encountered a transforming space, could easily adapt to the program in the space.

This situation indicates that in a space structured within the framework of a purpose or need, the individual has the freedom to realize himself, therefore, instead of strictly defined programs, flexible, it highlights fictions that allow the individual or society to transform with space. In this context, space transforms the individual and the individual transforms the space.

It is thought that this study, which presents sections of the user actions, spatial movements, spatial transformations and function clashes, by deciphering the architectural programs existing in the regions that have historical or cultural assets, which form the interfaces of cities, would shed light for the studies that would be made for reprogramming.

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Resume

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Augmented Reality for the Presentation of Cultural Heritage: On-Site Application and Evaluation of a Model

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Abstract

This paper comes out of a scientific study concerning development of an AR model for the presentation the archaeological site of Alexandria Troas for the visitor experience, and on-site application of this model, through a case, namely the Podium (or Forum) Temple, to investigate the nature of that experience provided by AR and its implications as well. The study is established upon the proposition that "AR is tailored to fit to provide a compatible, accessible, and sustainable presentation of historical built environments and archeological sites to public experience, while respecting much of the problem(atics) coming along with norms and privileges of historical heritage preservation and conservation." Departing from this ultimate proposition, it sets out a framework of questions to address. This paper provides a summary of the whole research, followed by the detailed description of the methodology and process concerning the developed model's on-site application, and a succinct presentation of its findings, finally, an account of the research as a means of testing the research questions. Findings confirm much of the assumptions deriving from the initial proposition and showed the great potential of AR towards this end as expected. A number of issues and problems were surfaced as well, some of which are oriented from the technologies concerning the AR itself, while others are related to the limitations of the proposed model and its on-site execution. Furthermore, the research indicated a number of matters to address and possible ways to expand such research. All in all, we argue that the research yielded a number of valuable results and insights in addressing the departing problem situation, while it also posed new questions and research paths to follow for new research.

INTRODUCTION

Today, it might be firmly stated that Augmented Reality (AR) is an increasingly well-established, yet rapidly proliferating and evolving research field. Among its multidisciplinary proliferations, Augmented Reality's adoption for the (re)presentation of cultural heritage poses a special case, that has a great potential towards this end. It is no surprise to see that, almost from its onset, parallel to the studies in AR in general, researchers have been working on AR's specific employment towards this end, and there is a considerable literature stacking up, especially in recent years. The present paper comes out of a larger scientific study that could be embedded within this framework. Its departure point is the proposition that "AR, almost by definition, is tailored to fit to provide a compatible, accessible, and sustainable presentation of historical built environments and archaeological sites to public experience, while respecting much of the problem(atics) coming along with norms and privileges of preservation and conservation." (Anay, Özten, Ünal, & Öztepe, 2022). The study concerns development of an AR model for the presentation of a cultural heritage, namely the archaeological site of Alexandria Troas, for the visitor experience, followed by on-site application of this model, through a case, namely the Podium (or Forum) Temple, to investigate the nature of that experience provided by AR and its implications. Hereby in this paper while summarizing the whole research, we particularly intend to focus on the second part, as follows, on-site application of our model to report and discuss the findings thereunto, consequently a means of addressing our initial proposition.

AUGMENTED REALITY: A DEFINITION AND A BRIEF INTRODUCTION

Augmented reality could be described as a technology that enhances and extends the real (physical) world by incorporating virtual layers that consist of both (virtual)entities and information, weaved together in real time to constitute a new, unprecedented reality, namely an environment, where active bodily and mental participation and interaction is possible.

In all of its original (and followed by) conceptions, AR is deemed as essentially "distinct" and "different" from VR, in the sense that it requires bodily experience and movement as a part of the equation, and also that it demands both the "real," and the "virtual," weaved together to constitute a new reality (Anay, Özten, Ünal, & Öztepe, 2022). As compared to VR, in AR, total "immersion" in virtual and total "detachment" from the real is not a sine qua non. On the contrary, AR do not require replacing reality with the virtual, and thus a total virtual immersion, but compels reality to exist as an important component, a basis to be enhanced and augmented by the virtual, in total, constituting a "blended," "natural" environment.

As it comes to its history, studies concerning AR are often dated back to the explorations in the late 60s. While these were the pioneers mainly focusing on technological developments and their adoption for practical solutions (such as Head Mounted Display of Ivan Sutherland (1968)), often intermingled with Virtual Reality, the idea might be traced even back to the studies in fields such as computer graphics (i.e. work of

Charles Wheatstone, (1838)) and film (i.e. work of Morton Heilig, 1956). As it was stated, the notion of AR in these early studies were often hidden within the investigations attributed to so-called Virtual Reality, possibly, it was not yet conceived that AR was a different phenomenon, and possibly without being aware of the essential differences between the two. This awareness, together with the theory of AR and its first conceptualization only comes about in 90s: Thomas Caudell and David Mizell (1992) first coined the term, Pierre Wellner, Wendy Mackay and Rich Gold (1993) recognized AR as a distinct phenomenon, and proposed that AR should be placed almost on the opposite side of Virtual Reality. Finally, in congruence, Paul Milgram and Fumio Kishino's (1994) famous Reality–virtuality continuum provided a way of contextualizing AR further in these terms.

In its practical applications, while at the beginning, primary target of AR was industry where AR often found its place in fields such as aviation and military, it started to disseminate other fields about 2000s, and after 2010s, it became mainstream and accessible for all, parallel to the technological developments and particularly due to the availability of tablets and smartphones. This historical trajectory also marks a number of parallel major shifts in its development, since AR's field of applications started to proliferate considerably, notably, to fields such as commerce, advertisement, gaming, and of course it pervaded art, design and architecture finding its specific adoptions in these areas.

RESEARCH ON AUGMENTED REALITY'S SPECIFIC ADOPTION FOR THE (RE)PRESENTATION OF CULTURAL HERITAGE: A DUAL EPISTEMOLOGICAL FRAMEWORK

By nature, AR could be viewed as both multidisciplinary and cross-disciplinary, since on the one hand, it addresses the problems of, and draws upon and incorporates knowledge from distinct fields, on the other, itself being a hybrid field of study, it is a synthesis of technology and knowledge derived from various other fields. As it was already stated in the introduction, among its multidisciplinary proliferations, studies concerning Augmented Reality's adoption for the (re)presentation of cultural heritage, particularly for historical built environments and archeological sites, presents us a special case. This is since, AR almost by definition is tailored to fit to address much of the problem(atics) coming along with norms and privileges of historical preservation and conservation of cultural heritage while providing a potential for a compatible, accessible, and sustainable presentation of these assets to public experience (Anay, Özten, Ünal, & Öztepe, 2022),(Cannella, 2019). It is no surprise to see that, almost from its onset, parallel to the studies in AR in general, researchers have been working on AR's specific employment towards this end, and there is a considerable literature stacking up, especially in recent years. The content of such studies might be roughly divided into two

interconnected categories, implying two overlapping epistemological frameworks under which they could be investigated.

First framework is about conceiving and developing ideas, models (solutions), followed by their application and examination in themselves (i.e. gathering and employing data, conceiving a new approach, an idea, creating models and virtual layers, adopting a new technology, testing its technical aspects, and corresponding performance, etc.) The subject matter here is the AR model itself. A brief overview of such "content" within previous research is as follows:

AR-cheoguide prepared for the presentation of Ancient Olympian city of Greece (Vlahakis, et al., 2002) is one of the earliest examples where both tangible (completion of Temple of Hera) and intangible (illustration of running athletes in an Olympic game) heritage were introduced as an "augmentation." Ancient Pompeii (Papagiannakis et al. 2005) project on the other hand focuses on the intangible part most, using the murals to reanimate the life and people, and through a storytelling technique to create an experience for the visitors. Aside the unique and novel ideas introduced by them, in these studies there is much work and discussion on the development of technology and software and their adaptation to the purpose. A more recent study concerns AR representation of a Roman Villa located in Valladolid (Martínez, Álvarez, Finat, Delgado, & Finat, 2015). While the study provides a virtual model of the villa, originally the problem was to incorporate the complex stratigraphic layers and partial excavations to present visitors an interactive navigation while showing various layers and giving a certain interpretation of the site. This was achieved through interactivity; by asking some simple questions, and assigning minor tasks and puzzles. Study also shares the research process prior to the preparation of the model. So does AR project of Aurelian Wall at Castra Praetoria in Rome (Canciani & Saccone, 2016), where, aside from the AR model provided, the subject matter is the investigations prior to the development of AR application, such as historical research, surveying (documentation), and restitution. One of the most popular examples of use of AR in the presentation of archaeological sites is models developed for Acropolis. AR project of Parthenon Temple (Liestøl, 2011) provides an interactive model, and zooming (and therefore viewing buildings in detail with information) and transparency (i.e. which makes Cella visible from outside). In parallel, Mobil Optical Illusion's (MOPTIL) Acropolis application is publicly available for mobile devices, and they provide restitutions of the buildings both synchronically and diachronically presented. For example, in a time warp, one could see Acropolis in Greek and Ottoman times with an information-rich layer provided as further augmentation. Similarly, the AR application for the Apulian ancient city targets representation of the history and culture of the city by letting visitors engage with the context. The application offers an ancient city experience by combining various types of data (such as 3D model, map, text, and audio) with historical buildings that have been completely

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destroyed. A key feature is that the visitor can experience different periods and learn the historical process. Therefore, AR provides an interactive environment where visitors are a part of the ancient city experience (Cisternino, Gatto, & De Paolis, 2018).

Figure.1 Apulian ancient city experiencing 3D models and content in the AR environment (Cisternino, Gatto, & De Paolis, 2018).

A novel use of time warp in AR applications is reported by Liestøl (2011). In AR application of Temple of Deified Julius Caesar, as one approaches the temple, the application opts for a rollback to time to the events that led to the building of the altar, the death of Julius Caesar, through a set of animated scenes. Here augmentation involves the "time," manipulated in two directions, and there is a cinematographic narrative as an augmentation. SensiMAR, on the other hand, is a study in which the remains of a Roman house in the Ruins of Conimbra are experienced in a multi-sensory environment with AR. Here, the visitor experiences Roman urban life in addition to animations, videos and sound effects, as well as smells (e.g. fish market smell for garum). Thus, while the existing structures and ruins can be observed, the ancient city experience is strengthened with elements(audio-visual-fragrance) that work in harmony with virtual scenarios in the AR environment (Marto, Melo, Gonçalves, & Bessa, 2021).

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Figure.2a Ancient city experience without AR and with SensiMAR application. **Figure.2b** Animations simulating urban life in Sensimar application (Marto, Melo, Gonçalves, & Bessa, 2021).
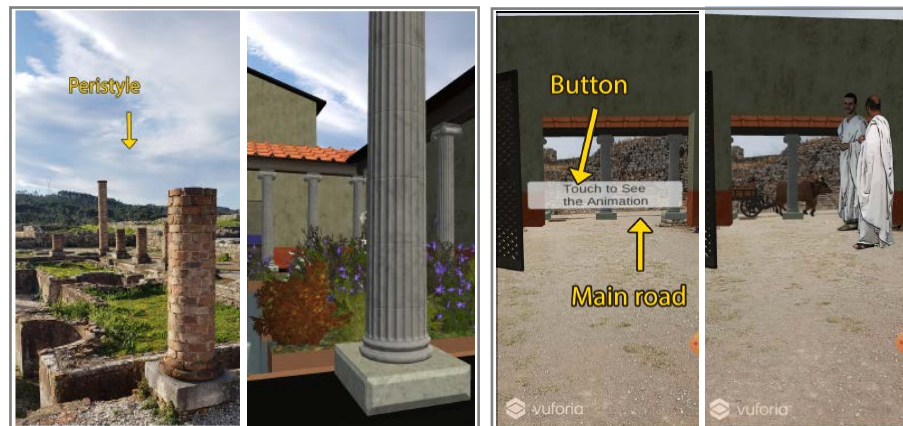
The Scipio Project, on the other hand, uses the application called Espacios Junta to address the visitors coming to the Archaeological Ensemble of Itálica (Seville) to experience the area with AR technology. The main purpose of the study is to analyze the applicability of AR technology in open areas for the presentation of archaeological sites. In this context, the application allows visitors to experience 3D reconstructions of various structures and objects in the area by using

their location information.This improves the visitor experience and provides a better interpretation of the entire area (Expósito-Barea, Gómez Pérez & Pérez Rufí, 2022).

Another study deals with recontextualization with the virtual reconstruction of a marble monumental element called "Tribuna", which is a special element of Palermo Cathedral. Two AR applications were developed within the scope of the study. The first is the experience of the reconstruction model reflecting the 18th century drawings from the nave, the second is the AR experience that offers a partial but close view of the 'Tribuna'. This work allows visitors to experience a past situation of Tribuna with its AR reconstruction, while helping them understand the meaning and location of the statues on the sides of the nave (Canella, 2022).

Second epistemological framework contains investigation of practical (on-site) application of such models, for understanding the very nature of the experience provided to the target audience, for the evaluation of the model's performance and potentialities towards the ultimate aim. These are not about the model itself, but are the means of addressing the initial conjecture about AR's contribution and potentials for the presentation of cultural heritage, which in turn would shed light on the ultimate questions posed and implied within. Here, the subject matter is the (user) experience with relation to the provided solution. A brief overview of such "content" within previous research is as follows:

The Historical Tour Guide is an AR application that aims to representation of the Trondheim history (via photographs and maps from different periods) to its visitors. In the study, a two-stage survey was conducted to measure the need for an alternative tool (in this case AR) in the representation of cultural heritage and its impact on user experience. While the first stage consists of 200 participants who watched a short video of the AR application, responding to a web survey, in the second stage, 42 participants answered a similar survey after experiencing the application on site. As a result of the comparative study, it has been revealed that the visitors who experience the area with the AR application have more information about the site and such a learning method makes the experience (Haugstvedt & Krogstie, 2012).

Figure.3 The user can get information about the past situation of the city with The Historical Tour Guide application (Haugstvedt & Krogstie, 2012).

Similarly, AR-view is an AR application developed for the representation of Dashuifa Ruins in Yuanmingyuan city. Virtual reconstructions have been presented to the user experience in order to revive the historical and cultural heritage devastated by the wars. According to interviews and survey results with visitors who have

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experienced the historical environment, AR enables users to make sense of the area they experience and enjoy the experience (Huang, Liu, & Wang, 2009). AR application for Tamsui District, which has many cultural values in Taiwan, focuses on the sense of belonging in historical environments. In that case AR is a guide for visitors who can access different types of data (visual/literary/audio) related to the historical environment. The application evaluated with 87 participants consisting of 3 different experience groups (with AR application, guided and unguided experience). The results show that users who experience the site with AR are more successful in creating a sense of belonging and perceive the historical and cultural value of the area better. In addition, authors stated that the learning motivation of the participants in the AR guidance group increased (Chang, Hou, Pan, Sung, & Chang, 2015).

Figure.4 Users get more information with the zoom-out function while experiencing the historical environment (Chang, Hou, Pan, Sung, & Chang, 2015).

One of the problem in the presentation of cultural heritage artifacts is their fragile nature and uniqueness, and limited access to artifacts. In this context researchers created an AR application to solve the problems of inaccessibility and lack of interaction with artifacts, thus, visitors can see and interact with virtual reconstructions of the artifacts in the Severis Gallery. As a result of interviews with 60 participants who have experienced the application, it has been revealed that AR is an effective tool in the presentation of cultural heritage and is accepted by all age groups (Kyriakou & Hermon, 2018). Another AR application developed for Casa Battlo focuses on user experience. In this way evaluation was made with 122 people who experienced the places and works in the museum in the AR environment. As a result it is revealed that with the AR, visitors could feel the spirit of that period and get clues about daily life (Gimeno, Portalés, Coma, Fernández, & Martínez, 2017).
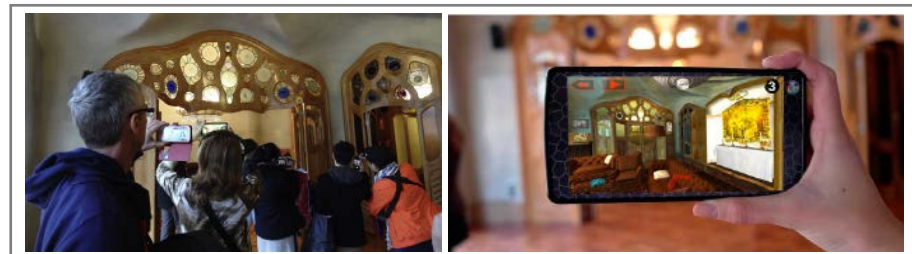
Figure.5 Users experiencing the augmented scene on their smartphones with the Casa Batlló AR application (Gimeno, Portalés, Coma, Fernández, & Martínez, 2017).

A recent study, MTRACR (Malay Traditional Clothing and Textile Augmented Reality Mobile Application), was implemented in the Malay Culture Museum to promote and representation for Malay culture. With the interaction options (such as virtual movements, buttons, games)

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offered by the AR application, visitors can experience cultural values such as traditional clothes and documentaries. According to the results of MTRACR interviews and surveys, which were evaluated with a total of 30 people, the experience in the AR environment provides a joyful learning environment (Masduki, Nazarudin, & Ali, 2021). DinofelisAR enables the virtual reconstruction of the Roman forum in the ancient city of Conimbriga. 90 visitors participated in a questionnaire to examine the effect of DinofelisAR application on the archaeological site experience. As a result of this evaluation, it was determined that AR can better represent the forum features (e.g. size, colors and architecture), contribute to the site experience and is an important tool in cultural heritage areas (Marto & Gonçalves, 2019).

Another study carried out in Peru was aimed to present the architectural heritage of the Casa Grande District via improving the visitor experience. Researchers state that visitors come to the site and see only a few buildings, but they do not know the values and history represented by these buildings. With the AR application created within the framework of this problem, they can obtain various types of data (visual, literary) about the structures in their surroundings. In the continuation of the study, the usability of the application was tested with experimental and test groups of 30 people. As a result, it was seen that visitors using AR got positive results in terms of access time and cost of information, number of visits and finally visitor satisfaction (Ganoza-Cabanillas, Gamboa-Cruzado, Moreno, Ruiz & Cruz, 2023).

A Grand Scenario for the Presentation of Forum of Alexandria Troas

While the larger research, from which the present study derives, concerns both of the aforementioned frameworks, the present paper could best be embedded within the second, since it involves investigation of practical (on-site) application of an AR model where the subject matter is the (user) experience with "relation" to the proposed AR solution. Therefore, before going into detailed presentation and evaluation of the on-site application and related (user) experience, first we ought to make a concise review of the proposed model as our basis and for making that "relation" apparent and sensible[1].

The research was about the archaeological site of Alexandria Troas, an antique city established in early 4th century BC, in Hellenistic times, but known to be reached its heyday under the Roman reign. Today, a few remains of the city are observable. Doric and Podium temples, Theatre, Maldelik, Odeion, Herodes Atticus Baths, Stadion, Nymphaeum, main street (Decumanus), waterway, port and some of the city walls, are all scattered around a large area, mostly in bad condition and generally not easily accessible for the visitors (Figure.6). As far as both excavations and visitor activity is concerned, present focus is the forum that consists of a number of architectural and urbanistic elements, such as the Podium Temple, Odeion, Sculpture Hall, Dodecagon building, and

[1] A detailed account of this segment of the research is well beyond the scope of the present paper. We already provided a review here (Anay, Özten, Ünal, & Öztepe, 2022).

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the main street (Decumanus), having potential to provide an idea about the architecture and the city fabric of Alexandria Troas. However, it remains as a "hint" rather than a satisfactory experience since the remains were either stripped to the bare foundations, or mostly unearthed, thus not permitting a cohesive view and understanding of the buildings and the forum. We identified this situation as the main problem to be addressed by our study. Apart from this main problem, we also examined the way forum was experienced by the visitors and identified the behaviors, patterns and problems concerning thereunto. General impression was that the visits were short and discontinuous; uninformative and unfulfilling, to a great degree because of missing elements and layers, an adhesion, leading to a set of disjunctions aside the ones presented by the site itself, needed to be augmented into a continuous cohesive whole. Apart from the lack continuity and adhesion, each component (a building, an urbanistic element) that would contribute to holistic experience have had its own specific set of problems and demands to be addressed.
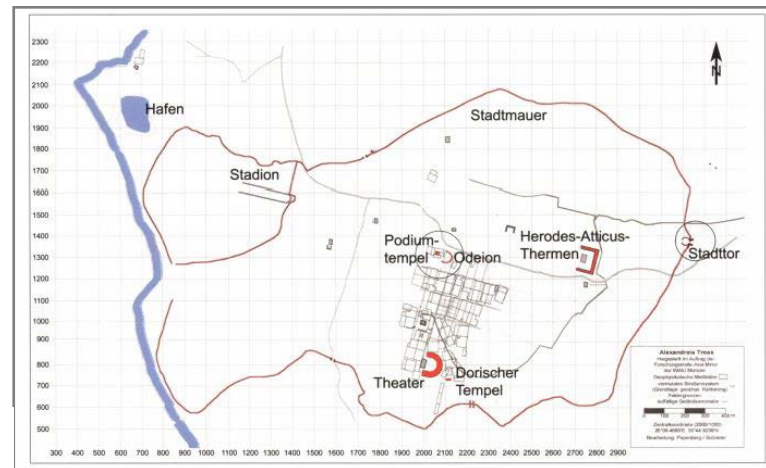
Figure.6 Alexandria Troas ancient city plan (Öztepe, 2017).

To deal with these problems, we adopted the idea of "montage of attractions" borrowed from Sergei Eisenstein's, early theories on film (Eisenstein & Gerould, 1974), with reference to his parallels between the architectural and cinematic experiences (Eisenstein, 1989) as they involve a sense of spatial and temporal progression that can be deeply immersive and engaging. Apparently such a paradigm would have helped addressing the elements one by one (as scenes or takes), while permitting and help maintaining a cohesive continuity through a cinematic experience (the grand scenario). Incorporating, was the conceptual and theoretical framework of an emerging design field "experience design."[2]

We prepared a "grand" scenario for the visits, consisting of a sequence of (staged) scenes (attractions) focusing on various elements (i.e. buildings), while considering their demands and specificities whether tangible or intangible (Figure7).

[2] For example see (Dewey, 1980)(Hassenzahl et al. 2013), (Shedroff, 2001) (Benz, 2015), (Anay, Özten, & Özten Anay, Towards a Common Framework to Operate with: Mediating Experience Design and Architecture In Designing Experience: The Ballerina on the Elephant, edited by Peter Benz. Hong Kong., 2014), (Özten, 2019).

For example for the Decumanus (S3a-b-c) we thought that since it was a linear element (street) it could be best experienced by movement, by being inside, by walking through it, or watching people doing things and walking around. Virtually augmenting Roman arch at its South end, and completing the shops alongside it would contextualize the street and bring its lost spatial characteristics back. We also proposed an intangible aspect, namely one of St.Paul's visits considered as an important event in time in the city's history (Acts 16:6-8) (Texier, 2002), as an augmentation (Figure.8).
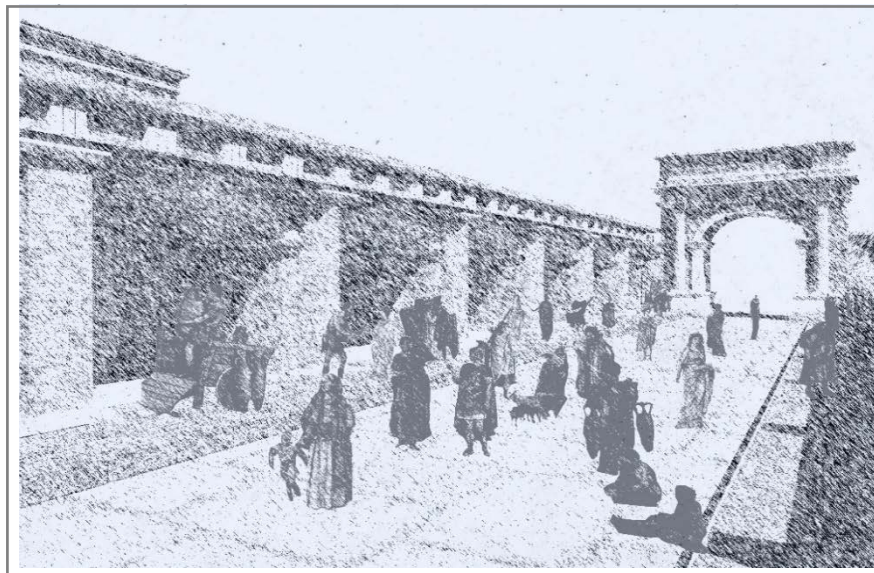
Figure.8 Thematic Reanimation of Decumanus.
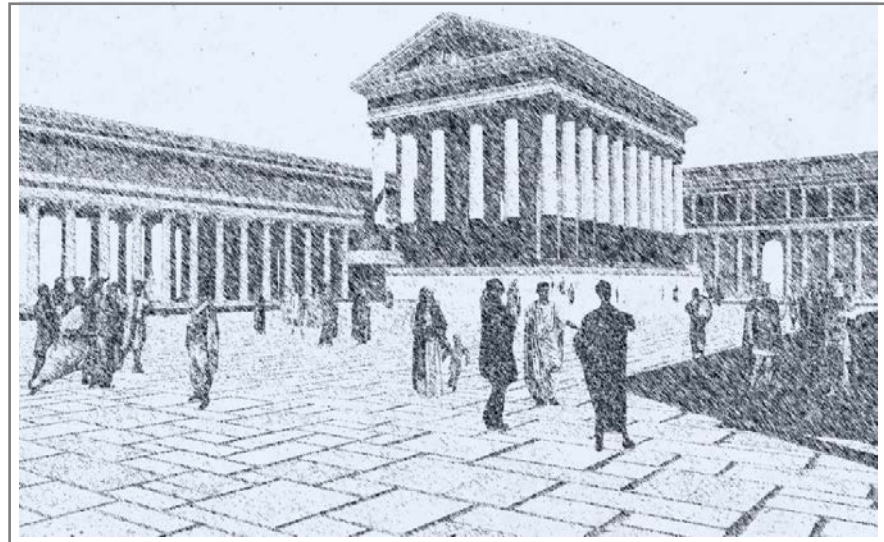
Figure.9 Thematic Reanimation of Podium Temple.

Odeion (S4), have had a potential to provide an experience from outside since first, it is monumental building, with architectural and aesthetic aspects, and second, it defines and contributes to the overall spatial and architectural experience of the forum. Furthermore, it is a means of providing a context, a background for the Podium Temple (Figure.9). Apart from its (external)formal contribution, its interior (spatial qualities) was of particular importance. As an intangible aspect we proposed adding the crowd, and an on stage performance of a musician from Lesbos who was commended for his exceptional accomplishment in a competition that take place in the building (Schwerteim, 2002).

For the sculpture hall (S2) and the Dodecagon building (S1), the dominant was the interior, rather than the exterior appearances of the buildings. For the first, we decided to place the found sculptures within the assigned space as an augmented layer. The Dodecagon building, having a unique, centroidal plan, was possibly related to some rituals concerning water, health and Eros cult. The space once have had a roof likely with an oculus (Schwertheim, 2018) carved architectural elements facing interior (now relocated somewhere else)(Figure.10), and possibly a water element located at the center, now all either stripped down or missing. We planned reintroducing the architectural elements and the roof that would add much to its missing aesthetic and spatial characteristics. We decided enriching the presentation further by adding an informational layer addressing the Eros Cult, and enriching the spatial experience by introducing water and sound of water echoing on the walls all contributing as intangible features.
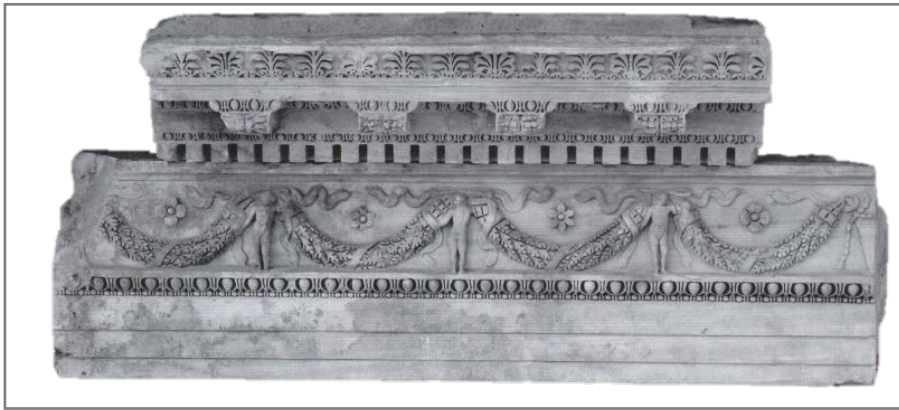
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The Case: Alexandria Troas Podium Temple

The focus of the forum was the early imperial Podium Temple (S5a) that dominates the visits and works as a binding element for all. We identified that it could (and actually it is) best be viewed from outside, as it was an isolated object, and wandering around to experience its monumental and sculpturesque characteristics was one of its dominant features once and then. This was conceived as a part of the Grand Scenario.

Starting with this dominant would be a logical choice, for the development of our AR experience "first, since it is already the visitors' main point of attraction, it is convenient to present it through AR and then test it. Second, it might be a departure point, a trial to learn from for a more comprehensive and inclusive study. Third, there is almost nothing left from it except the foundations to give a three-dimensional holistic idea about it, and there is nothing to do about this in conventional means."(Anay, Özten, Ünal, & Öztepe, 2022).

This decision is followed by a detailed documentation, expert interviews, and a literature study (Görkay, 2002). From the findings, we decide to develop our AR model upon three potential restitutions of the temple based on prostylos, peripteros, and pseudo-peripteros layouts (Figure.11), the temple being in Corinthian order. This multiple representation decision was also valuable to test and show AR's potential for providing holistic, informative and powerful alternating projections, yet being infinitesimally invasive. After preparing the digital 3D models, we developed our application for IOS (IPADS and IPHONES) using the ARKit library under Unity as our development environment.
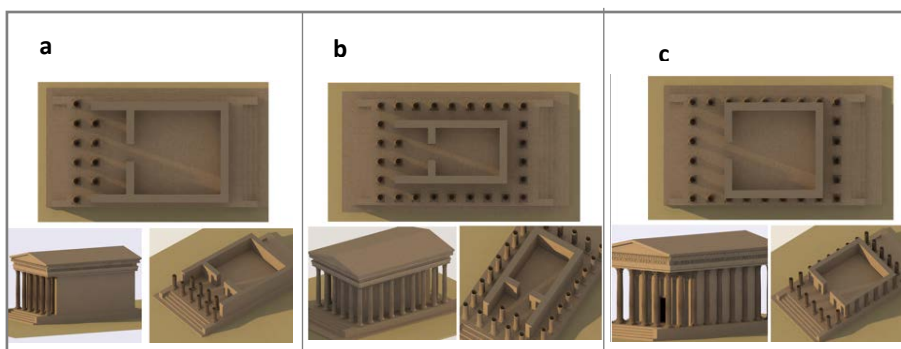
Figure.11 Potential restitutions of temple: a- Prostylos layout, section drawings and renders b- peripteros layout section drawings and renders c- pseudoperipteros layout, section drawings and renders.

FIELD STUDIES: METHODOLOGY & THE PROCESS

We employed a mixed-method approach in our research that yielded both qualitative and quantitative data.

First component was a semi-structured interview based on a framework of questions organized under the following titles: Basic information about the participant, Evaluation of the (AR)Application and the idea, Evaluation of the Experience provided, Informative/Educational Aspects, General Impression and Expectations, and Suggestions and Projections.

Second component was observations concerning participants' behaviour. While applying interviews we recorded visitors' behaviour such as general mood and approach, gestures, reflexes, exclamations, nature of the developed dialogue (active, passive, asking questions, sharing experience, positive, negative), and as well time passed during the visit, and the route taken.

In the process, after informing participants about the research, and after taking their consent, the interviews are conducted in the form of open-ended conversation. The researchers while keeping the conversation within the scope of initial question framework, let visitors to roam, talk and ask freely and comment, criticise and suggest. Therefore, it could be the case that they introduced new issues, questions, and interpretations, which in turn will add to the depth and comprehensiveness of the research. Each conversation is recorded digitally (as sound). As it was stated above, in parallel, we recorded participants' behaviour.

In total there were 215 participants, interviewed in 20 consequent days. 101 of them were women, 97 of them men, and 17 of them were children. As expected children were always accompanied by an adult. Thirteen of the participants were from the excavation staff, (archaeologists, architects, restoration experts, and students as well). Eleven of the participants were rather disinterested, but other visitors met our approach with great enthusiasm.

We used so-called general information, i.e. gender, age not as variables in evaluating data, but just for recording and seeing the distribution. Methodologically, we also did not intend to "select" the participants, but include all who wished to participate.

The process yielded sound recordings and notes concerning participants' behaviour, which this raw data were later, deciphered utilizing content analysis method. First, we processed data as a means of answering the initial set of questions. Second, we tried to identify unexpected and unprecedented patterns within the conversation. In parallel, we investigated recordings concerning participants' behaviour, if possible, in correlation with the interviews, or otherwise. This processed data is later structured and interpreted to draw the results.

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The Findings and Evaluation

In general, most(183) of the participants evaluated the AR experience in positive terms, each addressing a different aspect of AR (Table1). AR as a technology itself was also viewed mostly(155) as having a great potential for the presentation of cultural heritage; even before asking, a number of visitors(26) evaluated it as impressive and suggested that it must be used for other cultural heritage sites. Even the issue of non-invasiveness came up as a rationale here. They also demanded the application should be self-sufficient and available publicly (as in "apple store.").

Table.1 Participants' tags (descriptions) of AR experiences.
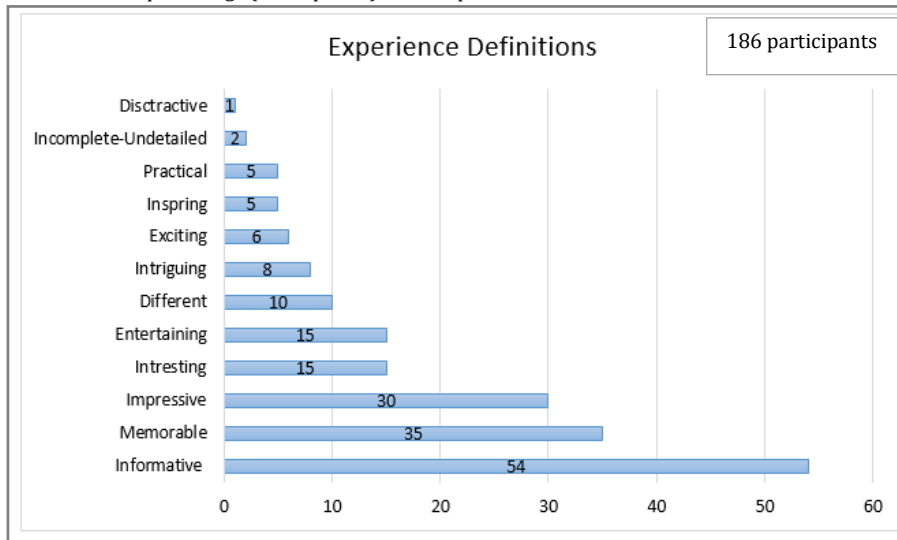
As a first impression and response, majority (177) stated that they did know/could not have imagined such a building (could have been) existed here before seeing it in the application. As such, the model was informative in many means such as the form, the scale, the type, the style, architectural elements, general arrangement, and so on so far. Participants(15) also raised issues concerning the details of the provided model. Especially those who have had a previous knowledge about architecture (i.e. archaeological excavation staff, architects, guides) identified the model as having insufficient detail and demanded more.

In congruence, participants(55) emphasized that what was visual, must be supported by informative augmentation (i.e. text, sound) as a means of introducing a complementary content that could not have been expressed with a visual representation alone. Many(63) visitors implied since the model did not have an informative layer, the experience would be always "less." The claim is that they only "see" the building, and how it was then, but without developing a deeper understanding about it, and raise an awareness about its cultural and historical meaning and importance. We particularly suggest that this should be one of the

important issues to address in developing AR applications, AR excels in introduction of information that could be digitized in any means.

• "Various information layers such as text, audio and video related to the structure should be added to the application."

• "If historical characters and various daily life activities are presented with some animations, it will provide a much better perception of the historical and cultural value of this place."

"Education" might seem not be the primary target for a developer, and the visitors, as compared to an entertaining, and recreational experience. However, obviously, there would always be at least an "implied" education, and transmission of information of some type would always be an indispensable part of the equation, which in turn would add much in "content" and might help in raising experience to a better, more satisfactory level. Information presented in context, transmitted through AR experience could be a very powerful device for education and the production of knowledge. This we suggest presents a great deal for an AR application.

Participants mostly(177) valued provided AR experience as memorable. Some of them even stated that there is no chance that they will forget this experience and the image of the building from then on. This was an indication of a success of the model on this vein, confirmed further. In parallel, participants also suggested that information received through such an experience would be more permanent.

• "The fact that we can see both the current state of the structure and the original state in the past, makes it more permanent in the mind."

• "Sometime after leaving the site, the original state of the structure experienced in application will remain in my mind, rather than its current state."

Generally, visitors found the provided AR model as being impressive(30), interesting(15), different(10), intriguing(8), inspiring(5), etc., all could be considered under a common theme. It was a common gesture, when first time visitors were handed the mobile device, they met it with exclamation ("Wow!") and enthusiastically tried to see "more." Obviously this is mostly by means of AR technology itself, providing an "unprecedented," experience, but it must be underlined that there might be a contribution of being an element of surprise, since for many (163) this was their first AR experience and they did not expect to see such a "thing" beforehand. From a certain point of view, a "shiny" AR experience and making advantage of element of surprise, is obviously "a low hanging fruit" that is hard to miss for an AR developer.

• "Looking at the current state of the building, I can't understand what kind of building it is and how it was used, but this makes me understand that it is a building with practical historical value."

• "I think this application greatly increases one's belonging here. "

We also observed from the gestures that just after they see the temple first time, participants immediately turned the device all around to see "more," especially seeking for a surrounding, and consequently being

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"let down" with the lack of a comprehensive context. In congruence, even without asking, considerable number of participants(38) indicated that a surrounding would have add much to the experience. This was one of the dominant critical themes resurfaced in many of the interviews. Visitors evaluated missing surrounding as a major problem to be addressed(157). In the suggestions category this theme also came up once more, being the general view as adding a physical context would have helped much to the experience and would re-establish the experience on a higher level and provide a better understanding of the building.

• "Seeing it as a temple allows us to connect with the past. Of course, it would be more beneficial if the whole environment was added."

• "If all the historical buildings and surroundings were added, I would feel like I was walking around in the past. It would be an enjoyable experience even for someone who is not interested in history. And so it would be more memorable."

Majority(176) emphasized recreational characteristic of the AR experience. The terms that came up was "fun" and "entertaining" as being two important components of the AR experience. Being "fun" and "entertaining," might be an end in themselves as far as a "touristic" activity was targeted, but these were often used as qualities or as adjectives associated with the experience, becoming more satisfactory, not boring or dull, much more elongated owing to these characteristics. Some also added the issue of passive or indirect learning while having fun, which was deemed as good, especially for children.

• "It will be a more fun and effective method in teaching cultural heritage, especially for children."

• "This application is much more enjoyable than seeing a pile of stones."

Curiously, many of the participants asked for a selfie or a photo in front of the building, possibly for recording the moment and for sharing it through social media. We "manually" provided them such material. Possibilities for "recording" a memory and making it socially available was not something that was initially planned to be incorporated in our model, but we thought that it might be a great opportunity for an AR application to promote historical heritage further, in a powerful and special way. Many(87) also stated that either before coming to see the site, or during their visits, they use some type of medium to get more information about it. Apparently, social media, rather than scholarly sources were one of such dominant sources providing a database for the visitors beforehand or during visits. Thinking that visitors' experience and activity contributes back to that pool, this we think presents a great opportunity a potential to take advantage of. These related issues are further supported by interviews. Participants(26) suggested that such a component in the application might help in promoting cultural heritage by this means. This might be done by incorporating social media capability within AR itself or incorporating AR within some type of social media.

• "I usually try to get information from the internet before visiting historical places. Such an application would be a more practical and enjoyable option. It would even be better if it is available from Appstore and playstore. Even without an application, a web page can be created and people can access it themselves with a QR code."

Figure.12 Photos of visitors with the podium temple.

We identified a number of user patterns from the onset, visitors, possibly being accustomed to (hand) gestures borrowed from their previous experiences with mobile devices and computer games, such as clicking certain parts of a building, and try to zoom into various parts, rotate, and pan, as a means of testing such abilities of the model. This, on the one hand, might be seen as a demand and an opportunity, to some degree should be explored and employed further in AR, on the other, it poses a number of issues those might be against the soil of AR itself. Same gestures, i.e. clicking certain parts of a model, trying to zoom into various parts, we believe are also related with abovementioned two issues of demanding the model having more detail and providing informative layers. Users were not only habitually using and testing the hand gestures, but also doing this for a reason, namely trying for getting more information about that certain part they've clicked and to see (more) detail of a part by zooming in.

CONCLUSION: WHAT WE HAVE LEARNED

General impression was that people generally receive AR with enthusiasm, expressed through wide spectrum of verbal, visual and auditory response, which we believe is an indicator of people becoming active part of the experience. They quickly became familiar with the idea and the application, internalizing it by various means, indicating existence of a sense of belonging and ingress, as if what was presented was a natural extension of corporeal and mental being and existence. There are five major categories under which could evaluate the research.

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Technology

Apart from these general observations, first matter that is worth to revisit is the issues concerning the AR technology. These are limitations mostly, but there are also issues concerning the specificities of AR. From the interviews, we identified a very high level of expectancy, as far as the digital layers (representations, interactivity, environment, affects, etc.) are concerned. Possibly related with the level of digital technologies people are accustomed to in other fields such as cinema, gaming, and affined area of virtual reality, visitors seem to be set their standards and their biases to that state-of-the art levels. At its present state, it seems too hard to cope with the standards of other such disciplines, the excellence they have reached. Visitors, demanding more detail in models, a full physical context, and a full interactivity, all in one, may seem rightful, and just, but as far as the available technology is concerned, within the capabilities of existing AR-enabled mobile devices, accomplishing all these in a satisfactory level is quite hard to accomplish.

As it was introduced earlier, our approach was to develop a model that could be available to ordinary people, for daily and momentary use, and suitable for devices they could afford. This pointed to mobile devices, namely smartphones and tablets. Once this decision was made, you only have a handheld that is neither primarily designed for this purpose, nor having a specialized hardware to answer to the demands of heavy graphics and visual processing. One could either decrease the overall level, or sacrifice one or two of the essentials for the benefit of the others. In AR, (publicly) available technology, we strongly believe is the major constraint, working as a "bottleneck" for developing such high-level applications for ordinary people. In addition, much of the expectations of participants seemed to be "assuming" AR same as a computer game, a film full of digital effects, or more likely a VR application. A detailed discussion would be beyond the scope of the present paper, but we could claim that the product, technology and experience wise, there are essential differences between AR and the others.

Augmentation

Second matter that is worth to elaborate is the issues concerning "augmentation" in general. As one might guess, this concerns "core" issues of AR, and could only be discussed under multiple sub headings.

a) Form: What is obvious in developing an AR experience an archaeological site, or a building within it, seems to be about providing a virtual layer that completes what was missing formally. This could be interpreted as "augmentation," and proposition seems straightforward, however, the situation gets complicated since "missing," and the notion of "augmentation" might refer to a rich gamut of aspects rather than a mere form.

b) The Context: This, we particularly find important, not only as a problem to address but also as a "must" general principle concerning AR presentation of architecture and built environment. Apparently, it seems that representing a sculpture or a coin without a context might not be a problem at all, while by nature, architecture demands such a background, an experience in context, without which the experience provided would always be evaluated as "less." Here we particularly point to physical context and the immediate surrounding. A piece of architecture, as a cultural product do not only have a physical context but also a cultural one. A cultural context might point to quite a number of things, all intangible, such as its history, its meaning, as well as, a narrative, a story, lifestyle, people, or an event.

c) The level of detail: Feedbacks concerning lack of desired detail in AR intrinsically brings up the issues of lack of information and availability of technology. First, restitutions have a level of reliability. Forcing those means a high-level speculation, even deceit and misinformation emitted to people as such. Perhaps an AR model would also need such a "reliability" layer or alternating proposals to make sure to stay on the safe side or not deceive people. We provided alternating restitutions but on a higher level. Second, as far as AR technologies are concerned, unfortunately, the question of the level of detail was (and possibly still is) highly constrained by the availability of sufficient hardware as it was discussed above.

d) Information Provided: A building and its context expressed in mere form might tell much. However, not all could be expressed and told through the building and its context itself. For example, one cannot identify the type and period of a building, its function, its importance, its history, when it was built, by whom, why, etc. without appealing to some other means. Tangible should be accompanied by intangible.

Interactivity

Third matter is the issue of interactivity. AR, since it demands a bodily existence and experience, by definition would always have a degree of interactivity. This being said, problems might raise here due to the specific nature of AR, i.e. for going somewhere, or for seeing something in detail, you have to really walk, rather than clicking to that position or move joystick to that direction as it was in computer games on in VR. This, we observed the visitors were not accustomed to. Interactivity, while being an essential component of AR, might be quite different from the types and norms of interactivity in real life and interactivity in VR and computers which people are much more used to. This is a major issue to be addressed by AR development. Developing hybrid applications that contain both AR and VR might be a solution too. Interactivity does not only concern visitors' intentional gestures on a mobile device or a mere natural bodily movement. It might involve a trigger that activates a response when someone approaches to a thing, enters a domain, does something, or behaves in a certain way, even

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spells a "magic word." The Response depends on the trigger and the correlated event that could be anything.

Due to the nature of process, an expert accompanied all visits. Naturally there was a continuous dialogue, special type of interaction which we believe added much to the experience. It was not passive such as a clicking a part of a building and getting information, or triggering and event, and passively listening to a story, or just walking around to see if something happens. It was a type of "intelligent augmentation." That mediates itself according to the situations that came up. However, this was a special occasion wince we were conducting a research. Assigning this task to a device would put us in the domain of machine learning and artificial intelligence. However, we strongly believe that such an understanding of interactivity would re-establish AR on a higher level.

Continuity, elongated experience and estrangement

Fourth matter is the issue of continuity, elongated experience and estrangement. We already introduced the power and importance of utilizing "an element of surprise" in the previous section. Yet from another point of view, this situation poses a serious question: what happens when the first impression becomes accustomed to, and initial enthusiasm vanes out? This, we particularly deemed as an important issue to be addressed by an AR application. This issue could be evaluated under an essential theme which actually is common to many design/artistic discipline such as film, and literature, involving experience that is based on time and diachrony, or a video game, even if it was open-world, still experienced in time. Keeping the visitor "estranged" (alert, curious) all the time during the process (the time dimension), while elongating the experience, keeping it intact and continuous, as much as possible must be a general principle to be sought for. Now we fall into the domain of art.

Social Media Integrity

As a fifth, since it was already introduced and discussed in the detail, we would like to just remind the matter of social media integrity, and social availability as an important issue to take in the consideration.

FINAL REMARKS

This study was established upon the proposition that "AR is tailored to fit to provide a compatible, accessible, and sustainable presentation of historical built environments and archaeological sites to public experience, while respecting much of the problem(atics) coming along with norms and privileges of historical heritage preservation and conservation." We believe that the research confirmed much of the assumptions deriving from this initial proposition, and AR showed a great potential towards this end as expected as it was discussed in detail above. However, we also believe, the major contribution of this study was not that it confirms the ultimate assumption but rather for it raised

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a number of issues and problems, as well as indicated a number of matters to address and possible ways to expand such research. Overall, the research yielded a number of valuable results and insights in addressing the departing problem situation, but it also posed new questions and research paths to follow for a new research.

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Resume

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Erhan Öztepe, who graduated from Ankara University, Faculty of Language, History and Geography, Department of Classical Archaeology in 1988, completed his master's degree in 1991 and his doctorate in 1999 in the same department. He continues to work as a professor at Ankara University, where he started to work as a research assistant in 1992. He has been chairing the Alexandria Troas Excavations since 2011. Since 2009, he has been a member of the Trabzon and Çanakkale Cultural Heritage Preservation Regional Board of the Ministry of Culture and Tourism. His fields of interests are Greek sculpture, Greek and Roman iconography, Cyprus archaeology, archaic and classical Cyprus sculpture.

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Analysis of Global Research Trends on BIM Studies in the Field of Architecture

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Abstract

This paper reveals the results of a bibliometric analysis on BIM and architecture to analyze and determine how the current research trends in BIM literature have evolved and diversified in the discipline of architecture. Although there are currently bibliometric analysis reviews of BIM in the literature, these studies take either the BIM process from a general perspective or the engineering-construction sectors, urban design scale. This state-of-the-art study explains a bibliometric analysis of the literature's relationship between architecture and BIM. Through analyzing the data including keywords, authors, journals, institutions, citation rate etc., the relationship between BIM and architecture in all times till today has been mapped and visualized by using Clarivate Analytics' Web of Science database and VOS viewer program. In addition, analyzing the current literature published between 2017-2022 was highlighted and the emerging fields in architectural research were revealed. Emerging fields today in architectural research under the scope of BIM have clustered according to the keywords and these keywords are mostly related to information technologies and automation. The goal of revealing these findings extensively is to inspire future research based on the gaps and missing information in the existing literature. The unique importance of this study is to generate a knowledge base for the relationship between BIM and architecture studies based on the data including keywords, authors, journals, universities, citation rate, etc., adopting the bibliometric approach. This study provides valuable information to BIM studies in architecture research for researchers and practitioners. The current state of the research field, trend topics, and the key scholars and universities were identified.

INTRODUCTION

From the beginning of the design to the end of the construction process, especially in large-scale projects, stakeholders from many professional groups transfer data and try to implement the project. In this process, problems may be unnoticed during the design phase in data transfer, and construction mistakes can occur. In addition, it is known that some decisions to be made during the design phase can be beneficial to the sustainability of facility management after the project is built (Leite, 2020; Sacks et al., 2018; Garber, 2014). For these decisions to be made correctly during the design process, various simulations and analyses of the data and environmental impact assessments of the project should be made before the construction phase (Krygiel, Nies, 2008). Due to the evolving needs, traditional construction management and project delivery processes have changed, and information technology applications have entered our lives to be used throughout the project's life cycle (Gerrish, T., Cook, M., Ruikar, K., 2016).

NBIMS (National BIM Standards) (2007) defines BIM (Building Information Modeling) as the quantitative expression of the project's features of form and function and the process that ensures the transfer of information throughout the life cycle of the project and evaluates it in 3 dimensions:

A BIM model is a virtual representation of the project's form and function features with a data directory.

The BIM process is the process that covers the production and use of design, construction, and operational data that the project will have throughout its life cycle.

BIM management refers to the organization and control of the business process using BIM model data. Communication infrastructure is created to ensure efficiency and quality in management.

BIM is a process covering design, construction, facility management and technology that strengthens communication between architecture, engineering and construction industries (Leite, 2020; Deutsch, 2011; Lévy, 2019; Sacks et al., 2018). Khosrowshahi and Arayici (2012) support that BIM provides an improvement in the subjects of information management for the life cycle of the structure; increased efficiency for an improved design; reduced errors, rework and waste in design and construction; enhanced risk management; lean construction and design; gaining supply chain support in the production of documents; ensuring construction management with the use of technology. With BIM technology, a virtual model of the building is created using quantitative data before its physical construction (Azhar, 2011). This way, it is possible to analyze architectural, structural, electrical and mechanical details separately beforehand (Kymmel, 2008). During the architectural design phase, BIM helps the architect to visualize the building, estimate project costs, select and evaluate the material applied, adjust project

inputs such as environmental comfort, and facilitate communication between professionals in the process (Amorim et al., 2009).

This study conducted a bibliometric analysis to determine how research trends related to BIM in the literature have evolved and diversified in architecture. For future research on BIM, there is a need to create networks for studies in the literature (Hosseini et al., 2018). The resulting findings raise awareness of the need to address identified gaps and neglected areas in the BIM literature; it allows specifically selected research to benefit practical life (Vilutiene et al., 2019). Although there are currently bibliometric analysis reviews of BIM in the literature, these studies take either the BIM process from a general perspective (Santos et al., 2017; Chihib et al., 2019; Babalola et al., 2021; Li et al., 2017; Zhao, 2017; Olawumi, Chan, & Wong, 2017; Oraee et al., 2017) or the engineering-construction sectors, urban design scale (Bastem, Cekmis, 2021; Shkundalov, Vilutiene, 2021; Wang, Pan, Luo, 2019; Vilutiene et al., 2019). It is believed that bibliometric analysis for the current relationship between architecture and BIM can guide authors for potential studies by giving general information about the area. The goal is to inspire future research based on the gaps and missing information in the existing literature. Therefore, in this study, bibliometric analysis and a comprehensive evaluation of published research were carried out to determine how researchers working at the intersection of BIM and architecture collaborate and where the gap and potential in the field lie.

METHODOLOGY

Bibliometrics is the measurement of documents depending on quantitative data. These documents can be exemplified as texts, books, records or information in different formats. Pritchard (1969) defines bibliometric studies as applying sequencing, mathematical and statistical techniques to different communication environments. Although most common in the library and information sciences, many research fields use bibliographic studies to explore research trends in their field and the implications of these trends. In these studies, data such as the number of citations of the publications, the changes in the content of the publications according to the years, the universities where the publications were studied and keywords can be used. Metric studies have increased in recent years. This increase is due to the progress in computer usage, statistical algorithms, databases and internet connections (Sajovic et al., 2018).

In this study, a bibliometric analysis was conducted to reveal the direction of the current trends and developments at the intersection of architecture and BIM. The flow chart of the bibliometric study is as follows:

Figure 1. Method Of The Study

In the study, publications of all times are gathered till February of 2023, when this study takes place. This study aims to identify the latest trends, so all research conducted in Web Of Science database until the start of the study has been considered. The search filter contains the keywords "Building Information Modeling" OR "BIM" as a topic in the subject area of architecture or construction building technology. These publications were examined according to years (publication and citation), research areas, document types, publication titles, publication numbers by countries, author and co-authorship analyses, publication numbers and citation analyses by universities and keyword analyses. With the search filter remaining the same, the most cited publications published between 2017-2022 and the direction of the trends are clarified.

Clarivate analytics' Web of Science database was used in this study for providing high quality data and allowing the option to enrich search queries. Web of Science is considered one of the world's preeminent research, scientific citation and analytical information platforms (Li et al., 2018; Chavarro et al., 2018).

3997 publications containing the keywords "Building Information Modeling" OR "BIM" as a topic was filtered in the Web of Science database, which are under the subject area of "Architecture or Construction Building Technology."

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Science mapping techniques and algorithms are used in bibliometric studies to visualize similarities and differences in collecting data from one or more sources. Network analysis, consisting of algorithm sets and techniques while deriving from network theory, enables scientifically demonstrating of the interactions of research and research trends, supported by the advent and advanced use of the internet and computers (Smiraglia, 2015). With recent advances in computer technology, scientific indexes, and information visualization techniques, researchers can discover hidden connections and trends in the literature (Li et al., 2017).

Various tools such as VOSviewer, SankeyMATIC, Gephi, nodeXL and Citespace have been developed to support network analysis by visualizing the data and information for a better understanding. In this study used VOSviewer software, which also allows working with different databases.

With VOSviewer tool, bibliometric charts, maps and clusters are generated using network links and understandable visual graphics like circles and labels to imply the similarities and relationships of the gathered data (Van Eck, Waltman, 2014). Network links state the relationship between the elements. The clusters are expressed with different colors. VOSviewer software is widely used especially in graphical and metadata metric studies (Aghimien et al., 2019; Akinlolu et al., 2020; Wu et al., 2020).

RESULTS OF THE BIBLIOMETRIC ANALYSIS

In the study, firstly, publications containing the keywords "Building Information Modeling" OR "BIM" as a topic within the subject area of "Architecture or Construction Building Technology" were filtered in the Web of Science database. Publication and citation numbers of 3997 publications by years, research areas they address in addition to Architecture or Construction Building Technology, document types, publication titles, publication numbers by countries, author and co-authorship analysis, publication numbers and citations by universities, and keyword analysis are presented. Applying the same filter, the 10 most cited publications published between 2017-2022 were presented in detail, and the direction of the research trend today was interpreted.

Number Of Publications And Citations By Year
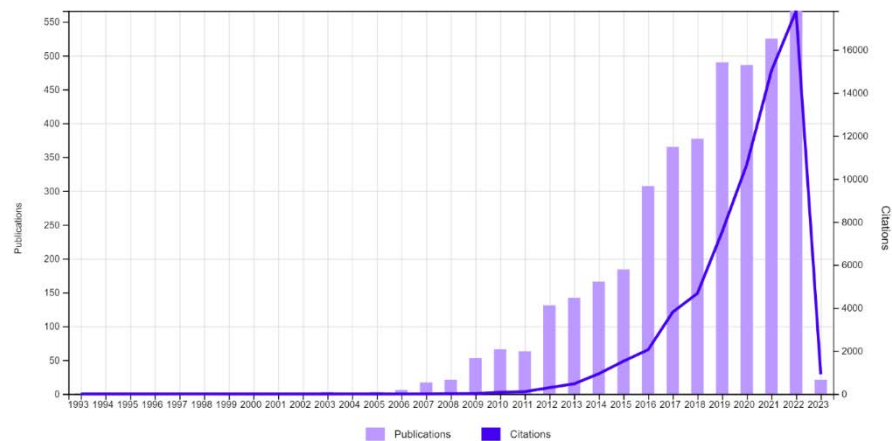
Figure 2. Number Of Publications And Citations By Years

Figure 2 shows the number of publications and citations of 3997 publications by year. The first publication was in 1993. It is stated that between the years 1993 and 2023 (until February when this study was conducted), 2022 (566 publications) is the year that has the highest publication numbers. 2022 is followed by 2021 with 525 publications. There has been an increase in the number of publications on the subject investigated from 1993 to the present day. The period in which the number of publications increased the fastest is between 2015-2016 and 2018-2019.

Citations always express an article's scientific impact (Guo et al., 2019). When Figure 2 is examined, it is seen that citations for publications have increased since 2010. The fastest increase was experienced between 2018-2022. According to Figure 2, 2022 was the most cited year with 17819 citations.

Research Areas

In the study, all publications were filtered to be researched in Architecture or Construction Building Technology. There are other fields in which publications fall within the subject range apart from architecture or construction building technology. In Table 1, the top 10 research areas of the publications are listed. These fields are engineering, computer science, science technology, materials science, energy fuels,

urban studies, remote sensing and imaging science photographic technology. According to Table 1, research areas are identified with record counts and percentages as follows; 3345 publications (83.688% rate) in construction building technologies, 2589 publications (64.774% rate) in engineering, 856 publications (21416% rate) in architecture, 309 publications (7.731% rate) in computer science, 166 publications (4153% rate) in science technology, 134 publications (3.353% ratio) in materials sciences, 132 publications (3302% ratio) in energy fuels, 123 publications (3.077% ratio) in urban studies, 122 publications (3.052% ratio) in remote sensing and 88 publications (2.202% ratio) in imaging science photographic technology.

Table 1. Top ten research areas of the publications with record counts and percentages

Research Areas	Record Count	Percentage
Construction Building Technology	3345	83.688%
Engineering	2589	64.774%
Architecture	856	21.416%
Computer Science	309	7.731%
Science Technology	166	4.153%
Materials Science	134	3.353%
Energy Fuels	132	3.302%
Urban Studies	123	3.077%
Remote Sensing	122	3.052%
Imaging Science Photographic Technology	88	2.202%

Document Types

Document types are divided into 12 sub-titles in Web of Science database: articles, proceedings papers, review articles, editorial materials, book chapters, early access, news items, corrections, letters, books, book reviews, and art exhibit reviews. According to Table 2, most of the 3997 publications analyzed were published as articles (56.743% rate and 2268 articles) or proceedings papers (33.725% rates and 1348 articles). Apart from articles and proceedings papers, there are 232 review articles, 109 editorial materials, 74 book chapters, 58 early access, 34 news items, 8 corrections, 5 art exhibit reviews, 4 letters, 2 books, 2 book reviews among analyzed publications.

Table 2. Document types of the publications with record counts and percentages

Document Types	Record Count	Percentage
Article	2268	56.743%
Proceedings Paper	1348	33.725%
Review Article	232	5.804%
Editorial Material	109	2.727%
Book Chapters	74	1.851%
Early Access	58	1.451%
News Item	34	0.851%
Correction	8	0.200%
Art Exhibit Review	5	0.125%
Letter	4	0.100%

Book	2	0.050%
Book Review	2	0.050%

Publication Titles

Document type analysis states that publications are mostly written as articles or proceedings papers. It is supported in Table 3 that 9 of the top 10 publication titles according to the record counts are journals and 1 of them is a proceedings paper. Automation in Construction Journal is in the first place with 798 publications (19.965%) which published the majority of articles in the research area of "Architecture" or "Building Construction Technology" containing the keywords "Building Information Modeling" or "BIM" as a topic. Buildings (284 publications, 7.105% rate), Journal of Construction Engineering and Management (167 publications, 4.178% rate), Procedia Engineering (131 publications, 3.277% rate), International Archives of the Photogrammetry Remote Sensing and Spatial Information Sciences (119 publications, 2.977% rate), Journal of Building Engineering (116 publications, 2.902% rate), Advances In Civil Engineering (97 publications, 2.427% rate), Bauingenifur (87 publications, 2.177% rate), Construction Innovation England (74 publications, 1.851% rate) IOP Conference Series Materials Science and Engineering (71 publications, 1.776% rate) and are among top 10 publication titles with the most record counts.

Table 3. Top ten publication titles with the most record counts.

Publication Titles	Record Count	Percentage
Automation in Construction	798	19.965%
Buildings	284	7.105%
Journal of Construction Engineering and Management	167	4.178%
Procedia Engineering	131	3.277%
International Archives of The Photogrammetry Remote Sensing and Spatial Information Sciences	119	2.977%
Journal of Building Engineering	116	2.902%
Advances In Civil Engineering	97	2.427%
Bauingenifur	87	2.177%
Construction Innovation England	74	1.851%
IOP Conference Series Materials Science and Engineering	71	1.776%

Number Of Publications By Country

Figure 3 shows the distribution of 3997 publications, according to the countries in which they were published. According to the data obtained, China (747 publications) and America (689 publications) are in the first two places among the countries with the highest number of publications. After China and America, England (358 publications), Italy (337 publications), Australia (309 publications), Germany (253 publications), South Korea (199 publications), Canada (169 publications), Spain (156 publications), Malaysia (107 publications), Singapore (77 publications), Netherlands (75 publications), Portugal (73 publications), Iran (68 publications), Finland (62 publications), Taiwan (62 publications),

Turkey (61 publications), Sweden (60 publications), Belgium (57 publications), Czech Republic (55 publications), Austria (52 publications), Brazil (51 publications), Norway (49 publications), Poland (49 publications) and Denmark (47 publications) follow the graphic.
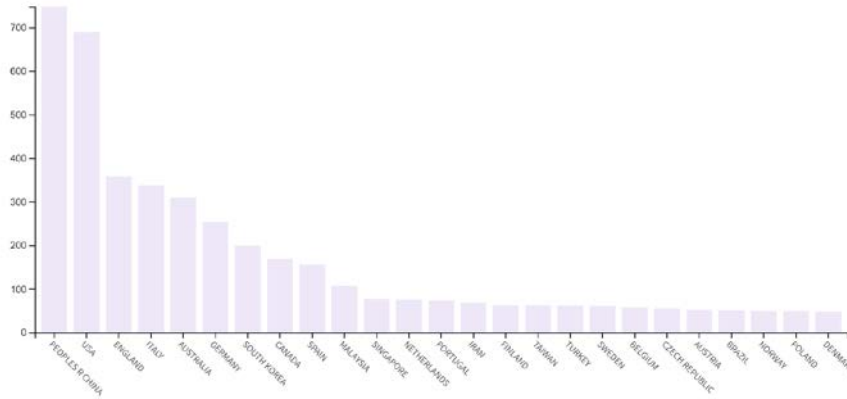
Figure 3. Number Of Publications And Citations By Years

Author And Co-Authorship Analysis

Co-authorship analysis assists in identifying and evaluating leading organizations, authors, countries and scientific collaboration trends (Fonseca et al., 2016). For author and co-authorship analysis, the minimum number of publications per author was set to 10 as a parameter in VOSviewer program. 62 authors met this criterion. Table 4 presents the list of the most productive 10 authors who have conducted research on the topic of "Building Information Modelling" or "BIM" in the field of "Architecture" or "Construction Building Technology." Accordingly, Cheng J. (41 publications, 1406 citations), Wang X. (32 publications, 2328 citations), Li H. (30 publications, 1247 citations), Lu W. (26 publications, 618 citations), and Luo H. (21 publications, 1097 citations) are the first 5 authors of the table. According to the table, the most cited author is Wang X.

Table 4. The most productive 11 authors and their document numbers and citations

Author	Documents	Citations
Cheng, Jack C. P.	41	1406
Wang, Xiangyu	32	2328
Li, Heng	30	1247
Lu, Weisheng	26	618
Luo, Hanbin	21	1097
Hosseini, M. Reza	20	867
Yan, Wei	20	543
Love, Peter E. D.	18	1204
Wang, Qian	18	598
Chong, Heap-yih	17	309
Leite, Fernanda	17	365

In Figure 4, a co-authorship network has been developed for authors. Lines between author names refer to collaborations and describe an author's connection with other authors (Van Eck & Waltman, 2010). 14 co-authorship clusters with 48 authors are identified in the table. Figure 5 visually represents the most productive years of the authors.
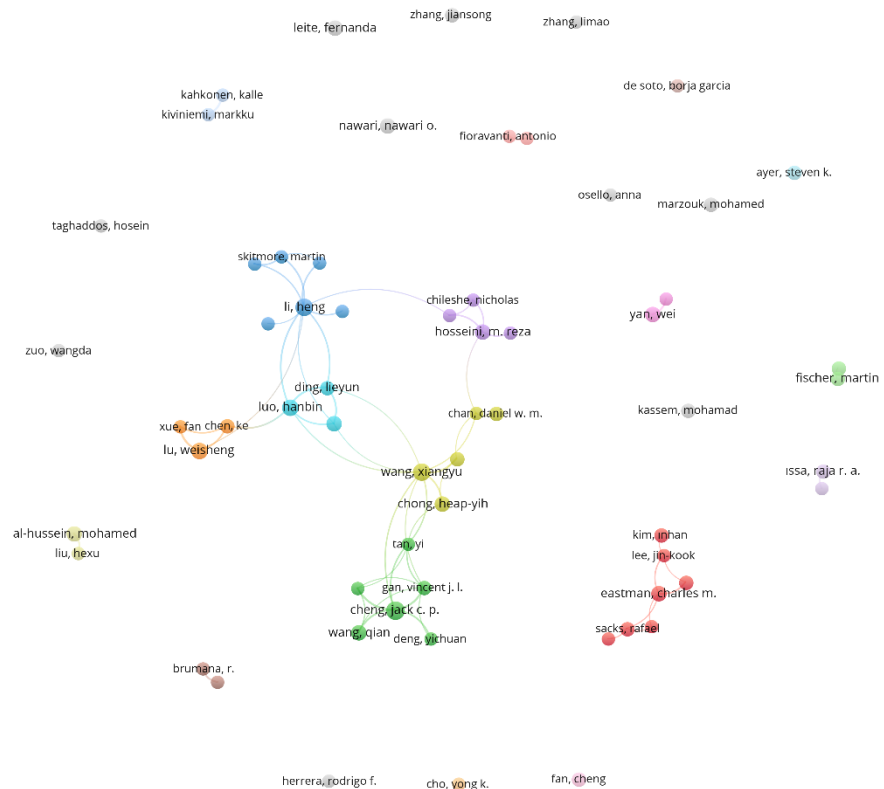
Figure 4. Co-Authorship Network / Author Collaboration
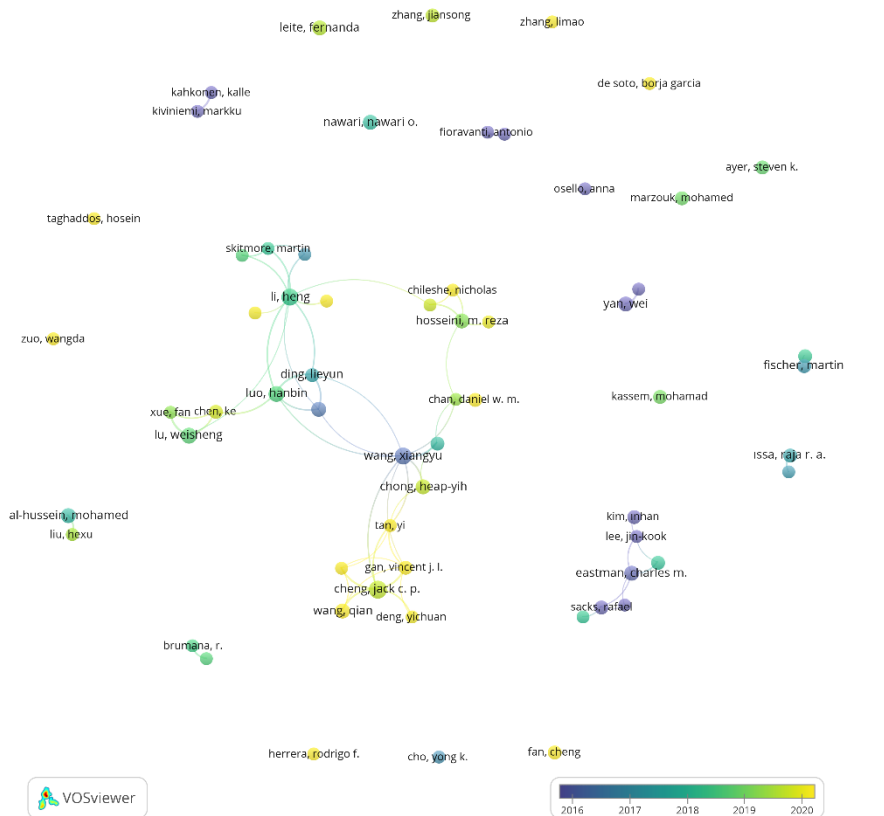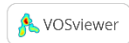
Figure 5. The Most Productive Years Of The Authors
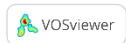
Number Of Documents And Citations By Universities

Document and citation numbers of the universities are examined in this section. Among the universities where the filtered publications are done, those with at least 30 publications are listed in Table 5. Accordingly, Hong Kong Polytechnic University (97 publications, 4203 citations), Politecnico Milano (83 publications, 588 citations) and Georgia Institute Technology (68 publications, 3416 citations) are the first three universities considering the document numbers.

Table 5. Number of publications and citations by universities

Organization	Documents	Citations
Hong Kong Polytechnic University	97	4203
Politecnico Milano	83	588
Georgia Institute Technology	68	3416
Curtin University	67	3027
University Of Florida	60	1151
University Of Hong Kong	57	1581
Tsinghua University	54	1645
Tongji University	52	937
Hong Kong University Of Science And Technology	49	1432
Southeast University	47	399
Huazhong University Of Science And Technology	45	1711
Deakin University	44	1935
Shenzhen University	42	596
National University Of Singapore	41	939
Texas A&M University	39	844
Politecnico Torino	39	282
University College London	38	655
Kyung Hee University	35	2079
University Of New South Wales	35	475
Northumbria University	35	730
Hanyang University	34	838
Technic University Of Munich	33	424
University Of Alberta	32	639
Katholieke University Leuven	31	358
Cardiff University	31	832

Keyword analysis

Keywords mainly mirror the essence of a publication (Xiang et al., 2017). Keywords were obtained by analyzing the content of 3326 publications with the co-occurrence option in VOSviewer program. Co-occurrence means the common existence or closeness of similar keywords (Lozano et al., 2019).

In the study, the minimum repeat number of the keywords was determined as 10. The keywords listed with the co-occurrence option were filtered by considering their repetitions, and 143 were found. According to their relations in publications, these 143 keywords were divided into 8 clusters by VOSviewer program. Each cluster is represented with a different color in Figure 6. Figure 7 depicts cluster titles according to the subjects of the keywords.

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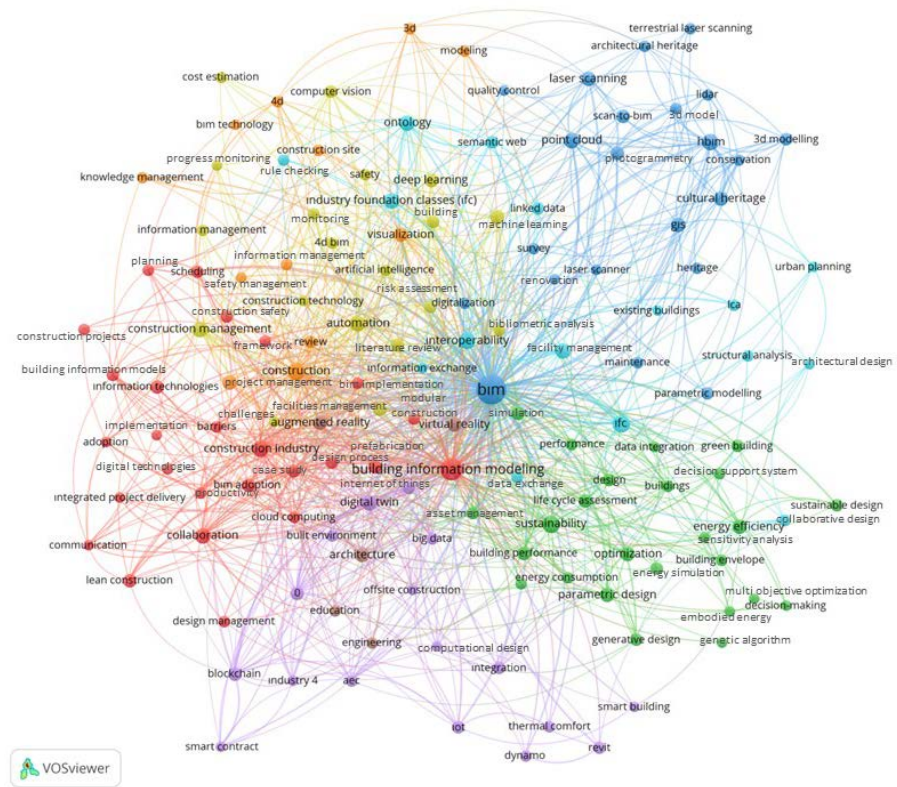
Figure 6. Keyword Network Analysis
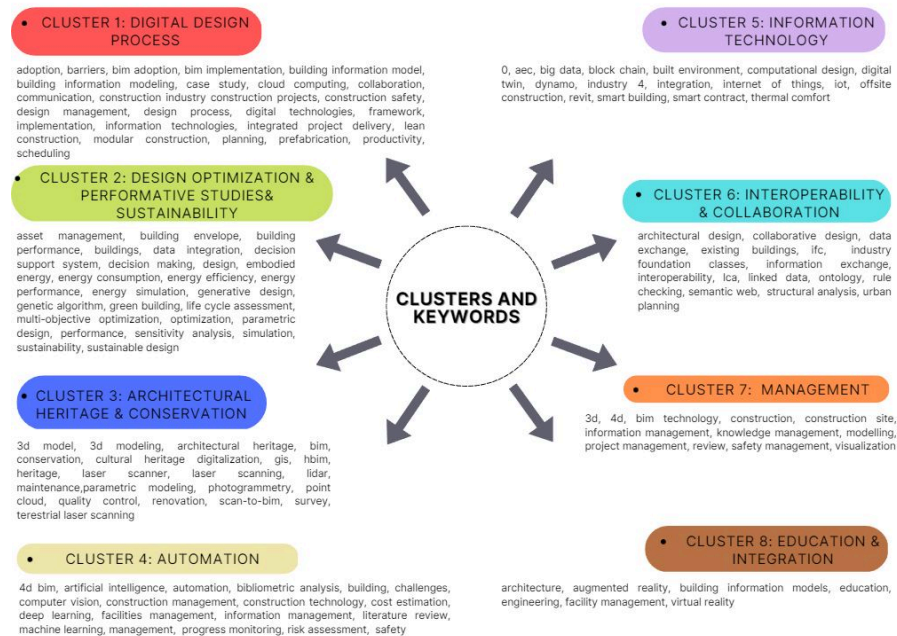
Figure 7. Generated Cluster Titles And Keywords

- **Cluster 1: Digital Design Process**

Building information modeling has significantly impacted how architects and engineers approach projects, promoting collaboration across disciplines (Harty, J., Kouider, T., Paterson, G., 2016). It has revolutionized the designer's relationship with the object they are designing, transforming the process from conception design to life cycle

maintenance, including detailed design and construction documentation (Marcos, 2017). Cluster 1 is shown in red in Figure 6. In the cluster, there are 26 keywords implying the *digital design process,* including bim adoption, bim implementation, design process, digital technologies, information technologies, and integrated project delivery.

- **Cluster 2: Design Optimization & Performative Studies & Sustainability**

BIM is not just a technological advancement but represents a new way of thinking about the entire lifecycle of construction, which has the potential to bring about a significant cultural shift in the industry (Vite, Morbiducci, 2021). To attain sustainable and efficient building design performance, stakeholders must make critical decisions during the early design phase. BIM can be used for energy performance simulations and can be integrated into the design process to improve the energy analysis process (Sherko, 2018). If BIM is not integrated into the design process, it can result in an inefficient design process (Cho, Chen, Woo, 2012). Sustainable architectural design aims to reduce energy consumption and minimize negative environmental impacts while providing comfort for building occupants (Abdelhameed, 2017). To achieve this, passive and ecological building design criteria should be employed during design. These criteria aim to reduce energy consumption by optimizing heat losses and gains through the building envelope (Omrany, Marsono, 2016).

Cluster 2 is represented with 25 keywords in green. These keywords include building envelope, building performance, energy consumption, energy efficiency, energy performance, energy simulation, life cycle assessment, optimization, performance, sensitivity analysis, simulation, sustainability and sustainable design, which involves content for *design optimization & performative studies & sustainability.*

- **Cluster 3: Architectural Heritage & Conservation**

Building Information Modeling (BIM) is a widely used tool in the planning, design, and management stages of building construction. It offers a spatial and functional representation of structures through parametric objects. It has several features, such as visualization, data management, and cost calculation, making it useful for energy management, emergency management, and retrofit planning. Recently, BIM has been used to document existing structures, especially in maintenance, renovation, and the building's life cycle (Volk, 2014). When it comes to heritage buildings, the difficulty of matching traditional data with the real conditions of the building can lead to challenges in understanding and preserving the structure. In this regard, BIM is recognized as a valuable tool for documenting and restoring heritage buildings (Murphy et al., 2017; Bruno et al., 2019; Allegra et al., 2020). Heritage Building Information Modeling (HBIM) is a specialized

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adaptation of BIM designed to preserve architectural heritage. HBIM has emerged in the literature over the last decade and is used to express the use of BIM in the context of heritage buildings (Coşgun, Çügen, Arslan Selçuk, 2021).

There are 22 keywords in Cluster 3, shown in blue. These keywords include architectural heritage, bim, conservation, cultural heritage, digitalization, gis, lidar, photogrammetry, point cloud, and terrestrial laser scanning. This cluster can be examined under the title of *architectural heritage & conservation*.

- **Cluster 4: Automation**

The development of the Industry Foundation Classes (IFC) format in BIM software has enabled collaboration between construction parties and facilitated information exchange (buildingSMART, 2016). In this way, designs can be produced and controlled automatically. (Sacks et al., 2018). To ensure efficient automation in complex building quality assessment during the design phase, it is crucial to understand both the data structure of the IFC, which is widely used for buildings and the data structure of the assessment method used.

The complex quality of buildings is a significant concern in the construction industry. It encompasses a wide range of criteria, such as environmental quality and life cycle assessment, energy performance of buildings, durability, resilience, internal environment quality, architectural and functional quality, and social issues. Rating systems and assessment methods are effective, inspiring, and motivating tools in the design process to achieve complex building quality. However, the complexity of the rating systems and the many criteria and parameters required for the assessment presents a challenge in finding new ways to automate the process. By connecting BIM, which serves as a structured database of building parameters, with data workflows linked to the assessment scheme, it is possible to create an efficient tool for complex building quality assessment (Růžička et al., 2022).

Cluster 4 is identified in yellow with 19 keywords. The keywords such as artificial intelligence, automation, cost estimation, facilities management, information management, machine learning, progress monitoring, and risk assessment demonstrate *automation* in general.

- **Cluster 5: Information Technology**

Today, information technology applications are effective from the design phase of a project to the entire life cycle. BIM (Building Information Modelling) is a technology that enhances communication between architecture, engineering, and construction sectors, covering a process that includes design, construction, and facility management. Due to evolving needs, traditional construction management and project delivery processes have changed, and information technology

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applications have entered our lives to be used throughout the life cycle of a project.

BIM is not just a technology but a process rich in information and centered on models. It can revolutionize project delivery and bring value to the entire life cycle of infrastructure assets, including planning, designing, building, and managing. BIM is a system of knowledge about how things are constructed. The technology enabling BIM gives it the potential to transform the construction industry. This technology allows for the creation and utilization of intelligent 3D models, connecting all project parties and stakeholders, enabling collaboration and seamless data flow about the design and construction process in a manner that the construction industry has never experienced before. (BIM for infrastructure the impact of today's technology on BIM, n.d.).

Cluster 5 is shown in purple in Figure 6. There are 17 keywords in the cluster, such as big data, blockchain, digital twin, internet of things, and iot that can be titled *information technology*.

- **Cluster 6: Interoperability & Collaboration**

From the planning stage of the building, many stakeholders (such as architects, engineers, contractors, owners, etc.) work together throughout the entire life cycle. The communication through which they exchange information is called collaboration (Ofluoğlu, 2014). According to a study by Wood and Gray (1991), collaboration occurs when a group of self-governing stakeholders in a particular field come together in an interactive process, using common guidelines, norms, and structures to address issues related to that field. Thomson et al. (2009) expanded on this definition in 2009 and stated that collaboration requires cooperation among all parties involved in creating rules and structures that benefit everyone involved. Different disciplines have different understandings of collaboration (Thomson et al., 2009, Bedwell et al., 2012). In fields related to management, collaboration is seen as a relationship structure that leads to successful management (Bedwell et al., 2012). Collaboration, closely tied to effective management, is crucial for success throughout the project lifecycle (van Gassel et al., 2014, Suprapto et al., 2015).

In Cluster 6, 15 keywords are expressed in light blue. The cluster containing the keywords data exchange, ifc, industry foundation classes, and semantic web can be analyzed under the title of *interoperability & collaboration*.

- **Cluster 7: Management**

The functions of BIM as a coordinator in a project system are comparable to those of a project manager. BIM facilitates communication among various disciplines, performs constructability analysis of project systems, calculates project costs and timelines using quantity take offs, creates a comprehensive view of projects through visualization, and fosters teamwork. These tasks are similar to those performed by a project

manager on a larger scale throughout a project's lifecycle (Rokooei, 2015).

BIM is known for its well-organized information creation and exchange process. With numerous stakeholders involved in a project, who often have conflicting perspectives and objectives, properly managing information becomes crucial in project management. BIM provides the opportunity to improve project and information management by producing and utilizing high-quality information and represents both a challenge and an opportunity (Scheffer, Mattern, Konig, 2015).

Cluster 7 consists of 12 keywords shown in orange. These keywords involve information management, knowledge management, project management, and safety management. Cluster 7 is expressed with *management* as a title.

- **Cluster 8: Education & Integration**

Today, the use of BIM in architecture, construction, contractor and consultant offices is rapidly increasing and there is a need for graduates with the knowledge and skills to meet the needs of the industry (Arroteia et al., 2019; Tanko, Mbugua, 2021). Studies examining the evaluation of BIM in architecture education have indicated that BIM-supported virtual reality (VR), augmented reality (AR), and mixed reality (MR) are among the future research areas for both architecture and engineering education and can be applied to curriculum using various methods (Wang et al., 2018; Maharika et al., 2020)

Cluster 8 is expressed by 7 keywords in brown. In Figure 6, there are the keywords augmented reality, building information models, education, engineering, and virtual reality in this cluster. This cluster is referred to *education & integration* as a title.

The changes in the most used keywords in publications over the years are visualized in four categories in Figure 8. The categorization is made by using dark blue, turquoise, green and yellow as references.

Accordingly, specifying the keywords from the past to the present, the first category includes keywords such as; 3d, 4d, modeling, safety, rule checking, bim technology, cost estimation, information management, knowledge management, visualization, interoperability, survey, laser scanner, existing buildings, bim, simulation, ifc, parametric modeling, structural analysis, architectural design, urban planning, framework, planning, modular construction, building information models, information technologies, project management, design process, performance, design, sustainable design, collaborative design, decision making, energy simulation, parametric design, education, cloud computing, collaboration, communication, integrated project delivery, productivity, digital technologies, lean construction and ontology, building information model.

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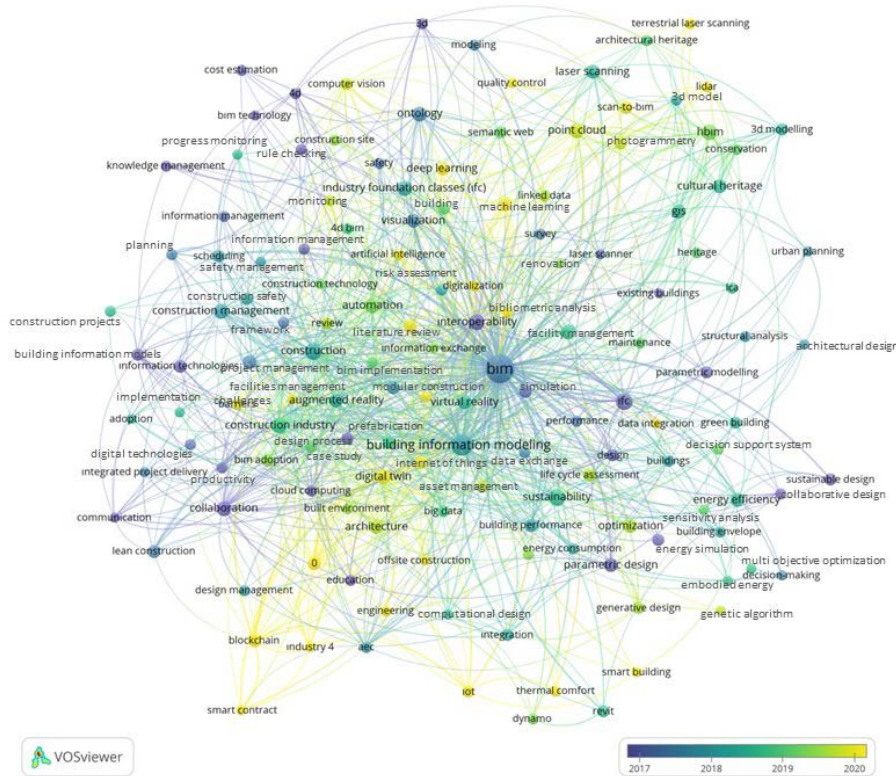
The second category consists of laser scanning, architectural heritage, 3d model, 3d modeling, cultural heritage, gis, heritage, lca, progress monitoring, semantic web, industry foundation classes (ifc), facility management, maintenance, 4d bim, risk assessment, scheduling, management, construction safety, construction management, construction projects, building information modeling, sustainability, design management, aec, revit, building performance, energy consumption, big data, data exchange, buildings, green building, energy efficiency, building envelope, adoption, implementation, prefabrication, computational design, integration, construction, safety management.

In the third category, the keywords are; hbim, renovation, conservation, building, embodied energy, multi objective optimization, genetic algorithm, generative design, dynamo, architecture, built environment, point cloud, photogrammetry, linked data, construction technology, computer vision, automation, review, construction site, bim implementation, information exchange, construction industry, bim adoption, case study, optimization, life cycle assessment, asset management, virtual reality, decision support system, energy performance, sensitivity analysis, augmented reality.

Keywords of the most recent publications include terrestrial laser scanning, barriers, engineering, lidar, scan-to-bim, quality control, machine learning, deep learning, artificial intelligence, digitalization, terrestrial laser scanning, bibliometric analysis, literature review, modular construction, facilities management, challenges, data

integration, internet of things, digital twin, 0, offsite construction, blockchain, industry 4, smart contract, iot, thermal comfort and smart building.

When examining the changes in keywords according to the years, studies have been carried out on *digital design process, management, design optimization & performative studies & sustainability, interoperability & collaboration, and architectural heritage & conservation*. Currently, studies are frequently being carried out on integrating *automation and information technology* with BIM. It is believed that this is because various technologies can provide new solutions by integrating with BIM. Although there is a need for academic studies in the field of *education & integration*, it is stated that the least amount of research has been conducted in this area.

The Most Cited Publications Published Between 2017 And 2022

Finally, the most cited 10 publications between 2017 and 2022 among all analyzed sources were examined in the study. In Table 6, 9 out of 10 publications were published in Automation In Construction journal. 6 of these publications are reviews, 2 of them are scientometric and 1 of them is bibliometric analysis. In line with the results, it can be concluded that these studies on BIM tend to determine the potential study areas. On the other hand, Zhong et al. (2017) propose a BIM platform with the Internet of Things to achieve real-time visibility and traceability in prefabricated buildings with a case study. When the conclusion parts of the publications are examined, it is stated that the most researched topics recently are the development of BIM tools, the research of the adoption of BIM worldwide, energy simulation using BIM-based information, semantic web technology, ontology, interoperability, mobile and cloud computing (Zhao, 2017; Santos et al., 2017). According to these publications, potential fields of study were evaluated as optimization, collaboration, interoperability, and information technology (Tang et al., 2019; Guo et al., 2017; Pauwels et al., 2017). Academic case studies have been found to be rare to observe current practices and developments (Pärn et al., 2017).

Table 6. The most cited publications between 2017-2022

Publications	Citations
Critical Evaluation Off Offsite Construction Research: A Scientometric Analysis Hosseini, Mr, Martek, I, (...), Chileshe, N. 2018	Automation In Construction 87, Pp.235-247	170
A Scientometric Review Of Global Bim Research: Analysis And Visualization Zhao, Xb. 2017	Automation In Construction 80, Pp.37-47	162
Critical Review Of Bim-Based Lca Method To Buildings Soust-Verdaguer, B., Llatas, C., Garcia-Martanez A. 2017	Energy And Buildings 136, Pp.110-120	158
Building Information Modelling (Bim) For Green Buildings: A Critical Review And Future Directions Lu, Yj, Wu, Zl, (...), Li, Yk. 2017	Automation In Construction 83, Pp.134-148	154

The Building Information Modeling Trajectory In Facilities Management: A Review Parn, Ea., Edwards, Dj, Sing Mcp. 2017 | Automation In Construction 75 , Pp.45-55	145
A Review Of Building Information Modelling (Bim) And The Internet Of Things (Iot) Devices Integration: Present Status And Future Trends Tang, S, Shelden, Dr, (...), Gao, Xh. 2019 | Automation In Construction 101, Pp.127-139	139
Bibliometric Analysis And Review Of Building Information Modelling Literature Published Between 2005 And 2015 Santos, R. Costa, Aa., Grilo, A. 2017 | Automation In Construction 80 , Pp.118-136	131
Prefabricated Construction Enabled By The Internet-Of-Things Zhong, Ry, Peng, Y, (...), Huang, Gq. 2017 | Automation In Construction 76 , Pp.59-70	131
Visualization Technology-Based Construction Safety Management: A Review Guo, Hl, Yu, Yt; Skitmore, M. 2017 | Automation In Construction 73 , Pp.135-144	123
Semantic Web Technologies In Aec Industry: A Literature Overview Pauwells, P., Zhang, Sj., Lee, Yc. 2017 | Automation In Construction 73 , Pp.145-165	122

RESULTS, DISCUSSIONS AND FUTURE STUDIES

In this study, a bibliometric analysis of published documents was conducted to determine how researchers collaborate at the intersection of BIM and architecture and where the gap and potential are in the field. Data from 3997 publications that include keywords "Building Information Modeling" or "BIM" in the research area of "Architecture" or "Construction Building Technology" has been examined. The relationship between BIM and architecture over time was mapped, visualized, and described by analyzing the published data in depth and using keywords and a collaboration network analysis. Number of publications and citations by year, research areas, document types, publication titles, number of publications by country, author and co-authorship analysis, number of documents and citations by universities and keyword analysis are interpreted, respectively. The most cited 10 publications between 2017-2022 were determined and their contents were examined to observe research trends. The findings of this study will enable researchers and practitioners to benefit for future studies.

The results are as follows:

- Between 1993 and 2023 (until February, when this study was conducted), most of the publications were made in 2022. There has been an increase in the number of publications on the subject investigated from 1993 to the present day. The periods in which the number of publications increased the fastest are between 2015-2016 and 2018-2019. 2022 is also the year that has the highest publication numbers. This statement indicates that the topic is currently in the field being worked on. Therefore, it is important to identify existing gaps in the area, which is the purpose of the study.
- Other fields in which publications fall within the range of topics apart from architecture and construction building technology are engineering, computer science, science technology, materials

science, energy fuels, urban studies, remote sensing and imaging science photographic technology. It is possible to say that engineering field involves most of the publications. Thus, this field is mostly suitable for more technical studies.

- Most of the 3997 analyzed publications are in the type of article or conference proceedings. This situation proves the current existence of the issue as the latest studies are presented as conference proceedings before converting into articles.

- According to the number of publications, nine of the top ten references are journals and one is a proceedings paper. BIM is a technology and process encompassing technical subjects such as optimization in design and construction, management processes in architecture, so it can be stated that journals working in this field are primarily listed in the article.

- Approximately 20% of the reviewed publications were published in the journal Automation In Construction because it is a subject that entirely fits the journal's scope. Apart from this, other references also publish on technical issues. It is worth mentioning that the list did not include any journal or conference that specifically focuses on architecture.

- When the number of publications is analyzed by country, China and America are in the first two places among the countries that publish the most on the researched subject. The reason for this can be a possible subject for future studies.

- The most productive 5 authors between searched years in the studied field are Cheng J., Wang X., Li H., Lu W., Luo H. and the most cited author is Wang X. 14 co-authorship clusters were identified with 48 authors. Authors who have made the most recent publications include Zhang, L., De Soto, B., Taghaddos, H., Sepasgozar, S., Xu, Z., Chileshe, N., Daniel, W., Zuo, W., Tan, Y., Chen, K., Vincent, J.; Wang, Q., Deng, Y, Herrera, R., Fan, C. For new studies on BIM, it is recommended to examine the studies of these authors working on the most recent publications.

- According to the number of documents, Hong Kong Polytechnic University, Politecnico Milano and Georgia Institute Technology are in the first three places. It was wondered what path the listed schools followed in their education about BIM. Given the need for research in the field of education, it is believed that this topic can be an intriguing area for investigation.

- For keyword analysis, 143 keywords are divided into 8 clusters. Clusters are titled according to the subjects of the keywords. These titles include; *digital design process, design optimization & performative studies & sustainability, architectural heritage & conservation, automation, information technology, interoperability & collaboration, management and education & integration.*

- Examining how keywords have evolved over the years reveals that research has been conducted in areas such as *digital design process, management, design optimization & performative studies*

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& sustainability, interoperability & collaboration, and architectural heritage & conservation. Much research is being conducted on integrating *automation and information technology* with BIM, as it is believed that integrating various technologies with BIM can offer new solutions. However, despite the need for academic studies in the field of education and integration, it is noted that the least amount of work has been done in this area.

- The most cited 10 publications in the last 6 years present that studies on BIM in recent years aim to identify potential study areas.

In conclusion, recent research on BIM and architecture specifically, has identified key technologies such as laser scanning, lidar, scan-to-bim, machine learning, deep learning, artificial intelligence, internet of things (IoT), digital twin, blockchain, smart contract, smart building, etc. This demonstrates that BIM can be integrated with new technologies to address different issues and that further studies are needed. How these technologies work together is an open research topic, and studies in this scope are expected to be conducted soon. Moreover, academic studies on suitable approaches in design-construction processes and architectural education about BIM technology are limited, and there is a requirement for further research on these subjects.

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Although this study contributes to the literature, it also has some limitations. First, the analysis is based on the dataset from the Web of Science database. For this reason, BIM-Architecture interaction has been reflected in the literature within the boundaries of the Web of Science database in terms of scope. Second, the analysis includes English literature using a specific set of keywords for search. A more comprehensive study can be done by adding publications in different languages.

Furthermore, this study focused on providing a broad picture of the available literature on BIM for architecture through bibliometric analysis of citation networks and less on in-depth content analysis of existing studies. Also, it would be beneficial to compare the bibliographic results of BIM research centered on architecture with other bibliographic research related to BIM. Despite this, there is a qualitative analysis of the most cited articles between 2017-2022. A complementary study to analyze the content of existing studies can provide a more comprehensive insight into research trends on the subject.

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Resume

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Research Article

A Spatial Configuration Oriented Control System as a Mobile App for Educational Facilities Design in Turkey

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Abstract

Facilities has decreased due to the developing technologies around the world. The main objective of this study is to offer an alternative solution in terms of architecture to the use of copy-type projects which are still used by the Ministry of Education in Turkey. In this direction, it is aimed to develop a software to make the spatial configuration of an educational structure in the design process controllable. In this study it is planned to design a feedback mechanism that architects can use in the educational structure design process. The data obtained as a result of expert interviews, examination of guidelines by the ministry and examination of existing types of projects with the space syntax technique were transformed into software language. As a result of analysis done, evaluations were presented in line with the obtained data and findings. Out of these a pre-notification mechanism was designed to be used in the design process of educational buildings. The feedback system, which is defined as educational buildings in the current article, can be applied in different areas such as clinics, hospitals, shopping centres and university buildings in the next stages. By using the mobile application that is emerged as a result of the research, the designers will be able to identify problematic spatial relationships by providing data to the application at different stages in the process of designing an educational structure. Thus, it will be able to intervene in a timely manner based on the problems it detects.

INTRODUCTION

Education plays one of the most active roles in the self-determination of nations. In the 21st century, when the concept of globalization has become more prominent, this role causes the differences and similarities between the structure, process, purpose and policy dimensions of different education systems to gain importance (Balcı, 2018).

Schoolhouses have historically been the symbol of grassroots national education policy delivery (Uduko, 2015). In 2005, the OECD Programme on Educational Building (PEB) organised two international experts' group meetings to discuss how countries define and evaluate quality in educational facilities. According to the research and experiences of six experts the meaning of quality in educational facilities were defined. All individuals have the right to have a quality educational and a physical space that facilitates the learning process as an educational facility which is cost-effective over time, respectful with the environment, encourages social participation, and provides a healthy and comfortable environment. They also mention that universal parameters that reflect temporary, local and tangible quality dimensions such as flexibility, sustainability, and preventive and corrective maintenance can be used to evaluate the physical space that defines a school worldwide (Abend et al.2006). Moreover, studies have been done on methods of evaluating and optimizing environmental comfort parameters (thermal, acoustic, natural lighting and functionality) of school buildings during the preliminary stages of design which shows the importance of educational facilities design process (da Graca et al.2007).

Learning is the most important activity in educational facilities. Understanding the physical conditions of these structures and the effects of it on students' motivation is a complex process. Teaching resources, teacher quality and education plans and programs have an important place in the education process of the child and these factors are effective on student success (Lyons, 2001). The physical and environmental conditions of educational facilities are the primary conditions that directly affect students' ability to be productive and learn. Conditions that will ensure the physical comfort of individuals such as ventilation, heating-cooling, natural lighting, healthy material selection and acoustic comfort are a few of them (Tavşan & Yanılmaz, 2019).

The main purposes of educational facilities are to ensure the integration of the individual into the society, to provide education and to produce and transfer culture (Johnson, 2006). Other purposes of these facilities are to present the educators as role models for students, to transfer valid behavior patterns and beliefs, to disseminate the traditions approved by the society, and to provide cultural change by discussing, testing and selecting the values affected by great changes and passing them on to new generations. One of the international

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drivers behind the transformation of school design has been the promotion of the child-centered learning model in primary education pedagogy (Woolner, 2010; Hille, 2011). As a result, classroom elements like windows and learning spaces have been designed at a more intimate scale to meet the needs of children. For collaborative learning, child-sized furniture should also be placed in groups (Uduku, 2015).

In accordance with the central government principle adopted in the Constitution in Turkey, the Ministry of National Education has to carry out all educational activities managed centrally in the Republic of Turkey. Education levels consist of Preschool, Primary Education, Secondary Education and Higher Education (Eurydice, 2015).

Each level is 4 years in terms of primary school (1st, 2nd, 3rd and 4th grades), secondary school (5th, 6th, 7th and 8th grades) and high school (9th, 10th, 11th and 12th grades). It is implemented on a compulsory 12-year gradual basis. In addition, primary, secondary and high school levels are compulsory for individuals with special education needs, as well as pre-school education (Eurydice, 2015).

It is stated in the revised "Ministry of National Education Educational Buildings Minimum Design Standards 2015 Guide" (which will be represented as "MEB Guide 2015" for the rest of article) that "new or repaired education facilities, special projects prepared by governorships or philanthropists, are aimed to meet today's expectations and needs of education. According to the data obtained from 2017 Ministry of National Education statistics, It has been noted that significant repairs and upgrades to existing schools typically focus on strengthening the structural foundation and enhancing the physical facilities (Çakır & Tuna Taygun, 2021). It should also be done in accordance with the developments in technology in education and training, the legislation in force, region and land conditions, region and land conditions, qualified education environments, in addition to being safe, aesthetic, and accessible to everyone."" (MEB guideline, 2015). The difficulty to assemble the rules of educational facilities designed by the designers due to the multiplicity of the rules of the Ministry of National Education is the main problem that was taken in consideration in this study.

Copy-type projects are projects that are based on certain data to be used in the construction process of buildings based on the repetition of similar organizations. The main reasons for the continuation of copy-type project applications in Turkey are primarily to minimize the mistakes in the planning of school buildings and to provide economic profit from the construction. The reasons for the implementation of copy-type projects for educational buildings in Turkey are listed by experts as follows:

- Ease of preliminary cost evaluation for the investments to be made,
- Accelerating school investments,
- Providing standard opportunities for educational structures,

- Making a balanced use of the available resources throughout the country,
- Providing maximum project service with limited technical staff,
- Minimizing project costs (Gür & Zorlu, 2002).

Gür and Zorlu (2002) explained the disadvantages of copy-type project applications as follows;

- Such projects cause functional problems as it is not possible to predict educational and social developments.
- Educational buildings become too small or too big for the population of the region they are located at.
- Weaknesses in open and close area relationships.
- They are multi-storey, bulky structures that are not suitable for educational buildings.
- They are not physically aesthetic.
- İnconsistency of the climatic characteristics of different regions with structures (Gür & Zorlu, 2002).

Copy-type projects also have deficiencies in terms of meeting the psycho-social and cultural needs of children. The problem of uniformity in these structures affects the identity of the city and does not comply with the characteristic features of children such as originality and privilege. In high-rise copy-type projects where the relationship between the classroom and the garden is broken, the sense of trust and shelter that can be provided by the spatial arrangement of the children is ignored. With classrooms lined up along a corridor, high-ceilinged, dry, and colourless-copy-type schools are far from offering perceptual richness to children. In addition, since it does not contain a multi-purpose indoor space where children can spend time during recess, it is not possible for children to have a break during the winter months.

The use of the copy-type project application for the design of educational buildings has decreased throughout the world due to the problems it creates in the usage process. The positive effects of a properly designed education structure on the education received by the student are one of the frequently encountered issues in national and international research areas. The main purpose of this research, considering these two factors, is to develop a method proposal so that the educational buildings built by the Ministry of National Education in Turkey can go beyond the boundaries of the copy-type projects and the designer effect can be seen more in the design process of these buildings. Accordingly, another aim of the study is to propose an inspection model that can prevent the problems that may arise in the implementation of the requirement lists and copy-type projects recommended for educational buildings.

The use of the copy-type project application for the design of educational buildings has decreased throughout the world due to the problems it creates in the usage process. The positive effects of a properly designed education structure on the education received by the

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student are one of the frequently encountered issues in the national and international literature. The fact that the number of functional areas in the educational buildings, which is the focus of this study, and the fact that the relationships established between these areas are faulty, can leave irreversible traces to the user group, making the decisions taken during the design process of similar buildings more important. By using the mobile application that is emerged as a result of the research, the designers will be able to identify problematic spatial relationships by providing data to the application at different stages in the process of designing an educational structure. Thus, it will be able to intervene in a timely manner based on the problems it detects.

SPATIAL CONFIGURATION

The potential transitions that occur as a result of the existence of boundaries in the spatial order and as a result of spatial merger or rupture are called spatial configuration. In this sense, spatial configuration includes the sequencing and succession of the transition between spaces, the change of the movement route in the transition, the existence of alternative transitions and the intersection of the transition routes in different directions (Erman, 2017). The plan is used as an expression and application tool, which is necessary for the realization of the design, which is determined beforehand and shows the relationship between the spaces of the building. It ensures that design studies are organized according to architectural data and the design is explained as a plan (Arcan & Evci, 1999).

FEEDBACK IN DESIGN

Feedback is all kinds of information and notifications given back by the system to the user about the situation he is in and the action he has taken. A set of outputs from a system that corresponds to input of information is called feedback. Information such as whether the system is working, whether an action was taken correctly or incorrectly, whether the user interacted or not, and similar information is presented to the user as feedback (Kurtuluş & Kaymaz, 2007). Designers apply different processes, such as developing ideas, narrowing idea options, and deriving more alternatives, to determine a final design. These processes require divergent thinking to create choices that can come to the fore, and convergent thinking to narrow and select these choices (Yılmaz & Daly, 2016).

Through automatic control, the operating conditions of a system can be changed to meet certain performance characteristics, which may include enhanced performance and additional safety requirements. Moreover, many systems such as chemical processes, mechanical systems, electronic devices and complex structures will not function properly without additional control. Therefore, control has played and continues to play an important role in the design of industrial and

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engineering processes that must meet improved performance requirements (De Callafon, 1998).

As a result of the combination of these three parts, it has been revealed that a mechanism that will provide feedback to the architect about the spatial configuration of the building can be designed during the design process of educational buildings. In the section of the studies carried out, detailed information is presented along with the design of this feedback mechanism and data collection techniques.

METHODOLOGY

As stated in the aim of the study, in order to create a mechanism to control the spatial configuration of educational buildings, it is necessary to first reveal the truths and wrongs related to this subject. In order to reveal these truths and falsehoods, the interrelationships of all functional areas specified in an education structure spatial requirement should be examined. The entire architectural process, including the design, implementation and inspection process of educational buildings in Turkey is carried out by the Ministry of National Education, Construction Affairs Department. For this reason, in this study, the "Minimum Design Standards Guide for Educational Buildings" published by the Ministry of National Education in 2015 and the copy-type projects used for buildings were taken as reference. According to this guide, the functional areas that should be found in schools to be built at different levels in Turkey are as follows (Table 1).

Table 1. Primary, secondary and high school spatial requirement list

Administrative spaces	• Principal's office • Vice Principal's office • Administrative Staff Room • Teachers' room • Group Teachers' Room • Archive and Document Room	• Counseling Service Room • Parent Meeting Room • Parents' Association Room • Infirmary • Staff WC
Educational Spaces	• Classroom • Music Classroom • Visual Arts Classroom	• Laboratories (Science-Technology-Chemistry-Physics-Biology)
Public places	• Library • Multipurpose hall • Performing Arts/Conference Hall	• Praying Room • Physical Education Hall • Canteen- Cafeteria • Dining Hall
Circulation Areas	• Entrance Halls • Corridors • Indoor Break areas	• Staircase • Fire escape • Elevators
Wet Areas	• Students WC • Disabled WC	• Teachers WC
Technical Spaces	• Heat Control Center • Electric Room • Generator Room • Ventilation Control Unit • System Room	• Technician and Stuff Rooms • Storage • Shelter
Open Spaces	• Outdoor sports Areas • Social Areas • Entry area and security	• Service and rescue road • Parking Area

• Garden

The data to be used in the design of the mobile application, which is aimed to be prepared within the scope of the study, was obtained using three different techniques and presented in the findings section. In this section, the process of transforming the rules to be defined in the mobile phone application as a result of the interpretation of the data and the establishment of relations with each other is explained.

MEASURES AND TECHNIQUES

It is a robust technique for describing and analyzing patterns of architectural space at building and urban level. It establishes an objective method to evaluate and investigate the relationships between morphological structure of man-made environments, social structures, or events.

a. Interview:

The interviews conducted within the scope of the study were carried out with two different groups consisting of 5 academicians in the field of educational studies and 43 experienced school administrators. Within the scope of this study, the selection of interview techniques was carried out under the guidance of pre-prepared questions. Detailed information about the questions in the interview forms and why these questions were included are given below.

The interview forms prepared for the study were shaped in two stages. In the first stage, after the questions were prepared, an interview was held with an expert from both groups. The titles and questions in the final version of the interview forms are explained below.

In the first interview form, three different groups of questions were formed, each containing three questions: "The relationship between education quality and education space", "Existing educational structures problems" and "Necessities of the future education structure".

The questions in the forms used in the interviews with experienced school principals are focused on spatial relations. The aim of these questions was to reveal the spatial relationships that can affect the quality of education. For this, the participants were expected to mark and briefly explain the areas where they think that there are problems in the relations of different areas in the education structure with each other. Since it was difficult to reach more school principals and to carry out face-to-face interviews during the period when the interviews were held, due to the pandemic, online formats of the interview forms were prepared and the data was collected online.

b. "Ministry of National Education Educational Buildings Minimum Design Standards 2015 Guide" Scan:

"Ministry of National Education Educational Buildings Minimum Design Standards 2015 Guide" was prepared by the Ministry of National

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Education to direct and supervise the design, structuring and repairs of new or to be repaired education facilities. The details of all functional areas that should be present in educational structures at all levels are explained in detail in different tables in the guide. In these tables, the spatial relations of the functional areas are examined in order to reveal the necessities and limitations. As a result of this examination, the relations of the functional areas with each other were put forward in the form of items. In these tables, there are also detailed explanations about the purpose of use, location, area, door window details and material properties of the functional area. These expressions have been examined in order to reveal the spatial relationship imperatives and limitations of the functional areas. As a result of this examination, the sentences related to the function field relations in the tables are separated.

c. Space Syntax Analysis:

Space syntax theory can be simply defined as a data collection technique developed by a research group led by Bill Hillier at Barlett School, University College London. The basic idea on which this technique is based is on the idea that the social structure that constitutes the space can be understood by examining the physical structure of the space. The spatial setup has a structure that affects the social structure and the components that make it up. Therefore, there is a reciprocal relationship between social structure and space (Hillier & Hanson, 1989).

In this study, depth charts were created using the "Depthmap X" program in order to reveal the relations between each of the functional areas, among the analysis options offered by the space syntax program. These graphs were applied separately for each functional area in the structures mentioned in the next section, and the interrelationships of these areas were revealed. As a result of synthetic analysis, spatial confirmation lines in copy-type projects were revealed. The data obtained from these analyzes are defined as rules to practice.

The archive containing all copy-type projects implemented throughout the country until February 2020 has been provided. In this archive, there are all the projects of buildings which are still used for applications such as primary schools, secondary schools, high schools, special education centers, public education centers, research units, cafeteria and dormitories prepared in 2014, 2017 and 2019. Architectural projects of primary, secondary and high school buildings in this archive were separated and examined. As a result, seven primary school projects with 4,8,12,16,20,24,32 classrooms, and eight secondary school projects including 8,12,16,20,24 classrooms accessed. Likewise, nine high school projects, 8,12,16,24,32 and 40 classroom high school were accessed.

Within the scope of the research, all different school levels were included in the analysis stage in order appeal control mechanism to any type of educational structure design process. As a result of this, 12

different building types were analyzed, including primary school, middle
school and high school buildings with 8, 12, 16 and 24 classrooms. Since
structures with 24 and 32 classrooms have no functional difference and
differ only in the number of classrooms, only structures with 24
classrooms were preferred.

The "Space Syntax" analyzes were carried out in order to reveal the
common spatial configuration characteristics for the 12 selected types
of projects. In this process, the following steps were carried out using
the "Depthmap X" software.

1. The floor plans of the schools are divided into different sections
   to create convex spaces. While making these distinctions, each
   region where the user has to change direction and the areas
   where the transitions are located are separated from each other.
2. In the Depthmap x program, the relations between the regions
   whose area boundaries are specified are defined (Figure1).

Figure 1. The relations between the functional areas with each other

1. As a result of defining the relations between the functional areas,
   the floor plans were prepared for the analysis to reveal the
   depth graphics. These analyzes (Step depth) will reveal the
   depth of field and how many different steps can be reached in
   other areas from the basically chosen area. As a result of this
   analysis, the relationship of the selected area with other areas
   will be revealed with the schemes indicated in different colors.
   While the area specified as the source of the analysis is indicated
   in blue, the areas that reach this area in the most steps are
   indicated in red. Intermediate stages are determined by
   intermediate tones between blue and red according to the
   number of steps (Figure 2).

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Using the depth graphs obtained, information is given in Figure 2 to indicate which areas each functional area is associated with in the 2nd and 3rd steps (Figure 3).

2. The data obtained from these analyzes were replicated for all functional areas in all 12 structures and depth graphs were presented (Table 2).

Table 2. depth graphs examples for all functional areas in all 12 structures

Area	Number of Analyzed Plans	Analysis		
		Primary School	Secondary school	High School
		Example	Example	Example
Principal's office	12			
Vice Principal's office	12			

Admin. Staff Room	11			
Teachers' room	12			
Group Teachers' Room	14			
Archive & doc. Room	12			
Counseling Service Room	12			
Parent Meeting Room	11			
Music Class	12			

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Visual Arts Class	12			
Laboratories	23			
Library	12			
Multipurpose hall	12			
Praying Room	10			
Physical Education Hall	12			
Canteen- Cafeteria	12			
Dining Hall	7			

Entrance Halls	12			

3. In this process, the functional areas mentioned below were excluded from the analysis for different reasons.

+ Considering the requirement list of the MEB 2015 Guidelines, all functional areas under the title of technical spaces were excluded from the analysis. Since these areas are not directly related to both students and trainers, they are required to be located in the basement of the schools. Therefore, they were excluded from the analysis process.

+ Vertical circulation elements (stairs, fire escapes and elevators) were not analyzed separately as it can be predicted that they are located on each floor and can be interpreted in line with the data obtained from the analysis of other areas.

+ Since stairs, fire escapes and elevators continue on all floors and contact a corridor first on the floors they connect, the other functional areas analyzed will not be able to establish a 2nd and 3rd step relationship between floors. Therefore, the other floors of the buildings were not included in the depth maps.

+ The sub-units or support areas of the functional areas in the requirement list were considered as a singular area. These areas are:

    - Canteen/Cafeteria: Kitchen, preparation area, warehouse and service area

    - Physical Education Hall: Sports area, Changing rooms, Shower and WC

    - Multi-purpose Hall: Backstage, preparation, warehouse, projection room and WC

    - Worship Areas: Female/Male Masjid, WC, Ablution areas

    - Laboratory: Warehouse, Sink

    - Guidance: Private meeting room

    - WC: Female/Male WC, Disabled WC and Teachers WC

Choosing a Software Platform: Mobile devices are all devices that we can carry with us at any time of the day and use independently (Ayres ve Sweller, 2005). Commonly used mobile devices are smartphones, tablet computers, portable gaming devices and laptop computers (Traxler & Wishart, 2011). Mobile applications are managed by application markets that own mobile operating systems such as App Store and Google Play and take their place on distribution platforms through companies (Bilgin, 2019). Commonly used platforms for applications are iOS developed by Apple and Android, developed by

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Google Play. Different devices and different programming languages are used for each environment (Keskin & Kılınç, 2015).

The prototype of the mobile application developed for the study was developed on the Android system because of the flexibility of the encoding platforms. The use of smartphones and tablet computers has increased in recent years. A mobile phone and tablet-based infrastructure was preferred so that the application planned to be designed within the scope of the study could be used at every stage of the designer's education structure design process. The easy portability of these devices will enable the designer to use this application in the research, analysis, synthesis and evaluation stages of the design process without the limitations of time and space.

d. Examination of Data and Transformation into Rules

When the user enters the spatial configuration data in the mobile phone application, the application is expected to provide a preliminary notification about these spatial relationships. The spatial configuration realized in an architectural design process can be given feedback in two different ways. The details of this process will be explained using a schematic method.

In Figure B, there are 4 different functional areas as A, B, C and D. In the architectural design process, it can be made a rule that two areas should be "related" or "not related" to each other. The spatial relationship scenarios between these areas are presented below.

● Fields A and B must be related. ---------- Rule I
● Fields A and C must be related. ---------- Rule II
● Fields B and D should not be related. ------ Rule III
● Fields C and D must be related. ---------- Rule IV
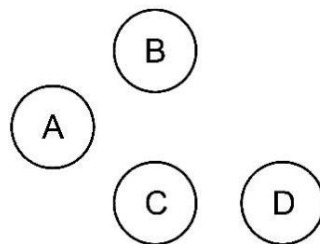
Figure 4. Cells representing functional areas defined to the application

As indicated in Figure 5.b, the designer will define A, B, C and D fields in the first step while using the mobile phone application. As stated in the plan designed by the designer in Figure 5.a, the spatial relations that he foresees and defines to the program are the relations between A-B and A-C and B-D. After these definitions are made, the application will be able to make the following comments according to the rules defined in the infrastructure as preliminary notification (Figure 6).

● According to "Rule I", the A-B relationship is correct and no further explanation will be given.

● According to "Rule II" the relationship A-C is correct and no further explanation will be given.
● According to "Rule III", the B-D relationship is not correct. B and D must not be related.
● According to "Rule IV", C-D fields must be related. Since the user did not establish this relationship, C and D must be related.

Figure 5.
a. The spatial configuration created by the designer within the boundaries of the space,
b. The spatial relationships that the designer defines to the mobile phone application based on his own design

a

b
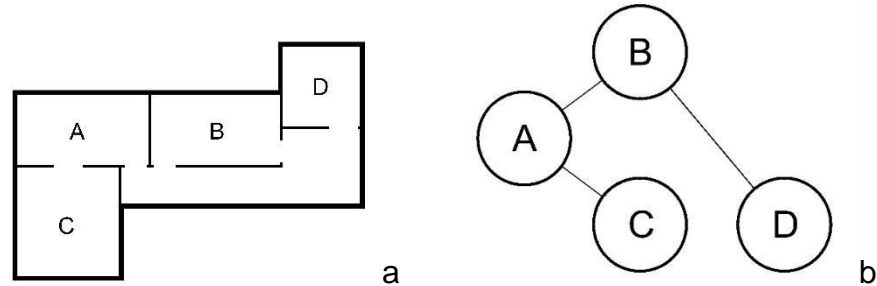
In addition to these rules, places where spatial relations are not mandatory but the status of being related will be positive will be presented as "recommended relationship". Accordingly, if the "B and C fields are recommended to be related" rule is defined in the previous example, it will appear as a warning because the user does not establish this relationship (Figure 6).
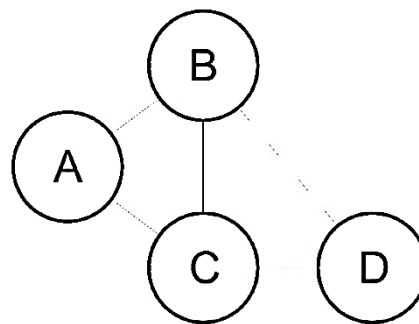
Figure 6. Submission of "recommended to be relevant" as preliminary notification

In line with this setup, the data that transforms to the rules obtained from all three techniques is explained in the finding section.

FINDINGS

Data Obtained from Interviews:

As explained before, the interviews were conducted with two different groups of educational scientists. As these interviews were done with professionals no statistical outcomes were expected. The interviews were recorded during the interview. The records were re-evaluated and the most common and important answers were listed according to the question groups in line with the answers given by the interviewers to the questions. Some examples of answers to questions from both expert groups are given in Table 3.

Table 3. Examples of answers to questions from both expert groups

Question Topic	Findings from the answers given

Interviews with Education Scientists	The relationship between education quality and education space	The educational structure meets the students' physical needs as well as their psychological and sociological needs.
	Existing educational structures problems	Classroom arrangements are teacher-centered. It causes students to communicate least socially with each other.
	The requirements of the education structure of the future	Classes should be replaced by practice centers. Simulation rooms and skill laboratories should be designed.
Interviews with School Principals	Which areas do you think have problems in their relations with administrative spaces?	The fact that classrooms and administrative units are related facilitates students' control over their behavior.
	Which areas do you think have problems in their relations with the classrooms?	Classrooms should be far from places such as music rooms and practice workshops in order to prevent noise from these environments for more efficient education.
	Which areas do you think have problems in their relations with the shared Areas?	Correct relationship between shared areas and classrooms, socialization, belonging and self-confidence positively affect students.
	Which areas do you think have problems in their relations with circulation areas?	Arrangement of circulation areas may pose a danger to the safety of students.
	Which areas do you think have problems in their relationship with the WC?	Since the door of the toilet opened directly to the common area, there was a privacy and odor problem.

By considering the method specified before, the findings obtained in the previous section have turned into rules. These rules are all supported by data obtained other two methods for certain outcome. Examples of rules derived from interviews section is given in the table below (Table 4).

Table 4. Examples of rules derived from the interviews section

Transforming the data obtained from the interviews into rules	
Answers Given	Rules
The correlation of classrooms and administrative sciences facilitates students' control over their behavior.	Principal Room-Classrooms are recommended to be relevant
Classrooms should be far from places such as music rooms and business workshops in order to prevent noise from these environments for more efficient teaching.	Entrance hall – Classroom should not be related

Data Obtained from the Review of the MEB Minimum Standards Guide:

Detailed explanations of all functional areas that should be found in educational structures at all levels are included in the tables between

pages 61-152 in the guide. In these tables, there are detailed explanations about the purpose of use, location, area, door window details and material properties of the functional areas. These expressions have been examined in order to reveal the spatial relationship imperatives and limitations of the functional areas. As a result of this examination, the sentences related to the function fields relations in the tables were separated. An example sentence under each heading from the sentences obtained from this review is given below.

Administrative Spaces: "The principal's rooms will be located in a position where students can be watched easily, especially during extracurricular activities and between classes, and will be in a position that will dominate the school's entrances from the point of view, and will be in contact with the Administrative staff room."

Classrooms: "Classrooms of branches that are close to each other will be designed in the same location."

Shared spaces: "The library will be planned for group and individual study together with a computer classroom on the ground floor. They will be in an easily accessible quiet area, with computer equipment, internet connection, e-library, and sound insulation."

Circulation Areas: "The entrance halls should be designed in direct connection with the main circulation lines in a size and shape that will allow the students to disperse easily and to leave the education structure quickly without crowding."

WC: "All wet areas should be easily accessible from general areas and should preferably be designed near stairs and elevators, and should not be located above the laboratory, panel room, generator, system room and kitchen spaces."

Technical Spaces: "The electrical room should be resolved in the basement with the generator room and technician room in a close and central location."

By considering the methods specified before, the findings obtained in the previous section have turned into rules (Table 5).

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Table 5. Examples of rules derived from Guide examination

Data from MEB guideline review	Rules
The principal's rooms will be located in a position where students can be watched easily, especially in extracurricular activities and between classes, and will also be located in a position that will dominate the school's entrances from the point of view of the Principal's Room-Administrative Staff.	Manager room – Administrative staff room should be related.
The teachers' room and the group teachers' rooms will be located in a way to observe the students and facilitate continuous communication, and will be resolved in different floors and regions within the school.	Teachers room-Classroom must be related Group Teachers room-Classroom must be related

Data Obtained from Space Syntax Analysis:

In this section, the analysis tables and results performed on copy-type projects using the space syntax technique are included. Numerical data was evaluated comparatively. The places with the highest value are determined in the 2nd and 3rd step areas in the tables. Stairs, fire escapes, elevators and wet areas are not explained separately as they are assumed to be available on every floor in all structures associated with all areas.

By considering the method specified before, the findings obtained in the previous section were turned into rules. Examples of rules derived from space syntax analysis is given in the table below (Table 6).

Table 6. Examples of rules derived from space syntax analysis

Space Syntax Analysis Results	Rules
There are 12 plans taken as the principal's room, the main point of the analysis. As a result of these analyses, we can see that the principal's office is mostly related to the administrative staff room in the 2nd step, while the 3rd step is related to the classrooms and laboratories.	Manager's Room-administrative staff room must be related Principal Room - Laboratories are recommended to be relevant.
There are 12 plans that "assistant principal's room" taken as the main point of the analysis. As a result of these analyses, we can see that the Deputy Principals' Rooms are mostly related to the Library and the entrance hall in the 2nd step, while the 3rd step is related to the music classroom, the library and the entrance hall.	Deputy Director room- Library must be related Deputy Director's room - entrance hall must be related Deputy Director room- Music Class are recommended to be relevant.

All the rules obtained in this section were converted into a software language and transferred to the mobile phone application. This process is explained in detail in the next section. In addition, all these rules are given in Table 46 under three headings. In cases where the rules obtained from different techniques are repeated, the rule is included in the table once. In addition, if a rule is "recommended to be related" to a technique and "must be related" to a technique, that spatial relationship is included in the table only once as "should not be related" (Table 7).

Table 7. All the rules that will turn into the software

	Rules	
Spaces that should be related to each other	● Principal's office– Administrative Staff Room ● Teachers' room – Classrooms ● Group Teachers' Room - Classrooms ● Archive and Document Room- Administrative Staff Room ● Entrance Hall - Parent Meeting Room ● Visual Arts Classroom -	● Cafeteria - Music Classroom ● Cafeteria– Entrance Hall ● Laboratories - Classrooms ● Counseling Service Room - Entrance Hall ● Counseling Service Room - Parent Meeting Room ● Parent Meeting Room - Vice Principal's office ● Vice Principal's office – Entrance

	Classrooms ● Visual Arts Classroom - Music Classroom ● Library - Entrance Hall ● Library - Cafeteria ● Multipurpose hall - Entrance Hall	Hall ● Group Teachers' Room - Teachers' room ● Counseling Service Room - Classrooms ● Praying Room - Physical Education Hall
recommended to be relevant	● Principal's office – Classrooms ● Library - Classrooms ● Principal's office – Laboratories ● Vice Principal's office - Library ● Vice Principal's office - Music Classroom ● Multipurpose hall - Vice Principal's office ● Multipurpose hall - Cafeteria ● Cafeteria - Vice Principal's office ● Teachers' room - Principal's office ● Administrative Staff Room - Classrooms	● Archive and Document Room - Praying Room ● Archive and Document Room - Physical Education Hall ● Laboratories - Entrance Hall ● Laboratories - Principal's office ● Counseling Service Room - Principal's office ● Music Classroom - Entrance Hall ● Visual Arts Classroom - Entrance Hall ● Visual Arts Classroom - Vice Principal's office
Spaces that should not be related to each	● Praying Room– Classrooms ● Physical Education Hall – Classrooms ● Physical Education Hall – Principal's office ● Physical Education Hall – Administrative Staff Room	● Entrance Hall - Classrooms ● Entrance Hall – WC ● Entrance Hall – Classrooms

RESULTS

The data to be used in the design of the mobile phone application, which is aimed to be prepared within the scope of the study, was obtained by using three different techniques and presented in the previous section. In this section, the process of transforming the rules to be defined to the mobile phone application as a result of the interpretation of the data and the establishment of relations with each other is explained.

User Interface Design:

Since the Android operating system is mainly used in smartphones and tablets, the GUIs of the applications are designed to get the best results on touch-screens. Since there are resolution differences between mobile devices, device-specific interface designs should also be made. Views in applications are created by adding predefined widgets to XML files belonging to that screen (View objects such as EditText, TextView, Button and RadioButton). The layout is provided with ViewGroup objects (URL-11). The working algorithm of the interface designed for the mobile phone application planned in this research is explained in detail in Figure 7.
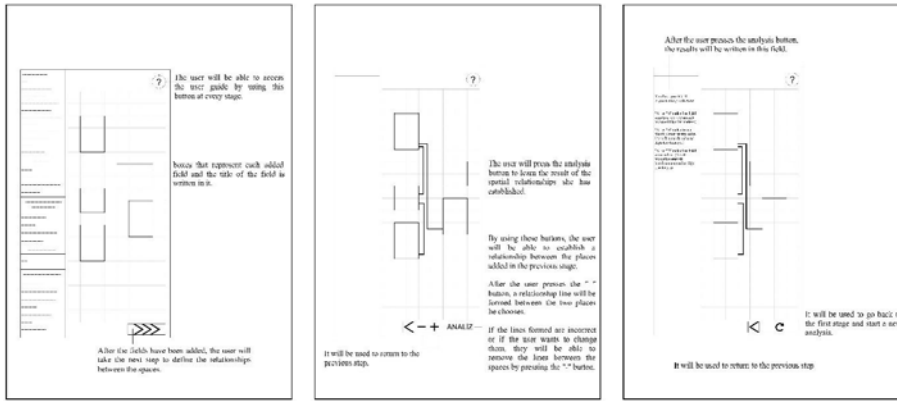
Figure 7. Screens that the user encounters in the first, Second and third stage

Integration of Data with Interface:

The process of transforming the rules obtained in the previous section into a software language consists of two stages. In the first stage, coding was carried out in the "Android studio" environment, using the "java" language, in order to experience the relationship process between spaces in practice. In this version of the application, it was seen that the possibilities provided by the "java" software language were missing in the process of defining the relationship between spaces. Screenshots of these codes are in Figure 8.
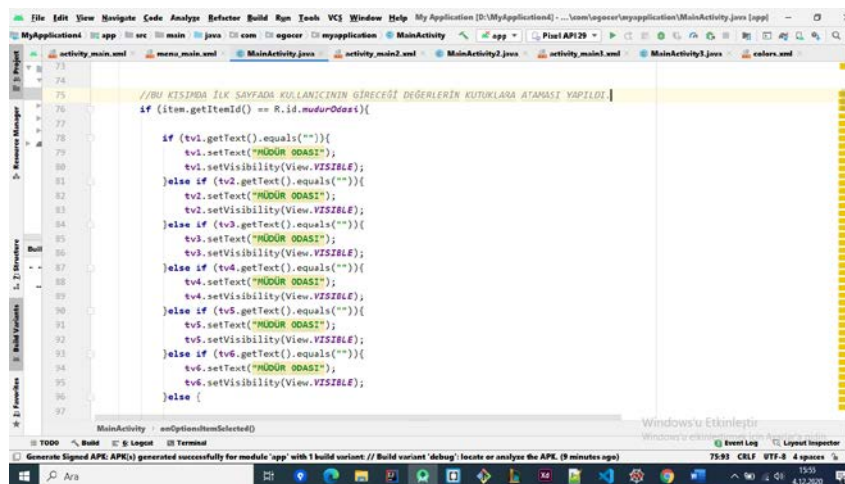
Figure 8. The coding process of the Android application created using the "java" language in the "Android studio" environment

Relationships between the defined areas in this version are indicated with different color coding when it passes to the next stage. Since the designer's ability to add his own design data, which is the main goal of the application, was disabled in this version, the process was stopped after it was merged with the interface and the second stage was started with the experience gained. The interface images of this application are shown in Figure 35 (Figure 9).
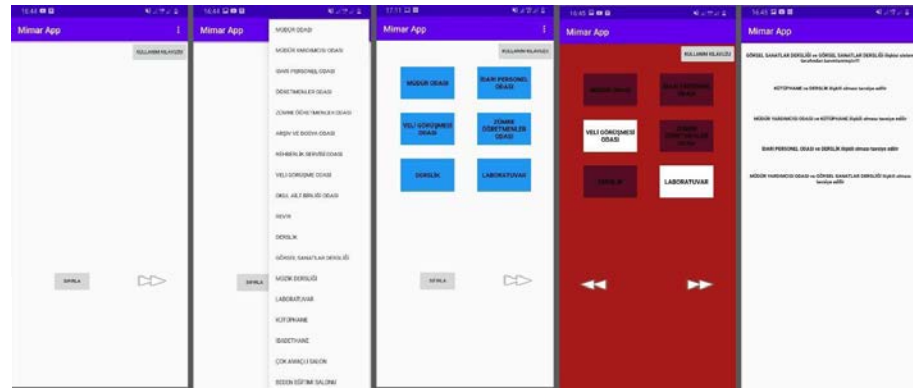
Figure 9. Interfaces of the first Android application, obtained by transforming the data into the software language

As mentioned before, support was received from software experts at this stage of the study. As a result of the emergence and experience of the first application, it was decided to use a different software language and a different software application in line with the opinions and suggestions received from experts. "Unity3D" program and "c#" software language were used in this process, which constituted the second stage of the process of transforming the data into a software language. The connection problems that existed in the application obtained in the previous stage were corrected here for the user to add or remove the desired place at any stage. Screenshots of the codes written in the "Unity 3D" program are shown in Figure 10.

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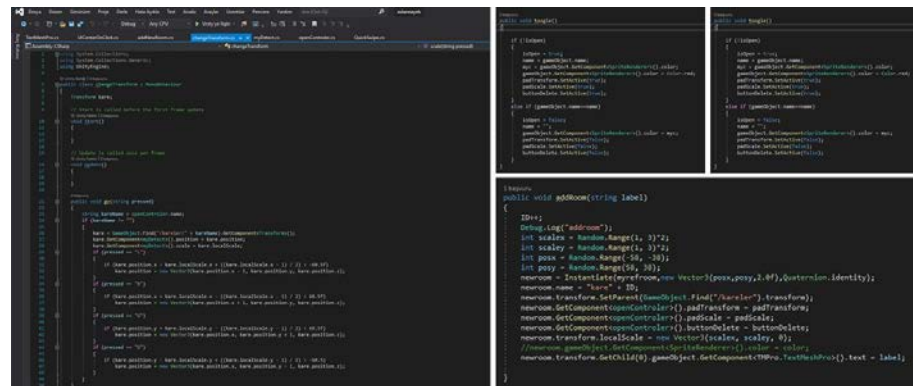
Figure 10. The coding process of the Android application created using the "c#" language in the "Unity 3D" environment

In the application obtained in the second stage, it was aimed to facilitate the use of the application by adding features that will facilitate the user experience. These features are presented below, depending on the application usage process. The interface images of the application are shown in Figure 11.

● The user can always access the list of places that can be added at the bottom of the interface.

● Functional areas have been placed under general headings and access has been made easier.

● It can pass the cells representing the spaces added in the area by selecting them.

● The colors of the cells can be changed to facilitate the management of the added spaces.

● Cells can be zoomed in and out (Zoom in/Zoom out) using two fingers.
● After the added cell is selected, it can be deleted by pressing the delete button.
● By choosing two places, a connection can be established between them.
● Added relationships can be deleted before analysis.

Figure 11. The interfaces of the second Android application obtained by converting the data into the software language

DISCUSSION

The development process of the application obtained during the working process, the interface design and the work with the software experts will continue so that the data can be added and removed continuously. Similar application design processes developed in line with technical knowledge emerge after a long experience process with qualified experts, technical equipment and financial support. In the future, it is expected that the application will be produced and experienced with different user groups, and the application will be offered for sale as a result of receiving preliminary notification. While students, professional architects and companies can use the application in the education structure design process, the Ministry of National Education and affiliated institutions can benefit from the application for the supervision and control of the projects. It is necessary to make long-term plans in order for the produced application to be constantly updated, sustainable and producible for different building types.

Since the mobile phone application produced through this study is the first version of its kind, advanced versions can be produced as a result of experiments with designer subject groups at later stages. These processes can be updated by experiments with small sample groups at first, and then with professional designers at the next stage. In the application with an open database, new data obtained at each stage can be added to the system and reduced to eliminate errors where necessary.

This feedback system, which is defined as educational buildings in the current project, can be applied in different areas such as clinics, hospitals, shopping centres and university buildings in the next stages.

For this, the data of the structure type obtained by user groups and experts can also be converted into rules and added to the application.

ACKNOWLEDGEMENT

CONCLUSION

Compared to the teacher-centered factory model of the 20th century, educational objectives and practices have changed considerably. Thus, students in the 21st century need learning environments that meet their needs (Chism, 2006). As a result of the paradigm shift based on active learning and student-centered classrooms, the study of the effects of school buildings on learning behaviors and teaching is gradually increasing (Leung & Fung, 2005), (Scott-Webber, 2004). Due to the idea that physical elements in the environment can provide clues for learning, architecture is considered to have pedagogical value (Wilks, 2010). In this regard, school design should be seen as a chance to improve educational outcomes by creating better learning environments and considered in each of the four stages of architectural design consisting of information gathering, analysis, synthesis and evaluation, the design of the functional areas of the building and their interrelationships. Although this issue is important in every type of building, it can be used in hospitals, clinics, schools, etc. It becomes more important because the number of users in the structures is high and it should allow functionally different services to be offered. A design mistake made in these structures affects many people negatively during the usage process and it is more difficult to fix this problem in the future.

In this context, the role of the architect becomes very important in the design of buildings such as educational buildings and hospitals. One of the most important reasons for the use of copy-type projects, which is also effective in the preference of educational buildings in this design process, is to minimize these errors. Considering that the use of copy-type projects is without identity and cannot adapt to today's developing technologies, architects should be given the opportunity to put forward different designs. In this design process, control mechanisms should be produced in order to minimize errors. In this study, a pre-notification mechanism was designed to be used in the design process of educational buildings. Architects will be able to receive preliminary notification of the spatial configuration of the educational structure they have designed at every stage of the educational structure design process via a mobile phone application.

The most important benefit of this mechanism being implemented over a mobile phone application with an "open database" system is that it makes this mechanism a dynamic system. This mechanism consists of

4 different components: the designer, the mobile phone application, the architectural structure and the user. By providing a continuous flow of data between these four components, as indicated in Figure 12, the mechanism will have a self-renewing cycle.
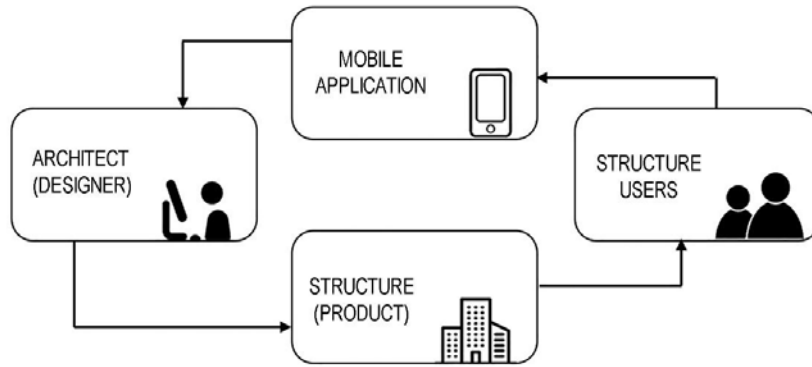
Figure 12. Data flow diagram between designer, mobile phone application, architecture and building user

In this cycle, the user of the architectural building will provide data about the use of the building as they experience the building. Students and teachers who could be mentioned as active users of the educational structure should be included in the design process and it should be ensured that they express their expectations with the structure (Şenyiğit & Memduhoğlu, 2020). This data will continuously update the infrastructure of the mobile phone application. The architect, on the other hand, will design a new structure using the application updated with this data. This cycle will be completed when the newly designed structure meets its new users. The information obtained from new users, new designers and new structures will ensure that this cycle is constantly renewed and will make the preliminary notification mechanism based on the research dynamic.

Although architectural design decisions result from a variety of contextual factors, budget realities, such as local regulations, site considerations and planning codes using syntactic techniques reveals common and specific design patterns in plan layouts (Liao, P., Gu, N., Yu, R., & Brisbin, C. 2021). In this research, it is aimed to propose an innovative interior configuration-oriented preliminary notification model that designers can use in the architectural design process. Considering the result of the study, we believe that the desired goal has been achieved with the data obtained in terms of theory and practice.

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Design Approaches to Museum Open Spaces with User Evaluations

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Abstract

The concept of the museum today should be considered as a social communication platform, and museums should be designed by taking into account the interaction and harmony of their open and closed spaces with the immediate surroundings. This study emphasizes the importance of museums for the city and discusses design approaches to museum open spaces with examples of their effective use and an evaluation of the opinions of their users. In order to shed light on today's museum exterior design approaches, evaluations of the design setup of the museum open spaces were carried out on the basis of literature research and spatial experiences of the museum examples visited. In addition, using the content analysis method, by creating statements about usage, satisfaction level, and expectations, a questionnaire was planned and designed to be applied to a volunteer user group. According to the examples given and the survey data, museum open space designs were carried out. Four groups of factors - planning and design, social, functional and perceptual-having the greatest impact on visitor satisfaction were identified. The examples given include a discussion of museum open space facilities, along with commentary from the literature. For the evaluation of the users, a survey was conducted with 74 people. The survey asked about their satisfaction levels and their expectations in terms of museums and open spaces. Since there was not chance to conduct face to face survey in pandemic conditions, the study was conducted that questioned the general qualifications. In addition to reaching the users visiting the museum were limited. When we look at the literature, multi-dimensional research has been carried out on museum architecture and design. However, no comprehensive study has been carried out on museum open spaces. Consequently, this study focused on the interaction between museum open spaces and visitors.

INTRODUCTION

There are many different theories about the origins of the word museum. One popular theory is that the word museum comes from the Greek Word "mouseion" (URL- 1).

The word museum, derived from the Greek word "mouseion", means a temple dedicated to the goddesses in Greek mythology called Muses and to a hill in Athens dedicated to Moses. The same word passed into Latin as "Museum" and into the languages of other Western and world nations (Gerçek, 1999). In ancient Greek mythology, the god Zeus and his wife Mnemosyne had nine daughters. It was believed that these nine girls lived in a temple called Museion. Since artistic creativity was dedicated to Mnemosyne, beautiful, unique, and remarkable objects, with or without their myths, were placed in the Museion, and thus the first foundations of the museum concept were laid in those times (Artun, 2006). This concept of museum dating back to the ancient Greek temples began to develop at the end of the 17th century, when the nobles of the city began to exhibit their works of art in a section of their houses.

Contemporary Museums presents the sanctuaries of museums, according to the meaning of the Greek Word Museion, the origin of the Word museum, just like the magnificient temples erected in antiquity, today's museum buildings are temples of our bourgeois enlightened cultural ideals (Uffelen, 2011).

In Prague, on 24 August 2022, the Extraordinary General Assembly of ICOM has approved the proposal for the new museum definition with 92,41%. Following the adoption, the new ICOM museum definition is:

"A museum is a not-for-profit, permanent institution in the service of society that researches, collects, conserves, interprets and exhibits tangible and intangible heritage. Open to the public, accessible and inclusive, museums foster diversity and sustainability. They operate and communicate ethically, professionally and with the participation of communities, offering varied experiences for education, enjoyment, reflection and knowledge sharing." (URL-2).

In addition to the exhibition function, which plays an important role in the collection, protection, preservation, and survival of cultural heritage, museums that shed light on scientific research come to the fore with their educational activities that transmit historical and cultural achievements to future generations. The museum serves the society as an organization that facilitates social interaction among people. Museums are also educational institutions that shape the future and reflect the scientific, cultural, and historical past of the society. Moreover, with their architectural structures and open spaces, museums are also important elements of the landscape. In this respect, in both urban and rural areas, museums and their open spaces, in addition to their functions of storage, protection, documentation, repair and display, undertake missions such as providing quality space, enabling social activities for users, offering different venue options

according to their content, and ensuring national and international recognition (Ataoğlu, Acar and Yavuz, 2020).

However, in recent years, museums have been seen as centers for attracting effects such as revitalizing tourism, stimulating the service sector, rehabilitating urban slums, and reviving declining cities (Lorento, 2011). Museums are also learning centers that use technology for exhibiting cultural, artistic, and scientific creations (Yavuz, 2020).

Digital technologies are considered essential for implementing strategies that enhance the cultural heritage. Exploiting the potential offered by digital technologies is no longer just an option but an absolute necessity for museums (Izzo et al. 2023).Today, museums have become dynamic centers with their ever-changing collections, and are no longer frozen spaces that need to be visited only once (Broto, 2013). The four main factors that accelerate this change in the functions of museums are listed as follows (Hudson, and Ritchie (2006):

• Increase of people's expectations of social life

• Increase of the per capita national income in Western countries

• Changes in the job descriptions of the specialists working in museums

• Increase in the number of independent museums

With the changing functions of museums, the reasons for visiting them have also changed. In most studies on museum visitors, the reasons that motivate them to visit museums are generally grouped under seven main factors (Ayaokur, 2014):

• Entertainment: Enjoying a pleasant time at the museum

• Social: Spending quality time with the people around you.

• Learning: Always learning something from a visit to the museum

• Lifestyle: Visiting the museum becomes a habit from an early age.

• Location: Exploring the current city or region

• Practical: Using the museum as a place to relax, eat, and drink

• Subject or Content: The theme of the museum is of interest to the visitor

However, Kelly (2005), who has conducted socio-anthropological studies on museum visitors, suggests that museums fulfill three basic requirements for visitors: *intellectual needs* (that museums should know and understand), *sacred needs* (as cultural sanctuaries where previous generations relate to their past), and *social needs* (to be visible in the museum) (MacDonald, 1992).

When evaluated in general, the function of the contemporary museum is moving away from the focus on object protection/preservation, with museums reshaping themselves as participatory, democratic, integrative, and informative centers for everyone, while emphasizing their socializing aspects. Museums act as catalysts in the transformation of a city. The multifunctional structure of museums is reflected in the various activities taking place in their open spaces. In this context, museum gardens also take their place as public spaces intermingled with urban life as a part of urban identity and urban design.

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In the study, museums were assessed using examples from different historical periods for their open spaces, historical, physical, functional, formal, and content functions. To shed light on current museum exterior design approaches, evaluations of the design setup of museum open spaces were made based on scant research on the use of open spaces in museums. These evaluations were made through literature research and spatial experiences of the museum examples visited. Literature data has been compiled based on the topics of city identity, urban design, public space, and socialization, which deal with the various contributions of museum open spaces. The design eras of museum open spaces are also discussed.

Goulding (2000), wrote in the study: "The Museum Environment and the Visitor Experience" that it is crucial to comprehend the hopes and feelings that visitors have when they visit a museum. However, for the most part, public museums have concentrated their research efforts into obtaining statistical data which measure through-put and provide demographic profiles, ignoring in the process the natüre of the experience itself.

The purpose of this study was to evaluate the potential of museum gardens, their suitability as substitute open spaces, user expectations and satisfaction levels, and the contribution of museum gardens to urban life quality.

General evaluations and inferences about the context were made using the "content analysis" method as a research technique. When we examine scientific research, we can see that content analysis—particularly in the social sciences—is frequently employed. Ültay etc (2021), defined the general goal of content analysis studies as identifying the overarching trend on the subject and directing additional academic research within the parameters of the subject under discussion. To explore all qualitative and quantitative research, published or unpublished, conducted independently of one another, it is necessary to conduct a literature review within a particular field and identify the broad trends that are consistent with the objectives. In the study conducted in this context, questions were posed to a volunteer user group using the questionnaire technique, and expressions about planning and design, usage, satisfaction level, and expectations were created using the content analysis method.

CONTRIBUTIONS OF MUSEUM OPEN AREAS TO THE CITY AND USERS

Open spaces as a component of urban identity and museum identity

As important elements of urban history where people come together for cultural, social, commercial, and recreational purposes, museums and open spaces reveal the local character and cultural diversity of cities. Museums have opened a whole new world for many tourists and residents of cities fortunate enough to have interesting buildings and

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collections (Jodidio, 2011). They play an active role in the recognition and image of cities. Museum structures symbolizing the city are commemorated in many cities. For example, Berlin Museum Island, where the Altes Museum and other museums are located, is an important element of urban identity as a recreational island surrounded by a river and displaying compelling landscape features.

The distinctive qualities of the identity element are important in the city scale as well as when using a holistic approach to describe the museum building and the open spaces that shape its surroundings. In this respect, museums should be considered together with their surroundings. Landscape elements and the quality of museum gardens are effective on user satisfaction (Düzenli et al, 2017). Chiappa, Andreu and Gallarza (2014), suggests that cognitive and emotional aspects should be considered simultaneously when measuring visitors' satisfaction. Further, it suggests that emotions are more significant than cognitive aspects in shaping visitors' satisfaction. Studies on the consumer experience in museums reveal a primary interest in the emotional, sensorial, behavioural and relational aspects of the experience, with a particular emphasis on how to impress the audience and promote active participation, with little regard to the content of the communication and evaluation of whether the public understand it (Izzo et al, 2023). On the other hand, Goulding (2000) argued that a satisfactory museum visit should incorporate a holistic strategy under the four categories of sociocultural, cognitive, psychological orientation, physical, and environmental. With its form, geometry, landscape elements, planting design, water elements, ground paving, fittings, notice boards, signposts, direction signs, lighting design, and restraining elements, the open spaces of the museum present a holistic style with the museum architecture. Effective museum open spaces include coherence and share the same characteristic language with the museum architecture.

For example, in the MAXXI Museum, the architecture generates a quasi-urban setting rather than a building as an object (Broto, 2013). By intertwining the circulation patterns with the urban context, the building's paths and open spaces overlap with those of the city (Betsky, 2021). The citizens can now reclaim this space, conceived as an open and liveable urban space, more as an urban locationthan a museum site (Bilotta and Rosati, 2010).

Zaha Hadid, who designed the MAXXI Museum, completed the exposed concrete surface using concrete floor slabs. A holistic design approach based on concrete aesthetics was followed by using exposed concrete on the fluid, curved façade of the building, concrete slabs on the floor of the outdoor courtyard, and concrete on the fluid-form seating unit in the courtyard (Ataoğlu, 2018). In today's contemporary museums, the open space design speaks the same architectural language as the museum building, and a holistic design approach can be observed (Fig.1)

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Museums and museum open spaces as part of urban design

Museums and open spaces of museums are planned as a part of urban design in order to improve the quality of urban life in a number of ways, to produce alternative environments, to ensure recognition, to contribute to social life, and to create a strong city image. With their design value in creating the city image and ensuring its recognition, museums and museum open spaces stand out within the framework of urban transformation and the restructuring of cities. As mentioned, the Berlin Museum Island and Culture Forum buildings together with their open spaces have joined the city life as an important element of urban identity, with spaces that add value to the city and enhance the quality of life. Similarly, Şanlıurfa Museum and the Halepli Garden Mosaic Museum, which were built around the 200-decare Archeopark near Balıklıgöl in Urfa, were designed to be integrated with the recreational park. Gaziantep presents an image as the "City of Museums", and its museums contribute to urban life as a part of the urban design, e.g., the eaves of the Mosaic Museum serve to shade spaces for activities in hot weather. The other example, Quai Branly Museum, is stuated in a park measuring 18000 square meters. The garden, designed by Gilles Clement, already intrody-uces the various climate zones (Uffelen, 2011). This delightful, visually appealing garden is designed to give the visitor a suprising, unexpected experience of escape from the surrounding urban environment (Demeude, 2006). (Fig. 2).

Museum open spaces as public spaces

Public spaces play an important role in the formation of the city and living environment. These areas form reference points for the establishment, past, development, and future of cities. These areas that constitute urban benchmarks should also have a strong identity. Public spaces have social functions, such as benefiting from the common values of the space and supporting social life, as well as individual functions that include developing a sense of belonging, establishing public order, ensuring security, enabling the realization of economic activities, contributing to the formation of spatial identity, and adding value to the area (Gökgür, 2019). As public spaces, museum open spaces play roles that include improving urban life, producing many types of more livable alternative environments, and supporting social life. As public spaces, museums are centers open to the public that provide education along with their activities. The Sabancı Museum garden carries out awareness activities with its plant diversity and children's workshops. "Jewish Museum is a large walk-in sculpture, in a piece of symbolic architecture. Within the building are three axes symbolizing the history of Judaism in Berlin. One of the paths leads to the E.T.A. Hoffmann Garden, where 49 tree covered concrete steles standing on a sloped ground plate" (Verlag, 2012). Thus the Jewish Museum provides a strong psychological, as well as a new formal environment (Newhouse, 1998). Located in a residential area, the garden of the Berlin Jewish Museum contributes to urban life as a public space with various recreational activities (Fig. 3).

Figure 3. Sabancı Museum garden *(URL-4);* Berlin Jewish Museum garden *(Ataoğlu, 2018)*

Museums and museum open spaces as a means of socialization

The museum is a unique place where visitors communicate and interact with exhibits within a particular architectural space (Jeong and Lee, 2006). Museums and museum open spaces become an important component of urban life via their diversity according to location, activities, historicity, form, surrounding buildings, and natural and artificial landscape elements. Over time, the contents of museums have been enriched and diversified, and the functions of museums have also expanded. The static museum, which includes preserving, protection, documentation, storage, display, and information functions, can be replaced by temporary exhibitions, seminars, workshops, performance programs, music concerts, etc. With its activities, library, research facilities, food and beverage concessions, and sales units, it has become a dynamic cultural center open to social interaction for users of all ages. The museum contributes to urban life with activities such as open air exhibitions, performances, concerts, and film screenings, and provides

facilities for refreshments, sunbathing, relaxing, and observation. Depending on their location, the open areas of the museum can be used as focal points, meeting places, exhibition and entertainment areas, and with the use of landscape features and green areas, can serve as recreational areas. Social mobility enables museums to play a role in urban life as public spaces when surrounded by food and beverage venues and shops. For example, as in many centrally located museums, the cafes, shops, and the pool in the square surrounding the Pompidou Art Center in Paris add vitality to the square, and the Berlin Altes Museum and the Museum Island recreational green area, Reina Sofia Museum and New Acropolis Museum which host various performances, form a socializing center. New Acropolis Museum is at once local and global. It operates on the local sacale as a powerful "urban magnet" that draws together the city's public spaces and pedestrian streets. It acts as a catalyst for changing common perceptions about modern public architecture, and no doubt will contribute to a new image for the city (Tschumi, 2009). The base of the museum and museum's garden floats on pilotis over the existing archeological excavations, protecting, consecrating and displaying the site (Broto, 2013). (Fig. 4)

Figure 4. Reina Sofia Museum; Berlin Museum Island; Acropolis Museum *(Ataoğlu, 2016, 2018, 2014)*

In this study, the open spaces of museums were evaluated in terms of their historical, physical, and functional features along with their style and content, with examples according to their periods. In order to shed light on today's museum exterior design approaches, evaluations of the design setup of the museum open spaces were carried out on the basis of literature research and spatial experiences of the museum examples visited. In addition, using the content analysis method, by creating statements about usage, satisfaction level, and expectations, a questionnaire was planned and designed to be applied to a volunteer user group.

PERIODS IN THE DESIGN OF MUSEUM OPEN SPACES
The concept of the museum, which dates back to the ancient Greek temples, started to develop at the end of the 17th century when the nobles of the city began to exhibit their works of art in a section of their houses. It is possible to evaluate the evolution of museums designed for exhibition and preservation under the headings of pre-modern, modern, and post-modern architecture. As a public space, open spaces of museums are as important as museum buildings. It is possible to determine the evolution of museum architecture via the open spaces of the museums.

Pre-Modern Architectural Period

Traditional museum spaces of the pre-modern architectural period are generally formed by repurposing historical buildings after restoration. Palaces, in particular, are among the buildings that have been converted into museums (Artun, 2012).

With the French Revolution in 1789, the social outlook began to change and a demand to open museums to a wider public emerged. The Louvre, the first public museum, were opened, conveying a sense of national belonging and making knowledge a public resource, in 1793 (Marotta, 2012). "Typological structure of renaissance and baroque palaces have had dominant influence on museum organization and structure The first museums, like Vatican Museum, Louvre and Ufizzi, are even now greatly admired and respected, as the prefect museum model" (Milojkovic and Nikolic, 2012)". Palace-museums merged culture and power to convey an image of an idyllic past (Marotta, 2012). Palace museums are important in terms of exhibiting the characteristics of the period and the qualified historical items they contain. The open spaces of these structures also exhibit the characteristics of the period. In this sense, the open spaces and landscape features of palace museums have cultural and historical value (Fig. 5).

Figure 5. Versailles Palace and garden *(URL-5)*

The 19th century was the age of neoclassical museums. In the 19th century, within the framework of typological features, neoclassical museums were built in many cities of the world with an architectural understanding emulating the ancient period (Pevsner, 1976; Atagök, 1999). "There are many examples of the 19th-century museum. In this period, museums began to be built in the capital cities of Europe. The buildings themselves alluded to the past. Classical pediments, Roman pilasters, and vaults and cupolas inspired by 16th-century architecture were prevalent. Thus it was not only the works within the museum but

the structure itself that exhibited and conserved the past" (Marotta, 2012).

Located on the Berlin Museum Island, the Altes Museum, designed by Karl Friedrich Schinkel, is an effective example of innovative contemporaneous museums in terms of typological plan features. In addition, with its recreational open space serving as a public space, it is also an effective example of innovation in holistic museum design (Fig. 6).

"The civic role of museums as symbols of local, regional, or national pride surely explains this ongoing relationship, as does the value placed on their contents. Frank O. Gehry's Guggenheim Bilbao is responsible fort he renewal of that Spanish city's center. Guggenheim Bilbao was surely not the fist instance of the successful combination of architecture and museums. Long before the modern era, buildings such as the Altes Museum, erected on Berlin's Museum Island from 1825 to 1828 by the famed architect Karl Friedrich Schinkel to house the Prussian royal family's art collection, firmly established this connection" (Jodidio, 2011). The Project involved much more than a new museum. Schinkel, proposed a complete renewal of the very heart of Berlin (Crimp, 1997). Schinkel, recognised the significance of this location in urban development. He noted: "The beauty of the area will be completed through this construction (of the museum) by filling the fourth side of this beautiful old square in a dignified manner." Berlin's centre of representation was to be enlarged splendidly with this new building (Steffens, 2016).

The Altes Museum was included in the restructuring of the city center. On both sides of the street, squares and tree-lined promenades were designed to serve as a center of urban life. In an age where cities were growing and the density of built areas in all cities was increasing, it was forward-thinking to design a spacious, wooded center that is not very dense. The Altes Museum, within the Berlin Museum Island, expresses its monumentality with its façade, consisting of high columns and a wide viewing and promenade area (Taricat, 2016) (Fig. 6).

Figure 6. Berlin Museum Island *(URL-6)*; plan of the Altes Museum *(URL-7);* Altes Museum *(Ataoğlu, 2018)*

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Modern Architectural Period

With the influence of modern architecture and Bauhaus in the 20th century, museum architecture began to break away from the classical-inspired neoclassical museum architecture of the 19th century. "Eschewing the imitations of 19th-century architects, the Modernists reinterpreted the act of remembering. In addition to the utopianism and abstraction in their work, they sought to reclaim influences from the past rather than its direct representation. For the 20th-century architect, history was a source of inspiration" (Marotta, 2012).

In the 20th century, a new era began with the museum designs of pioneers of modern architecture such as Le Corbusier, Frank Lloyd Wright, Mies van der Rohe, and Louis Kahn, and museum architecture underwent a radical change (Ataoğlu, 2016a, 2016b) (Fig. 7). "Le Corbusier called the Museum of Unlimited Extension. The project began as a simple core, to which square-plan bays would be added incrementally around the building's perimeter, maintaining a toplit condition throughout the main gallery spaces" (Christenson, 2016). "With the Guggenheim, Wright formulated a different approach to museum design, one in which the spatial setting has an affect on the exhibitions and changes the viewer's perception of the works on display out. Wright produced a small building in the city's urban fabric, yet one that explodes on the inside" (Marotta, 2012).

In the Modern Era, museums and museum open spaces with their cultural and social values in urban design were seen as important vehicles for contributing to public life. Examples included here of designs that support public life with their use of open space are Mies van der Rohe's New National Gallery, designed to integrate the cultural valley inside the Berlin Cultural Forum, and the Kimbell Art Museum, located in a park outside the city of Fort Worth, Texas. "Mies van der Rohe completed the New National Gallery in Berlin, in a decidedly different style tahat might be called classical Modernism. Here it is certain that the clarity and simplicity of the architecture carry the day, showing that modernity, too, cold achieve the kind of gravitas required of institutions devoted to art" (Jodidio, 2011). The transparency, flexible plan scheme, and outdoor use of the New National Gallery created an effective public space integrated with the environment. Kahn, by adding the coolness of the trees and water to the open space design of the Kimbell Art Museum, located in a hot climate, designed the exterior space in continuity and harmony with the museum interior. "In the case of the New National Gallery, the subterranean galleries about a long open sculpture garden providing natural light from one side" (Zimmerman, 2014).

New National Gallery and Cultural Forum: *"The basic understanding of the Cultural Forum, where the Berlin senate aspires to bring together museums and cultural equipment, is to create a valley in the context of a green urban landscape. The Cultural Forum resembles a chain of green spaces, gardens, and woodlands that form the continuation*

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of the Tiergarten, the large wooded area north of Berlin. The New National Gallery was built within this space. In the middle of an elevated podium, the New National Gallery and other buildings form an archipelago consisting of mounds separated by promenades and greenery. According to Mies van der Rohe, the monumental building, which aspires to receive the public, also dominates because of the size of the courtyard in front of it. This large forecourt, with its sculpture or temporary installation exhibitions, is sometimes used as a museum and sometimes as a promenade" (Taricat, 2016) (Fig. 7).

Figure 7. New National Gallery and Cultural Forum site plan *(URL-6);* Mies van der Rohe, Berlin, 1962-1968 *(URL-7)*

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Kimbell Art Museum and park: *"For Kahn, the proper preservation of all exhibits, the creation of general conditions that will ensure the visitor's comfort, and the best presentation of the rapidly growing artistic assets are the three basic principles that determine the museum program. 'The only thing you expect in most museums is a cup of coffee,' Kahn said. 'One feels so tired all of a sudden…then a visit to the museum provides the outward comfort of a beautiful home. It should start by dazzling us with a shelter to protect us from the scorching sun in one of the scorching suburban areas of the big city,' he said. 'As the visitor passes by the murmuring water, the coolness, and the shadow of the trees, with each step, the visitor breaks away from the sensations caused by the city, and the coolness and shadows that spread around bring about a visual and auditory retreat…' With its location, the museum resembles a small Renaissance castle between the park and the courtyard, decorated with pools and still defended by moats"* (Taricat, 2016. (Fig. 8).

Figure 8. Kimbell Art Museum (URL-8); Site plan by Louis Kahn (URL-9)

Post-Modern Architectural Period

In the 1950s, museum structures increased. "In the 1960s, new trends in architecture led to the development of the museum as a kind of kinetic, dynamic machine. The introduction of a movable skeletal structure allowed flexibility of use, as in Renzo Piano and Richard

Rogers' design for the Pompidou Centre in Paris" (Marotta, 2012). In the 1970s, museums were designed as social centers with cultural activities, as was the case with the Pompidou Cultural Center. The 1980s became a turning point in the development of museum architecture, and structures began to be built that questioned general typologies and brought about innovations in terms of design and function. By hosting temporary exhibitions, shows, meetings, conferences, research units, libraries, hobby rooms, workshops, cafeterias, restaurants, bar services, and museum shops, museums had been turned into cultural centers with events inviting active participation by all ages. Museums were designed as dynamic culture, entertainment, and social centers with their constantly renewed temporary exhibitions, educational activities, workshops, and urban open spaces, as opposed to buildings that no longer needed to be visited once the collection inside had been seen.

In the post-modern climate of the '80s we see a transition from the *city-museum* to the *museum-city*, where the museum itself becomes a kind of citadel – a complex image of solids and voids, with components of public space included within it. A vision of the museum developed as a reverse image of the city (Marotta, 2012). The Deconstructivist Architecture exhibition was held at the Museum of Modern Art in New York and sparked new concerns about architectural composition. It was no longer the image of the historic city that was dictating the rules but, rather, the concept of new, interstitial spaces and the philosophy of the 'between' or crossover became dominant. The MoMA exhibition inspired a change of direction. (Marotta, 2012). In this period several arhitects each with his own distinct vocabulary including Peter Eisenman, Frank Gehry, Zaha Hadid, wolf Prix, Coop Himmelblau, Rem Koolhaas, Bernard Tschumi, Daniel Libeskind. Have created what will bw referred to here as the new museum (new in design as well as age) (Marotta, 2012; Newhouse, 1998).

In the 1980s, museums began to be designed as iconic structures, transforming them into cities within the city, giving the architect a one-time opportunity to display his creativity, using monumental forms that attract attention and add to the image and identity of the city. By overcoming the existing museum typologies, the museum structure itself was evaluated as a work of art (Ataoğlu, 2016a).

The most eleborate "exhibit" into which museums today invest for their future is their own museum building, whether a new building, or the extension or renovation of existing buildings…There can be a focus on its role in the urban setting or the collection. Following the example of Gehry's Guggenheim Museum in Bilbao, today's museums are also tourist attractions. While this tendency started to emerge in the 1970s already, the Bilbao effect was nevertheless a turning point of modern museum construction (Uffelen, 2011).

Along with their activities, the museum garden and open spaces also constitute a strong focal point as new urban public spaces. Many examples can be given in this context. Recent museums that have been

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influential in the literature include the Pompidou Cultural Center (Rogers and Piano, Paris, 1977), the Jewish Museum (D. Libeskind, Berlin, 1998), the Guggenheim Museum (F. Gehry, Bilbao, 1997), the Quai Branly Museum (J. Nouvel, Paris, 2006), the MAXXI Museum (Z. Hadid, Rome, 2010), the Louvre (J. Nouvel, Abu Dhabi, 2017), and many more.

"In the urban context, a museum building points out a collection well worth seeing, seperates it from its trivial surrounding, since art museums are often located in the historic district or the periphery of the 19th century city center. At the same time, new museum buildings are also preferably built in inner cities where they have to fit in and find their place in a frequently heterogoous setting" (Uffelen, 2011). Following modern architecture came the different approach of holistic architectural design, with its original and extraordinary use of outdoor open spaces. Its content, architecture, and open spaces allowing different user activities contribute to public life, adding it to the city as a part of urban design, The open space use of the Pompidou Cultural Center is one example.

Pompidou Cultural Center: According to Grunenberg (1999), perhaps the most significant change in the concept and function of the modern art museum has been in the Pompidou Center. As a product of futuristic design, the grand building is much more than a traditional museum. In addition to the modern art collection and exhibition galleries, the center includes a public library, an industrial design center, a forum, a performance center for dance, theatre, and music, a cinema, a children's workshop, museum shops, and a cafeteria. Rich examples of 20th century art movements can be seen in the museum.

"The Pompidou is located on 2-ha among traditional building blocks of the historic Beaubourg district, an area of Paris that was in need of urban transformation. The building covers half of the area. The other half contributes to urban life as an open public space. The Pompidou Art Center is designed as a square for everyday urban life and as a building for official cultural events" (Gehl, 2019).

Piano and Rogers scored positively, however, by leaving more tahan half the site open for public square on which the area's rich street life could continue (Newhouse, 1998). The activity around the façade of this extraordinary museum enlivens the center as visitors move from one end of the square to the ground floor and then up the escalators (Foster, 2011). "Their concept of lively outdoor plaza, whose animation would be reflected in the facade's moving escalators, proved successful and the vitality of this space is one of the Centre's greatest accomplisments. Huge video screens planned fort he plaza facade to delşver the building's media role were also jettisoned for political as well as economic reasons" (Newhouse, 1998).

The square provides an open-air platform for the exhibition of the museum's large-scale works of modern art. To the west of the square, the pool is decorated with sculptures symbolizing the works of Igor

Stravinsky, which visually enliven the area, and seating accommodation is positioned around the pool. The escalators on the facade and the mechanical installations give a colorful appearance to the building and a strong identity to the square. Facing the square, there are large symbolic white ventilation pipes that feature on the façade of the Pompidou. Activities such as sitting, relaxing, watching, and walking, along with the artistic activities, open-air exhibitions, film shows, concerts, and performances that are held in the museum square invigorate the social life. The buildings surrounding the square are linked to the square via the cafes and restaurants and souvenir shops on their ground floors, all of which enliven the square with their activities (Fig. 9).
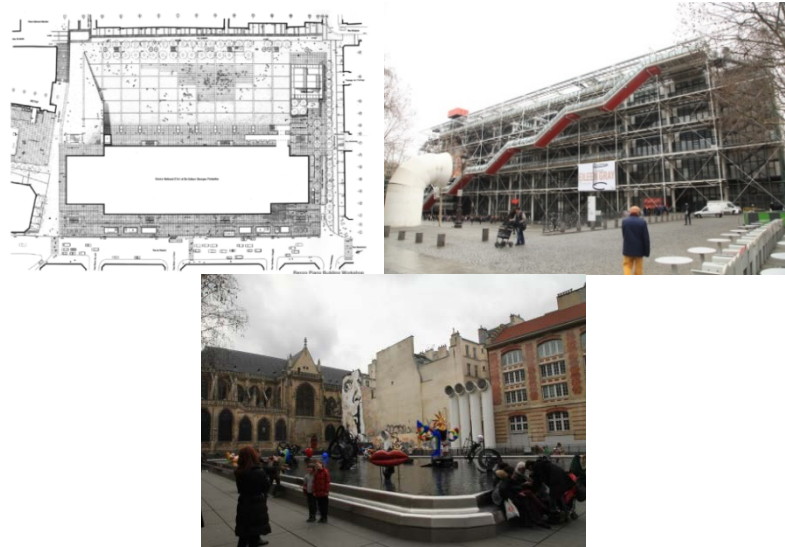
Figure 9. Pompidou Cultural Center, Rogers and Piano, Paris, 1977 plan *(URL-10)*; *(Ataoğlu, 2013)*

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As can be seen in the Pompidou Cultural Center and many contemporary museums, building design and open space design are emphasized as an important part of urban design. With their effective use of open spaces, museums play an important role as public spaces in the image of the city, in the recognition of the city, and in the quality of urban life. Museums that comprise the brand of a city are important for the city as centers of public focus and social activities, along with the importance and value of the collections within them and the value they add to their surroundings. "Planning of museum exhibition venues should be considered together with planning of outer space" (Erbay, 2016).

In this context, systematic studies are needed to determine how visitors perceive and accept the museum and its immediate surroundings and exhibition settings. When we look at the literature, multi-dimensional research has been carried out on museum architecture and design and indoor spaces. "Visitor-behaviour studies in museum's began with Benjamin Ives Gilman's work in 1909. An abundance of studies, headed by Edward Stevens Robinson and Arthur Melton took place between 1923 and the early 1930's" (Robillard, 1982).

For example, Graburn (1977), studied the museum and the visitor experience. Jeong and Lee (2006) examined user satisfaction by investigating the relationship between museum size, exhibition design, and circulation. In their study, Düzenli et al. (2017) discovered that the quality of the landscape features has a significant impact on how satisfied users are with museum gardens, and that the level of satisfaction rises as the quality of the features rises.

Chen and Ryan (2020) studied visitor preferences in museums. Determining the perspectives of visitors is also effective on the preservation, usage, and management models of museums (Moreno-Mendozaa etc, 2020). Kim, Park, and Xu (2020) examined tourist experiences in museum restaurants. Gong, Zhang, and Tsang (2020) investigated the role of educational activities at children's museums in developing children's creativity.

Museum's planning of outer space and museum open space is rarely studied in museological research. There are a few who have examined aspect of museum open space. Goulding (2000), investigated éthe museum environment and the visitor experience. Bollo and Pozzolo (2005), studied "Analysis of visitor behaviour inside the museum: An empirical study". "Museums compete increasingly more with very diverse entertainment providers, such as theme parks, despite the fact that their offer is mainly cultural. Museums have had to be more active and they have had to diversify their offer, in order to be more popular, therefore to better achieve their complex cultural missions" (Zbuchea, 2015). Zbuchea (2015), discussed in what extent the market approach of theme parks could be a viable marketing strategy for museums. Düzenli et al., (2017), examined the physical landscape features of the museum gardens in Trabzon, Turkey and determined the satisfaction level of the users. Erenler (2021), studied "The effect of using museum gardens as an alternative open space on urban life: İstanbul case". Besides this studies, no comprehensive study has been carried out on museum open spaces. Consequently, this study focused on the interaction between museum open spaces and visitors.

MATERIAL AND METHODS

The research's objective is to assess the museum's physical, social, perceptual, and content attributes as well as those of its immediate surroundings and outdoor areas. In this study, within the discipline of planning and design, museums have been handled as multi-layered structures, not only as indoor spaces but also with their immediate surroundings and open spaces, with the focus on the design of open spaces. The main material of the study consisted of users' evaluations of museum open spaces. Therefore, a survey was conducted with 74 volunteers. In the survey, users who had previous experience of visiting museums evaluated museums and their open spaces in terms of their physical, social, perceptual, and content value. In addition to answering questions about demographics, the participants rated 32 different

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content analysis-created expressions on a 5-point Likert scale (Strongly Agree, Agree, Disagree, Strongly Disagree) for planning and design, usage, satisfaction level, and expectations (Table 1). Since the 1960s, user satisfaction studies have been conducted in public spaces (Ayhan and Atabeyoğlu, 2020). Users' levels of satisfaction must be identified to evaluate current applications and collect data for upcoming research. In their research on the quality of urban public spaces from the user perspective, Zamanifard et al. (2019) evaluated a wide range of studies on the topic. In these studies, they carried out online surveys and evaluated the techniques for gauging the quality of public spaces. In the research conducted in open spaces with different functions (museum, city park), user satisfaction level analysis was carried out with the survey study; quality of the green area, service quality, positive-impact activities, parking facilities, cleaning/maintenance, security, noise, relationship with the environment, accessibility, equipment, water element, security, comfort, design, topography, landscape, functional quality, aesthetic quality, structural quality, economic quality, ecological quality parameters are discussed in terms of existence and quality (Önal and Sağır, 2018; Gürer and Uğurlar, 2017; Ayhan and Atabeyoğlu, 2020; Düzenli et al., 2017; Bekar and Sekban, 2020; Eren et al., 2018). The level of user satisfaction with the museum's outdoor spaces was investigated in this study in terms of the range of activities and opportunities provided by the area, landscape value, social and cultural benefits, semantic and perceptual value, originality, educational value, accessibility, readability, and relationship with environmental parameters.

The evaluation of museum open spaces was not made for a specifically selected museum. The purpose of the study is to assess the public areas of the museums or museums that the participants visited, as well as their interactions with these spaces—even though they may have different contents—under the predetermined headings. As stated in the conceptual framework of the article on museum gardens, this is intended to conclude various usage areas. The participants were asked to read each statement and evaluate the museums they have visited so far, rating each on a scale of 1 – 5, with 1 indicating the lowest value and 5 the highest. The survey was conducted online (using Google Forms) in July 2020. (Table 1).

Using SPSS for Windows 23, statistical analyses of the collected data were carried out. Descriptive statistics (frequency, percentages, and arithmetic means), correlation analysis, regression analysis, and factor analysis were used to analyse the data set. With the help of Cronbach Alpha analysis, the data's dependability was evaluated.

Table 1. Statements evaluating the museum, its close surroundings, and open spaces

1. **Spatial interventions** to accommodate a cultural heritage should be **compatible** with the importance of the building.
2. If a cultural heritage is to be protected by functional change, **the historical identity** of the building **should be respected**.

3.	A cultural heritage that has lost its function should be given **a new function**.
4.	Symbolic structures can be deliberately left in ruins in open public spaces for a **perceptual experience**.
5.	Museums have the mission of **guiding** future generations and **preserving** human heritage.
6.	Museums and their immediate surroundings provide opportunities for the appreciation, understanding, and management of **natural and cultural heritage**.
7.	Museums intervene in the lives and spaces of individuals by creating **social identity** and **"collective consciousness"** in the **individual**.
8.	Museums **establish relationships** between their interior designs and **open spaces in a semantic dimension**.
9.	Museums and their immediate surroundings, with their public and social dimensions, are **flexible structures**.
10.	Museums are **prestigious buildings** not only for their content, but also for their important architects, styles, and structural and spatial features, as well as **their gardens**.
11.	Museums and their gardens have the functions of preservation and exhibition, and serve as places for research, education, relaxation, and social interaction.
12.	With the integration of museums into the education system, there are **sections for children** and **educational programs** in the museum and its gardens.
13.	Museums and their gardens promote a **universal** view and respect for diversity.
14.	Museums and their gardens are updated according to the requirements of the times and **offer educational and social benefits**.
15.	By **informing** the visitor and increasing his **interaction** with the artistic works, museums and their gardens enable the visitor to **think and interpret.**
16.	Important objects in the accoutrements placed in museums and gardens provide **user satisfaction.**
17.	Museums and their gardens are seen as **cultural centers and a social tools.**
18.	Museums and gardens are used for **enjoyment, learning, and socializing,** and as centers that have many functions and increase social and community awareness.
19.	Museums and their gardens comply with the principle of **accessibility**.
20.	The gardens of the museums are created **in accordance with the philosophy** of the museum, according to the architectural form, spatial setup, type and purposes of the museum.
21.	In the design of the museum and its immediate surroundings, many factors such as the **comprehensiveness** of the exhibited works, the perceptions of the visitors and their comfort levels are taken into consideration.
22.	Spaces should be arranged in museums and gardens according to the **experiences and discoveries** they wish to convey to the visitor.
23.	According to its type and purpose, the **design** of the museum and its immediate surroundings and open spaces is **created by considering many elements** such as the type of exhibitions, target audiences, space setups, lighting, and acoustics.
24.	The gardens of museums are designed in such a way that they can reveal many **local** and **universal ecological, cultural, and artistic values**.
25.	With **"interactive space"** and **"interactive applications"** in the gardens of museums, spaces can be created that can sense people's movements, respond to them simultaneously, and interact with them.
26.	In order to **attract people's interest** in museums, **digital elements** such as videos and virtual reality with themes of science, art, children's topics, and history can be added to the traditional collection displays in the open spaces of museums.
27.	With the technology developing within the scope of exhibitions in open spaces of museums, the **phenomena of flexibility and changeability** can be added to the space and the artefacts.
28.	**Signs**, maps and plans, colors, textures, and lights for **informative** and **guiding purposes** in the open areas of museums allow the visitor to make his own way without any guide.

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29. Depending on the museum type (history, industrial, science, nature, etc.), **three-dimensional displays** and narrative sound effects can be used in the open spaces of museums.
30. Museum gardens are sufficient in terms of **landscaping criteria** (accessibility, location, close relations with the surroundings, plant landscape elements, display systems, information and direction signs, social spaces, equipment, and comfort).
31. **Interactive exhibitions** in contemporary art museums and open spaces draw the attention of visitors.
32. When visitors take part in workshops in the open spaces of museums, the resulting artefacts enhance the **recognition** and **social interaction** of the museum.

FINDINGS AND DISCUSSIONS

Statistical analyses of this study, which evaluated museums and their immediate surroundings and open spaces in terms of physical, social, perceptual, and content value, were carried out using SPSS version 23. The dataset was analyzed by performing descriptive statistics (frequencies, percentages, and arithmetic means) analysis, correlation analysis, regression analysis, and factor analysis. The reliability of the data was tested using Cronbach Alpha.

In the survey conducted with a total of 74 people, 66% of the participants were women and 34% were men, with 47% being young people between the ages of 18-25. In the sample, 42% of the participants were determined to be students. In addition, an evaluation of the educational status of the participant showed that 57% held bachelor's degrees (Table 2).

Table 2. Percentage distribution of the demographic characteristics of the participants.

		Percentage (%)			Percentage (%)
Gender	Male	34	**Occupation**	Student	42
	Female	66		Housewife	8
Age	18-25	47		Officer	32
	26-35	26		Worker	4
	36-45	11		Self employed	14
	46-55	14	**Educational status**	Primary education	3
	56-65	1		High school	8
	65 and above	1		Bachelor's degree	57
				Master's degree	15
				PhD degree	17

Considering the average values among the responses regarding the museum and its immediate surroundings and open spaces, respectively (Table 3), the following were determined as the most prominent statements, having the highest averages:

- "Spatial interventions to accommodate a cultural heritage should be compatible with the importance of the building." ($\bar{x}$ = 4.824),

- "If a cultural heritage is to be protected by functional change, the historical identity of the building should be respected." ($\bar{x}$ = 4.797),
- "Museums have the mission of guiding future generations and preserving human heritage." ($\bar{x}$ = 4.622),
- "Museums and their immediate surroundings provide opportunities for the appreciation, understanding, and management of natural and cultural heritage " ($\bar{x}$ = 4.527), and
- "In order to attract people's interest in museums, digital elements such as videos and virtual reality with themes of science, art, children's topics, and history can be added to the traditional collection displays in the open spaces of museums." ($\bar{x}$ = 4.486).

With these statements, the participants drew attention to the fact that they supported measures to protect, manage, and transfer our natural and cultural heritage values, being respectful of their identity in transferring them to future generations, to apply compatible interventions, and to implement the latest technologies. Many new technologies can therefore improve the visitor experience and overall satisfaction with it, enable the collection of data on visitor behaviour, make the museum more attractive to younger visitors, encourage the museum to establish collaborative relationships with private companies and make the museum accessible to specific types of visitors, e.g. those with visual or hearing impairments. (Izzo et al, 2023). In the study of Orhan and Yılmazer (2021), visitors similarly evaluated museums as exhibition places and stated that they expected museum building designs to have historical features, regardless of the physical characteristics of the museum buildings. In addition, they stated that they wanted not only to see the historical features, but also to feel as if they were in the period of the exhibited objects. Soundscapes can play an important role here because when sound is used as a design element, museum experiences are much more positive, as visitors can interact with the objects on display and feel as if they are living in a certain period. These details should also be considered in the design.

A correlation test was conducted to determine the functions that the participants considered necessary in the design of a museum and its immediate surroundings and open spaces. The correlation test was applied using the element to be searched for (the dependent variable) and the elements that may be related (independent variables).

"According to its type and purpose, the design of the museum and its immediate surroundings and open spaces is created by considering many elements such as the type of exhibitions, target audiences, space setups, lighting, and acoustics" (Statement 23).

Table 3. Mean values with deviations (SD) for the participants' responses to the statements regarding the museum and its immediate surroundings and open spaces

Item No	Concepts	Arithmetic mean	SD	Factor Loads	Cronbach Alpha
s1	Compatible with spatial interventions	**4,824**	0,45	,659	,922
s2	Respectful for the historical identity of the building .	**4,797**	0,44	,734	,923
s3	New function.	3,581	1,01	,799	,925
s4	Perceptual experience.	3,203	1,19	,657	,927
s5	Guiding and preserving	**4,622**	0,61	,756	,919
s6	Natural and cultural heritage.	**4,527**	0,74	,732	,918
s7	Social identity and "collective consciousness"	3,649	0,97	,763	,922
s8	Associated with outdoor spaces	4,081	0,89	,558	,919
s9	Flexible structures	3,527	1,14	,653	,920
s10	Respectable buildings with gardens	4,446	0,76	,799	,919
s11	Protection, exhibition, research, education, recreation, communication functions	4,405	0,83	,702	,918
s12	Include special sections and educational programs for children	3,986	1,01	,756	,917
s13	Universality	4,189	0,89	,543	,919
s14	Providing educational and social benefits	4,095	0,91	,634	,918
s15	Think and interpret	4,446	0,74	,762	,918
s16	User satisfaction	3,378	0,96	,609	,923
s17	Cultural center and social tool	4,135	0,78	,699	,919
s18	Enjoyment, learning, and socializing	4,027	0,92	,642	,919
s19	Accessibility	3,730	1,05	,699	,921
s20	In accordance with the philosophy	4,189	0,85	,723	,918
s21	Comprehensiveness	4,189	0,95	,804	,916
s22	Experiences and discoveries	4,311	0,81	,779	,921
s23	The effectiveness of many elements in its design	4,297	0,81	,818	,918
s24	Design with local and universal ecological, cultural, and artistic values.	4,135	0,96	,610	,919
s25	"Interactive space" and "interactive applications"	4,149	0,82	,666	,919
s26	Adding digital elements to attract people's interest	**4,486**	0,67	,677	,920
s27	The phenomena of flexibility and changeability in the display dimension	3,878	1,10	,753	,922
s28	Presence of signs for information and direction	4,176	0,93	,811	,920
s29	Three-dimensional displays	4,297	0,75	,687	,919
s30	Landscape criteria	2,865	1,00	,635	,925
s31	Interactive exhibitions	4,149	0,77	,593	,920
s32	Recognition and social interaction	4,419	0,83	,660	,919

With this approach, the relations between the dependent variable and the independent variables consisting of statements describing functions of museums and their open spaces were examined using the correlation test. Statements with significant correlations to each other at the -0.01 level according to the correlation test are shown with ** in

Table 4. Accordingly, among the elements and other functions to be considered in the design of museum open spaces that were in a positive relationship with their statements, the most correlated, respectively, were:

- By **informing** the visitor and increasing his **interaction** with the artistic works, museums and their gardens enable the visitor to **think and interpret.** (n = 74, r^2 = 0.736, p <0.01),
- In the design of the museum and its immediate surroundings, many factors such as the comprehensiveness of the exhibited works, the perceptions of the visitors and their comfort levels are taken into consideration. (n = 74, r^2 = 0.715, p <0.01),
- The gardens of the museums are created **in accordance with the philosophy** of the museum, according to the architectural form, spatial setup, type and purposes of the museum. (n = 74, r^2 = 0.692, p <0.01),
- The gardens of museums are designed in such a way that they can reveal many **local** and **universal ecological, cultural, and artistic values**. (n = 74, r^2 = 0.587, p <0.01),
- "**Signs**, maps and plans, colors, textures, and lights for **informative** and **guiding purposes** in the open areas of museums allow the visitor to make his own way without any guide." (n=74, r^2=0,571, p<0.01),
- Supporting these results, Gouilding emphasized that the visitor should feel comfortable in the study.

It is essential, therefore, not to let the experience start with frustration, anxiety and disorientation. Clear and easy to follow maps will allow the visitor to focus attention on the exhibit and enable the planning of a particular route. Seats and areas for contemplation will also allow individuals to absorb information and reflect on the object of their gaze (Goulding, 2000).

- "With the integration of museums into the education system, there are **sections for children** and **educational programs** in the museum and its gardens.", (n=74, r^2=0,558, p<0.01),
- "Museums and their gardens have the functions of preservation and exhibition, and serve as places for research, education, relaxation, and social interaction." (n=74, r^2=0,557, p<0.01),
- "Museums and their gardens are updated according to the requirements of the times and **offer educational and social benefits**. (n=74, r^2=0,540, p<0.01),
- It is a widely-shared view that museums should be hybrid places that balance learning and fun, using entertainment only to the extent of its role in edutainment, or infotainment for adult audiences, i.e. as a mechanism for learning and knowledge (Izzo et. al, 2023).
- "Museums and their immediate surroundings provide opportunities for the appreciation, understanding, and management of **natural and cultural heritage**." (n=74, r^2=0,511, p<0.01),
- "Museums have the mission of **guiding** future generations and **preserving** human heritage." (n=74, r^2=0,508, p<0.01) .

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These findings highlight the spatial, cultural, sociological, and educational value that the museum and its immediate surroundings contribute to urban life. Similar results were found by Erenler and Kürkçüolu (2020), who showed that using museum gardens as alternative open spaces will improve urban life's quality and keep it in a healthier state.

Table 4. Correlation table of the elements to be considered in the design of museums and their immediate surroundings and open spaces

	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16	s17	s18	s19	s20	s21	s22	s23	s24	s25	s26	s27	s28	s29	s30	s31	s32
s1																																
s2	.374**																															
s3	-.104	.022																														
s4	.349**	.290*	-.225																													
s5	.402**	.477**	.028	.312**																												
s6	.404**	.206	.006	.310**	.744**																											
s7	.108	.056	-.012	.240*	.234*	.373**																										
s8	.036	-.063	.085	.010	.309**	.432**	.335**																									
s9	.103	-.030	.160	.051	.211	.282*	.356**	.486**																								
s10	.272*	.028	-.057	.110	.484**	.523**	.233*	.493**	.310**																							
s11	.121	.193	.141	.054	.469**	.561**	.248*	.422**	.294*	.558**																						
s12	.205	.086	.169	.014	.323**	.518**	.176	.489**	.315**	.399**	.677**																					
s13	.085	-.112	.167	-.089	.361**	.449**	.221	.363**	.375**	.320**	.418**	.537**																				
s14	.108	.118	.238	-.094	.311*	.371**	.271*	.449**	.481**	.304*	.587**	.626**	.487**																			
s15	.074	.113	.180	-.042	.406**	.461**	.239*	.443**	.399**	.491**	.594**	.609**	.494**	.626**																		
s16	.220	.120	.322**	-.032	.223	.177	.056	.204	.103	.197	.080	.118	.156	.103	.163																	
s17	.147	.081	.369**	.029	.480**	.441**	.280*	.359**	.304*	.312*	.423**	.348*	.437**	.329**	.414**	.441**																
s18	.078	.014	.101	.045	.382**	.438**	.470**	.383**	.405**	.373**	.345*	.441**	.447**	.389**	.342**	.159	.375**															
s19	.130	.147	-.070	.077	.307**	.395**	-.014	.406**	.304*	.204	.428**	.472**	.306*	.472**	.350**	-.006	.195	.291*														
s20	.088	.067	.077	-.011	.348**	.401**	.296**	.503**	.403**	.458**	.666**	.604**	.476**	.523**	.663**	.095	.453**	.359**	.424**													
s21	.273*	.127	.012	.123	.409**	.557**	.282*	.422**	.504**	.433**	.549**	.588**	.463**	.648**	.638**	.206	.372**	.513**	.576**	.683**												
s22	.341**	.026	.111	.260*	.323*	.429**	.158	.136	.340**	.217	.198	.155	.356**	.183	.085	.252*	.387**	.338**	.213	.310**	.441**											
s24	.216	.132	.117	-.012	.299**	.399**	.303*	.391**	.286*	.485**	.426**	.325**	.490**	.551**	.093	.232	.291*	.419**	.622**	.330**	.683**	.291										
s25	.220	.085	-.006	.164	.412**	.497**	.221	.377**	.340**	.287**	.333**	.364**	.412**	.366**	.182	.136	.288**	.356**	.285**	.330**	.404**	.485**	.222	.236*								
s26	.198	.249*	.226	.064	.524**	.557**	.470**	.303**	.145	.241	.358**	.354**	.284**	.275	.286*	.018	.555**	.380**	.210	.317**	.286*	.401**	.237*	.347**	.566**							
s27	.095	.091	.052	.281*	.257*	.264*	.409**	.306*	.283*	.230	.282*	.331	.137	.516**	.462*	.263	.250*	.155	.126	.171	.234*	.228	.072	.094	.521**	.269*						
s28	.207	-.012	.212	-.082	.287*	.241	.070	.249*	.418**	.567**	.389**	.353**	.259*	.389**	.278**	.373**	.501**	.241	.106	.321**	.446**	.273*	.571**	.298*	.253*	.170	.196					
s29	.399**	.227	.040	.145	.514**	.523**	.220	.373**	.262*	.363**	.420**	.561**	.386**	.378**	.304**	.278	.373**	.501**	.241	.294**	.400**	.408**	.258*	.305*	.569**	.471**	.409**	.277*				
s30	.007	-.001	.093	.115	.005	.042	.007	.074	.233*	.153	.150	.215	.138	.075	.304**	-.203	.006	.153	.187	.191	.216	-.117	.306*	.178	.042	-.126	.122	.159	-.073			
s31	.195	.050	.046	.026	.266*	.291*	.089	.443**	.316*	.356**	.388**	.460**	.390**	.313**	.274*	.274	.307**	.245*	.422**	.352**	.374**	.320**	.281	.251*	.462**	.390**	.216	.231	.371**	.044		
s32	.311**	.162	.164	.079	.398**	.526**	.186	.345**	.315*	.330**	.369**	.497**	.357**	.274*	.294**	.366**	.313**	.560**	.195	.274	.370**	.457**	.201	.222	.511**	.445**	.419**	.171	.588**	.036	.416**	
s23	.146	.096	.088	-.063	.508**	.511**	.170	.444**	.469**	.473**	.557**	.558**	.438**	.540**	.736**	.118	.457**	.284**	.484**	.692**	.715**	.192		.587**	.22,237	.07	.571**	.258*	.306*	.281*		0.2

** Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

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In addition, the statements questioning the expectations of the users of the museum and its immediate surroundings and open spaces were grouped by factor analysis. Gathering many variables into groups and interpreting them is performed by factor analysis. In this context, all the statements (variables) questioned were grouped together with related ones according to factor analysis. Before factor analysis was performed, the suitability of the data for factor analysis was evaluated using the Kaiser Meyer Olkin (KMO) and Barlett tests. The KMO value for the scale consisting of 32 items was evaluated as 0.793, and the result of the Bartlett test was found as $X^2 = 1428.14$ ($p \leq 0.0001$). The fact that the KMO value was higher than 0.6 and the Barlett test value was significant showed that the data were suitable for factor analysis, and the factor eigenvalues of the statements related to the scale were calculated. The museum, its immediate surroundings, and open spaces (space integrity) were evaluated in terms of meeting satisfaction levels and expectations (Table 5). The reliability of the factor groups was examined by Cronbach Alpha analysis and accordingly, the Cronbach Alpha value for the 32 statements was found to be 0.922. This value is well above the desired 70% level.

In order to determine the significance of the factor analysis of the groups, a test was conducted with the statements that were found to be related to each other at the ** level in the correlation analysis. In other words, factor analysis was conducted among the functions that users associated with the elements to be considered in the design of a museum and its immediate surroundings and open spaces.

At this stage, Statements 1, 2, 3, 4, 7, 16, 22, 25, 27, and 32 were excluded from the factor analysis. The KMO value was recalculated as 0.845, and the Bartlett test result was found to be $X^2 = 846.911$ ($p \leq 0.0001$) for the scale consisting of 22 of the items evaluated. The fact that the KMO value had increased to over 0.6 and that the initial KMO value and Barlett test were significant showed that the data were suitable for factor analysis. The factor eigenvalues were calculated for the statements related to the scale which questioned the satisfaction levels and expectations regarding the museum and its immediate surroundings and open spaces (Table 5).

Table 5. Results of the factor analysis evaluating the museum, its surroundings, and open spaces in terms of satisfaction levels and meeting expectations.

Factor groups	Eigenvalues	Explained variance %	Cumulative variance %
1	8,840	42,094	42,094
2	1,813	8,633	50,727
3	1,245	5,930	56,657
4	1,072	5,106	61,763

In the study, factor analysis was performed using Varimax rotation for grouping the factors. According to the data obtained, four factors with eigenvalues above 1.0 explained 61.763% of the variance in the

scale scores. The total variance of the 1st factor group was 42.094%.These results revealed that the statements that met the satisfaction levels and expectations of a museum, its immediate surroundings, and open spaces under this factor group (Planning and Design) were more important than the statements under the other groups. The total variance of the 2nd factor group (Social) was 8.633% and for the 3rd factor group (Functional) the total variance was 5.93%. The 4th factor group (Perceptual) total variance was 5.106% (Table 6).

In terms of the physical environment, social environment, and environmental perception, it can be seen that museum examples that make their open spaces available to the public across the globe share certain characteristics. The use grows as these criteria' diversity and density rise (Erenler and Kürkçüoğlu, 2020). The study's findings revealed that the four-factor categories of planning and design, social, functional, and perceptual were similarly grouped in terms of user satisfaction and expectations.

Table 6. Factor groups that met the satisfaction levels and expectations of users of museums, their immediate surroundings, and open spaces.

		Factor Loadings				
		1	2	3	4	
Item No	Concept					Communality
s24	Local and universal	,761				,628
s20	Compatible	,722				,682
s21	Readability	,718				,740
s19	Accessibility	,669				,627
s15	Meaning	,655				,697
s11	Multi-functionality	,637				,676
s12	Child friendly	,605				,629
s14	Educational and social	,529				,625
s30	Landscape value	,380				,356
s5	Guiding and preserving		,780			,720
s26	Attractive		,740			,635
s6	Possibility		,709			,709
s29	Three-dimensional displays		,645			,580
s17	Social and cultural		,585			,496
s31	Interactive exhibitions			,689		,586
s9	Flexibility			,682		,686
s13	Universality			,552		,516
s8	Related			,546		,503
s18	Socializing			,477		,449
s28	Information and direction				,796	,709
s10	Respectability				,701	,721
% of variance		*42,094*	*8,633*	*5,930*	*5,106*	

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CONCLUSIONS

In the study, the cultural, artistic, and social attractions that museums contribute to public life and the different qualities they exhibit have been demonstrated. The open space designs of museums have been examined historically, the successful design approaches to their open spaces have been discussed, and the importance of museums as urban public spaces has been emphasized. Museums are important tools that support the economic, social, and cultural aspects of urban public life. The design and content of the museums have changed over time depending on communal and social life, cultural, and artistic events, and differences in their formal, conceptual features and typologies. The design of museum open spaces has also evolved depending on the change in museum architecture.

As can be seen in the findings, the museum contributes to urban life with its open spaces, social function, exchange of ideas, cultural values, and various pleasurable activities. In addition, museum open spaces attract attention as components of urban and museum identity, a part of urban design, and with the use of public space, a social tool.

A comprehensive analysis was made about which of the survey statements had more impact on visitor satisfaction. Accordingly, the four factor groups that had the greatest impact on visitor satisfaction were determined as the planning and design, social, functional, and perceptual factor groups. The most effective statements among these factor groups were:

• The gardens of museums are designed in such a way that they can reveal many local and universal ecological, cultural, and artistic values. (Planning and Design),

• Museums have the mission of guiding future generations and preserving human heritage. (Social),

• Interactive exhibitions in contemporary art museums and open spaces draw the attention of visitors. (Functional),

• Signs, maps and plans, colors, textures, and lights for informative and guiding purposes in the open areas of museums allow the visitor to make his own way without any guide. (Perceptual).

The statements that showed the most correlation among the elements to be considered in the design of museum open spaces were:

• By informing the visitor and increasing his interaction with the artistic works, museums and their gardens enable the visitor to think and interpret.

• In the design of the museum and its immediate surroundings, many factors such as the comprehensiveness of the exhibited works, the perceptions of the visitors and their comfort levels are taken into consideration.

• The gardens of the museums are created in accordance with the philosophy of the museum, according to the architectural form, spatial setup, type and purposes of the museum.

In conclusion, the potential of museums and museum open spaces to create social environments that are dynamic cultural centers should be strengthened and should support urban life as a strong focal point and meeting place for the city. Depending on the content, museums and their open spaces should be able to create a dynamic and lively urban environment hosting different activities throughout the year. In addition, planning and design approaches should be developed that consider museums as an important part of the urban open green space system. A design approach should be adopted with everyone in mind, taking into account the comprehensiveness of the exhibited works, the perceptions of the visitors, and their comfort level. The open space design should be compatible with the identity of the museum, and it should be open to diverse visitors from all parts of the society. With their multifunctional structures, museums will become new centers of social attraction, as institutions that convey cultural, social, historical, and communal values to future generations.

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Resume

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Building Production Processes Planning and Management in Classical Greek Era; Comparison with Contemporary Practices

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Abstract

Through the example of the Classical Greek Era, the study focuses on seeking an answer to the question of whether managerial techniques and strategies were developed in building production processes in ancient times. The study aims to identify and examine the stages planned in the building production processes and the construction management and organization techniques developed during the Classical Greek period (VI.-IV. century BCE), which played an important role in the development of building art and to compare the practices of the Era with today's construction and management practices. The research methodology is based on the interpretation of historical data from the Classical Greek Era, consisting of construction texts written on stone slabs and their epigraphic explanations, and the comparison of the practices of the Era with contemporary practices. The stone slab samples with the construction texts used in the study were taken from the Sara B. Aleshire Center for Greek Epigraphic Studies catalogs at the University of Berkeley. The epigraphically analyzed descriptions of these inscriptions by different authors were obtained by searching the literature sources through the catalog numbers given to the samples. In the classical Greek Era, three main administrative public bodies made decisions on construction, planning, and managing the construction processes. These include the Senate, Ecclesia (people's assembly), and building commissions. By the decision of the people's assembly, building commissions were established to manage and supervise the construction process from a financial, administrative, and technical perspective. This research has contributed to the understanding that today's building production strategies and management theories have their roots in ancient times, thereby contributing to the universality of construction and management theory. Due to the dynamic nature of the research, the period analyzed was also compared with the current production management theories. The study's uniqueness lies in interpreting historical documents and observing and comparing current conditions. Hence, while the construction and management systems in the Classical Greek period are understood, two different processes are analyzed in their own contexts, and their differences and similarities are highlighted.

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INTRODUCTION

In ancient times, as it is today, construction projects are a production, and their outputs emerge from managerial decisions and planning. The building production process encompasses all the actions and relationships from beginning to end (Yaman, 2009). Labor, materials, machinery equipment, money (capital), and management parameters, which are the inputs of the building production process, emerge as value-added and are presented to the user. Construction management is the most crucial factor in the production process of adding value (Akbıyıklı & Dikmen, 2019). Construction management is the definition and planning of the time, quality, and budget organizations carried out in the construction processes that continue until the emergence of a new building as a need, the decision to build, design, project design, construction and commissioning, and the description and planning of the relations of those involved in production for building production. Along with the careful design and use of quality construction materials and construction techniques, the planned phases of the construction process and the effective execution of the construction management and supervision systems have also played a significant role in maintaining the monumental historic buildings constructed during the old period. Large-scale public constructions such as the Egyptian pyramids, the Great Wall of China, the Parthenon, Hagia Sophia, and Süleymaniye were the product of long and complex production processes and efforts that required well-planned construction management strategies and organizational techniques.

Like other civilizations, the Greeks used building art and technology todemonstrate their power, especially during the Classical period (6th to 4th centuries BCE). By this means, the construction activities in prominent Greek cities such as Samos, Naxos, Athen, and Corinth formed the basis for Greek architecture. A number of Greek architects, including Theodoros of Samos, who studied in Egypt and designed and managed the temples of Artemis in Ephesos and Hera in Olympia during this period, as well as Skopas of Paros, who constructed the temple of Athena in Tegea , made a significant contribution to the development of building art and technique during this period. In addition, some architects, such as Kallikrates, the designer and builder of the Parthenon in Athens, were both architects and builders, working in design and construction. (Pfarr, 1985).

On the other hand, the Greeks also developed new techniques in construction during the Classical period. In particular, they used the wheel to transport large-sized stone blocks and used beasts of burden instead of humans as traction power (Coulton, 1977). For easy transportation of large stone blocks and column drums, circular wooden wheels (Paconius method) and wooden frame systems attached to the wheels (Metagenes method) were developed (Figure 1).

Figure 1. Transportation of large stone blocks and column drums by wooden wheels (Coulton, 1977, fig. 62), (2023).
a. Transportation by Paconius method
b. Transportation by Metagenes method

(a)   (b)
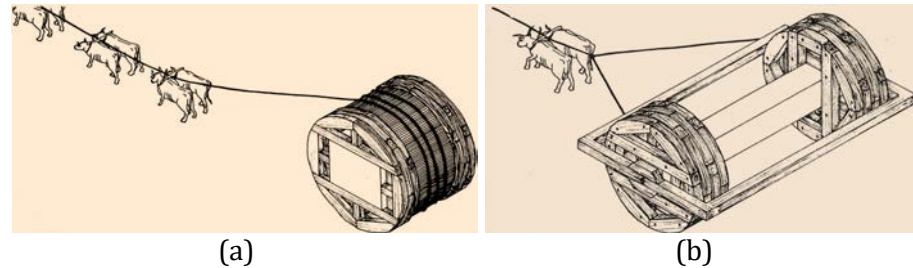
These applications, which were only used once, such as the transportation of column drums with wooden wheels, were abandoned over time and replaced by carts manufactured when the wheels were combined with a carrier (Figure 2).

Figure 2. Transportation of column tanbur and column base with wooden wheels and wheeled carts, (2021).
a. Transportation of the column drum by base placing it between the hoop wheel pulley (Koldewey and Puchstein 1899. Figure 98)
b. Transportation of the column base by wheeled car, (Korres, 2000,

(a)   (b)
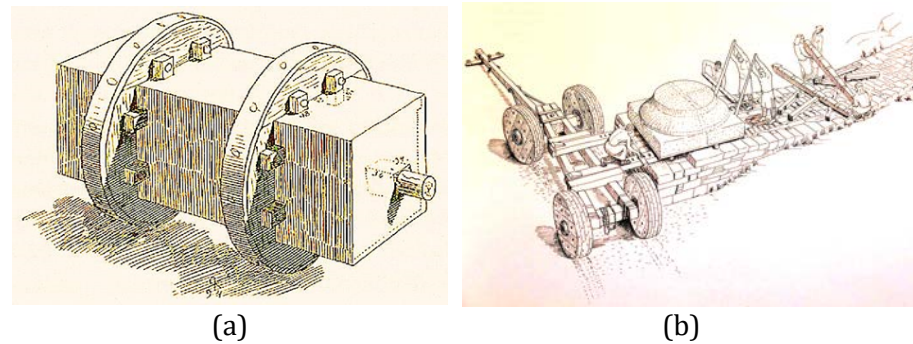
However, if the transport route was inclined, wooden sleds and ropes that provide a braking effect were used to prevent the stone blocks from sliding. In addition for the first time, wooden piers that can be raised gradually were used instead of high ramps like the Egyptians used, and materials were carried up to the upper levels in the building area (Figure 3).

Figure 3. Transporting the column base stone and restitution view of the wooden pier used in the construction of the Parthenon (Korres & Vierneisel, 1992), (2020).
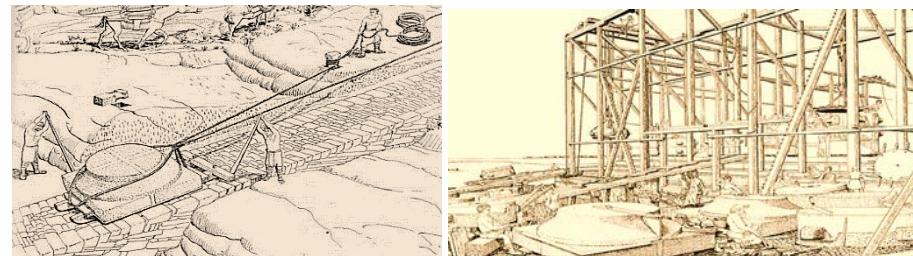
Additionally, wooden skids and ropes were used if the transportation route was inclined to provide a braking effect and prevent the stone blocks from slipping. Meanwhile, instead of high ramps, as the Egyptians used wooden scaffolds with a gradual rise to carry materials up to the upper floors of the building area for the first time.

Construction texts on stone slabs unearthed during excavations at Greece's sacred sites such as Boeotien Livadia, Delos , Delphi, Epidauros , and Athens are the essential sources providing information about the stages in the production process and the management of construction projects undertaken during the Classical Greek period. Through epigraphy, some of the stone slab texts have been analyzed by different scholars. Through these inscriptions, it was possible to understand how meticulously the buildings of the Classical Greek period were planned

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and constructed and how regularly management and organization systems were designed and implemented. Depending on their importance in the construction process, stone construction texts explaining administrative decisions and processes generally provide information on;

• Information on the decisions taken by public organizations on the implementation provisions of construction projects,

• Project descriptions,

• Technical specifications, tenders, details of suppliers, and information such as type, quantity, and price of materials to be used in the construction,

• Construction contracts between building commissions and contractors,

• Justification documents, including periodic reports on the source and use of construction-related funds provided by building commissions.

Initially, literature sources that provide information on the construction processes and management of the Classical Greek Era were analyzed. As part of the research process, three stone slab samples explaining construction practices of the period were selected from the Sara B. Aleshire Center for Greek Epigraphic Studies at the University of Berkeley, and the epigraphically analyzed explanations of these samples by different researchers were obtained by scanning the literature sources based on their catalog numbers in order to develop the research topic. Among the examples, the first plate, "I.G. I.3.35" describes the decision of the people's assembly on the construction of the Temple of Nike on the Acropolis of Athens and the establishment of the building commission, the second plate, "I.G. IV.2.1.102" describes the acquittal document for the Temple of Asclepios at Epidauros, where the post-construction accounts were checked, and the third plate "IG II/III (2). I.1.1.6" describes the general administrative specifications prepared by the building commission for the reconstruction of the Temple of Athena Alea in Tegea. In addition, the stone slab numbered IG II 167 , on which the construction contract and technical specifications of the Telesterion of Eleusis were inscribed, and the sample data containing the epigraphic explanations of the inscription were obtained from Lattermann's doctoral dissertation in 1908. Based on the interpretation of the epigraphic descriptions of the epigraphic texts of the stone slabs selected as examples, and with the support of other stone inscription texts published by different researchers, the data was able to determine the building production processes and administrative techniques valid during the Classical Greek Era, and these were presented as figures and tables. By comparing construction management theories developed today under different perspectives with those developed during the study's period of study, the construction and management practices of the period were assessed.

Research on this subject is, however, generally limited to the interpretation of stone inscriptions by linguistic experts through epigraphy or linguistic interpretation. No original study examines the building production processes and administrative techniques of the

period under study and interprets them by comparing epigraphic data with contemporary practices. This study aims to fill this gap as well. However, due to the limited number of stone slabs unearthed as a result of the excavations and the fact that some of the slabs were fragmented and the inscriptions on their surfaces were eroded to the extent that they could not be read, the number of examples that provide holistic information on the subject of the research constitutes a significant challenge for this study. Over the course of 50 years of excavations at Epidauros , only 30 stone inscriptions were found, some of which could not be read at all, and some were partially read but could not be interpreted. (Prignitz , 2014).

BUILDING PRODUCTION PROCESSES AND STAGES IN THE CLASSICAL GREEK ERA

In the classical Greek period, when a public building was to be constructed, it was first necessary for the Ecclesia (the people's assembly) to decide on the construction (Maier, 1961). The construction decision taken in the Ecclesia was submitted to the Senate, a higher authority, for approval (Bingöl, 2004). Based on the construction decision approved by the Senate, a building committee was established by the people's assembly depending on the type of construction (Honsell, 2010). If the building to be constructed was a temple structure, the commission was called the "temple building commission" (Naopoioi; temple builder), and if it was a city wall structure, it was called the "wall building commission" (Teichopoioi; wall builder) (Burford, 1969). The construction process is initiated by the establishment of building commissions following the decision of the Ecclesia to proceed with the construction.

The construction decision taken by the Ecclesia regarding the Temple of Nike (5th century BCE) on the Acropolis of Athens is an important example in this regard. An example of the stone plate numbered "I.G. I.3.35" on which this decision is inscribed given in Figure 4.

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Figure 4. Figure 4. Resolution Adopted by the Ecclesia for the Construction of Temple of Athena Nike, (http://aleshire.berkeley.edu), (2020).
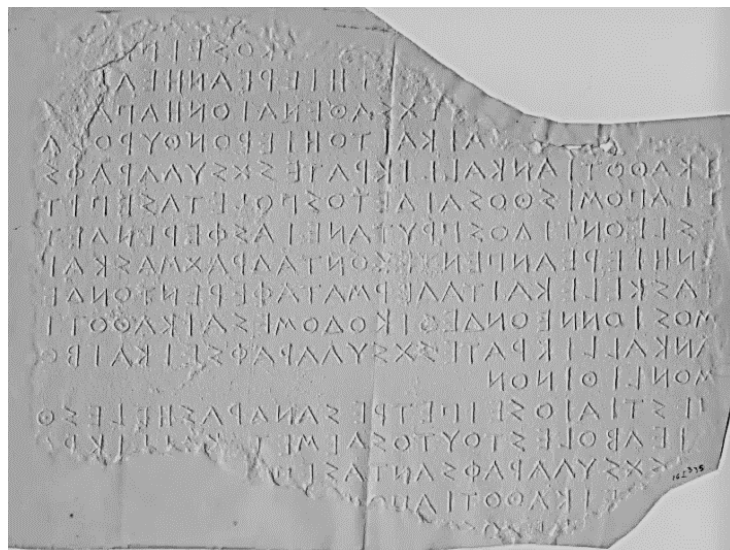
The epigraphic decipherment of the decision of the Ecclesia inscribed on the stone plate I.G. I.3.35 is presented below (www 2.hu-berlin.de/winckelmann).

For the construction of the sanctuary of Athena Nike, a priestess was chosen by lot from among all Athenians, an entrance to the sanctuary was built according to the plan of the architect Kallikrates, citizens from the prytane (pioneer) of the Leontis region were paid to work on this project, the priestess received 50 drachmas and the thighs and skins of the victims, The construction of a temple and a marble altar according to the plan of Chalicrates, the establishment of a building committee consisting of three people to take care of the construction and materials, the commission to carry out the planning together with Chalicrates, and the declaration of every work done to the Ecclesia at the end of the contract.

In this construction decision taken by the Ecclesia , it was stated that the architect was pre-selected and that the selected architect should work with the building commission. A public announcement of the decisions of the people's assembly was placed or posted in a public place. (Pfarr, 1985).

The first task of the building commission is to obtain the estimated costs of the building to be constructed. Once the approximate cost of the building is obtained, the commission organizes the budget based on the estimated cost values by utilizing public and local resources to cover the construction costs. (Osthues, 2014). This process involves the building commission tendering the construction work to a contractor at the estimated cost values following the technical and administrative specifications, where the source of the construction work has been prepared in advance. The signing of the construction contract follows this. (Osthues, 2014).

In the classical Greek period, for large-scale public constructions such as temples, theaters, stadiums, and city walls, no general contractor could complete the entire construction based on a single contract. The construction was therefore divided into work groups, and separate tenders were issued for each work group, resulting in multiple contractors being employed during the construction process. (Thür , 1984). The Temple of Asclepios building commission at Epidauros tendered the stone works to 13 different contractors and the metal works to 12 different contractors, resulting in 25 separate construction contracts for a single building (Burford, 1969). Similarly, 42 different contractors were hired to construct the Temple of Athena Alea at Tegea (Thür, 1984). The stone inscription of the Telesterion of Eleusis reveals that the construction was tendered to 3 different contractors, and contracts were made (Lattermann , 1908).

There is a construction contract between the building commission and the contractor of the Telesterion of Eleusis, inscribed on a stone slab numbered IG II 167 and dated 330 BCE (Figure 5).

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Figure 5. Construction contract between the building commission and the contractor of the Eleusis Telesterion (Lattermann, 1908). (2023).

There is a general description of the construction contract for the Eleusis Telesterion in general terms. Approximately eight months of work will be performed from December to August each year, the works must be carried out in accordance with the architectural drawings and the tender conditions, and the architect Philon and Epistat Melanopos will supervise each phase of construction. The building commission would penalize the contractor if he did not adhere to the contract terms, and the tender would be canceled and re-tender. In the technical specifications section of the contract, there are technical explanations on the type of stones, the width and thickness of the stylobate stones in steps, the number and height of columns, the length, width, and thickness of the other row, and cornerstones to be used, and that the stones should be connected with dowels and clamps before the lead is poured. (Lattermann, 1908).

A stone inscription found in the Boeotien Livadia region of Greece in 1875 contains a contract between the temple building commission and a contractor, including technical specifications and payment terms. In the contract;

The temple building commission states that the metal and stone work, the preparation of the inscription plates, and the ornamentation work will be done at the same price, while the Poros stonework will be done for five drachmen per stone. For the transcription and painting of the letters, the contractor will be paid one stater and three obolens per 1000 letters. The contractor is to start work immediately after receiving the prepayment and complete the work within ten days with at least five technical assistants. The contract then moves on to the penalty clause. In this section, it is stated that if the contractor fails to comply with the conditions specified in the contract or makes deficient or faulty work, the contractor will be severely penalized by the temple building commission on the grounds of unjust gain once this situation is detected by the Epistates, who are in charge of supervision. The contractor will also receive prepayment for the decorations he is required to make based on the inscription plate given to him, and after depositing ten percent of the prepayment amount as collateral, he will receive payment for the second

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stage if he proves that he has completed the work in accordance with the terms of the contract and to the satisfaction of the temple construction commission and the architect. Upon completion and delivery of the entire work, and if no penalty has been imposed on him during the construction process, he will also receive the ten percent deduction of this portion of the amount he has left as collateral. The other part of the contract includes the technical conditions of the work. Accordingly, the company will place eleven ornaments on the existing inscription plates. Following the previously given model and the specifications specified by the commission, the existing iron clamps on the plates will be removed and forged, deep holes will be drilled, a lead will be poured, and the plates will be placed back in their proper place. After deducting ten percent as collateral, the operator will receive the second payment after showing that the forged inscriptions have been replaced by pouring lead and that the decorations have been mounted on the inscription plates. The builder will receive the remaining payment along with the collateral once the decorations have been completed and approved by both the People's Assembly and the architect. The last part of the contract explains that other matters not covered by this contract will be dealt with in accordance with the law on construction control and the general law on temple construction regulation (Dörpfeld, 1882).

It is seen that contracts with contractors stipulate that each stage of the work undertaken will be controlled and that one stage cannot be started until the other stage is completed and delivered. In addition, the contractor is given a prepayment with a surety guarantee before the start of construction. An amount equal to 10% of the prepayment given to the contractor is deducted as collateral, and this collateral is returned to the contractor at the first payment after the final acceptance of the work. After receiving the advance payment, the builder has to start construction at the time set by the building commission. If the contractor did not start work within the time specified in the contract, he had to pay back double the amount of money he received (Thür, 1984). In addition, if the contractor failed to fulfill all or part of the work undertaken or did it incorrectly, the construction commission would tender that part of the work to another company. The company whose work is to be terminated in this way must pay to the temple construction commission the advance payment given to it at the beginning of the work, all payments it has received so far for the construction based on the general sum, and the penalty of 1/5 of the total cost imposed on it by the commission and other penalties if any (Pfarr, 1985). If the enterprise fails to pay the advance payments and penalties, the money is collected from the guarantor, who, according to the contract terms, acts as surety for the enterprise (Bohn, 1982). A certificate of acquittal is issued as the final acceptance of the construction after all contractors have completed the work according to the contract terms. (Bingöl, 2004). I.G. IV.2.1.102 is one example of a stone slab prepared by the building commission in the first half of the 4th century BCE., which contains part of the acquittal document presented to

the assembly of the people. In Figure 6, the breakdown of the work performed during the five-year construction period for the Temple of Asclepios of Epidauros, which was designed by Theodotus, is presented along with the payments and names of the contractors and guarantors.
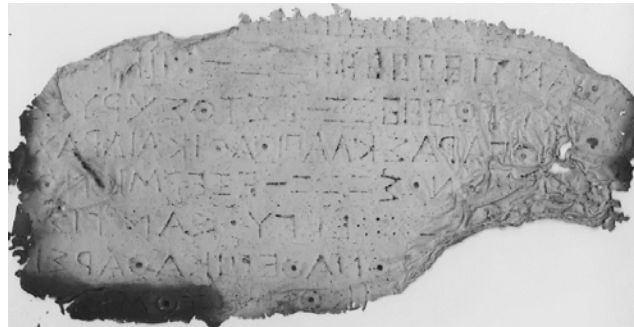
Figure 6. Certificate of release on a Stone Plate at Temple of Epidauros Asclepios (http://aleshire.berkeley.edu), (2020).

Part of the analysed version of the text of the release certificate written on the stone plate shown in Figure 6 is given in Table 1 as a general example. (Burford, 1969).

Table 1. List of expenditures of the temple of Asclepius in Epidaurus

Amount Paid (Drachmas)	Payee (Constructor)	Guarantor	Work Done
9800	Thrasymedes Pythokles	Theopheides Hagemon	Construction of balustrades in between the ceiling, interior door, and columns
6400	Lykios (Corinth)	Orsias Hagemon	Quarrying and transportation of stones for Peristasis,
6167	Euterpidas (Corinth)	Pyrrhias Aristandros	Quarrying and transportation of stones for half of the cella,
4400	Achilles (Corinth)	Milatos, Orsias	Quarrying and transportation of stones for half of the cella,
4320	Mnasillos Lakrines,	Euanthes	Quarrying and transportation of stones for the floor and ramps
3200	(Argos).....	Stratos	Construction of the cella
3068	Sotades (Argos)	Aristolas	Peristasis construction
2800	Kaphisias Lysion,	Nikaios	Glue for the door
2340	Theodotos	Theoxenidas	Pediment: acroters
2000	Mnasikles (Epidauros)	Kleanor	Quarrying, transportation and avement of stones for the foundation,
1610	Hektoridas Philoklidas,	Timokleidas	Completion of half of the pediment
1400	Damophanes	Aristophylos	Delivery of nails, rings, ring bearings, and latch for balustrades between columns
1385.	Antimachos (Argos)	Nikatas	Quarrying, transportation and pavement of stones for the foundation of the cella,
1336	Marsyas Antikritos,	Aristophylos	Polishing of internal and external columns
1050	Polemarchos Lykinos	Peristase:	Painting using Encaustic technique or painting the illustration of Stymphalos
900	Timotheos	Pythokles	Making and supplying of Typoi
882 Dr/3 Ob.	Euterpidas	Epistratos	Provision and transportation of stone ballast, and putting up of walls
843 Dr/2 Ob.	Lysikrates Eudamidas,	Lakrines	Quarrying, transportation and pavement of stones for the laying of the foundation
799	Mnasikleidas	Aristomedes	Supply of bricks
550	Kleandrides (Corinth)	Kleidikos	Polishing of the inner walls of the cella
540	Dorkon (Corinth)	Kleanor	Coloring of the cella and painting of illustrations
353	Theodotos	Architect	Annual charge

Based on the information obtained from the epigraphic descriptions of the stone slab samples presented in this article, as well as from epigraphic studies conducted by other researchers, it is evident that building production processes during the Classical Greek period consisted of seven successive and interrelated stages (Figure 7).

STRUCTURE CONSTRUCTION PROCESS

BUILDING COMMISSION

BUILDING REQUEST (Public)

APPROVAL PROCESS (Construction Decision)
Senate
Ecclesia
Establishing of a Building Commission

DESIGN PROCESS
Architect Selection
Appropriate Project Preparation
Calculation of Approximate Costs
Preparation of Technical Specifications

TENDER PROCESS
Determination of the Contractor
Signing of the Contracts
Determination of the Guarantors

CONSTRUCTION PROCESS
Supply of materials to be used in construction,
Supervision of whether the construction is being carried out in line with the contract.
Recording of the production and payments made

POST CONSTRUCTION PROCESS
Delivering of the structure to the architect and commission
Final acceptance with the approval of the acquittal document submitted by the Assembly to the Senate
Returning of the guarantees

USAGE

Figure 7. Chart of the Structure building production Process in Classical Greek Period

Building Management Organization; Operation of Public Units And Their Duties

In the classical Greek Era, three primary administrative public bodies made decisions regarding construction as well as planned and managed the construction process. These are the Senate, the people's assembly, and the building commissions. (Osthues, 2014).

A. Senate and Ecclesia

In the 6th and 4th centuries BCE., the classical Greek period, the highest body deciding on construction was the Senate and the popular assembly. The name of the people's assembly is Ecclesia. The popular assembly functions as the citizens' government in the Greek city. The popular assembly and administrative staff were selected by lot (Akad et

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al., 2017). In practice, participation in city governance corresponds to a wide range of roles in the city's political and social life. Despite the breadth of roles in the political life of the city, such as civil service, military service, tax obligation, the right to vote and the right to be elected as an administrator, the right to sue, the right to judge, the right to take part in the people's assembly, and the right to be an archon, each of them is characterized as citizenship (Akkoç, 2014). It is seen that different roles in the city's political life were distributed to citizens in proportion to their wealth. While the poor thetes could only participate in the public assemblies, noble landowners or the rich in trade could become administrators. (Ağaoğulları, 2013).

In this regard, every application for construction that comes to the popular assembly consisting of theteses has to pass through the Senate. Therefore, both assemblies are responsible for a construction decision (Bingöl, 2004). Following the construction decision taken by voting in the Senate, decisions regarding the establishment of the building commission, how many and from whom the commission would be composed, the commission's working period, and the architect's selection were also decided in the people's assembly. (Honsell, 2010). Philon was appointed by the popular assembly to oversee the technical aspects of the construction of the Eleusinian Telesterion (Lattermann, 1908). In addition, the final acceptance of the completed building and the acquittal of its accounts were also possible with the approval of the popular assembly and the Senate.

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B. Building Committees

In the classical Greek Era, a building committee was established for every building to be constructed with the decision of the people's assembly. The members to be elected to the building committee were required to be over the age of 30 and not owe any debt to the state (Kahrstedt 1969). The names given to the building commissions differ depending on the region. In Athens, the building commission for the construction of the Parthenon was called Epistatai, in Miletus, the building commission for the construction of the temple of Didyma was called Erlogistai; and in Tegea the building commission was called Esdoteres (Bingöl, 2004). The number of members in the commission is determined by the people's assembly, depending on the size and type of building. In general, the commission consists of a chairman, a chief sage (a priest or priestess if it is a temple building), an "Epistat" who oversees the construction of the building in compliance with the contract and specifications, two "Tamiai" who organize all the financial affairs of the construction and make all payments associated with the construction, and a clerk who records the work and payments and prepares reports that are submitted to the people's assembly at the end of the work to be voted on and acquitted in the Senate. (Wittenburg, 1978). From the accounts of the building committee for the Parthenon (447/6 - 433/2 BCE), it is assumed that the commission consisted of 3-5 members, except

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for one clerk. While a new commission was elected every year until the 11th year of the Parthenon's construction, the same commission served for the last four years (Osthues, 2014). The chairman of the building commission is usually the chief administrative officer of the region. In Miletus, Stephanephoros, the city governor, was elected as the chairman of the commission established for the construction of the Didyma Temple of Apollo (Bingöl, 2004). The names of epistates are also found in some inscriptions. Melanopos was assigned as an epistat for the construction of the Eleusis Telesterion (Lattermann, 1908). Meanwhile, in the Classical Greek Era, the financing problem had to be solved for a building to be started, as is the case today. Several methods were used during this period to generate income to meet the construction costs, which were among the most important duties of the building commission. The most prominent of these was public financing, including undertaking a portion of the construction costs through foundations established by top administrators, tax revenue, and transferring unused budgets from some buildings. Further, revenue-generating solutions have been developed through the use of materials derived from the demolition of an old building, the sale of animal skins sacrificed for religious reasons, donations from the city government, and the use of public properties for revenue generation. The columns built by the Lydian king Croesus for the Temple of Artemis at Ephesos at his own expense in 560-550 BCE, and the naos of the Priene Athena temple, financed by Alexander the Great and engraved on the wall of the built section, are examples that show that rulers covered some of the construction costs as a reflection of their piety (Gaertringen, 1906). Furthermore, Antiochus, the eldest son of King Seleucus, had a stoa of one stadium length built in Miletus in the early 3rd century BCE , and the annual revenues from the rental of the stoa were used as the king's grant for the construction of the Temple of Apollo in Didyma. (Günther, 1971). Moreover, for the reconstruction of the Propylaia on the Athenian Acropolis, the sale of building materials and the skins of sacrificed animals from the demolition of the old propylon and the renting of a house (temple) of a god built in 435/6 BCE for 132 drachmas per month were used (Wittenburg, 1978). Another example of generating revenue for construction is the aid provided by city-states to maintain, improve or restore political relations between them. Lampsakos (Lapseki) and Kyzikos (Erdek), two of the most important city-states of Anatolia, allocated 70 and 46 gold Stater, respectively, for the construction of the Parthenon (Bingöl, 2004). As these examples indicate, in the Classical Greek Era, construction costs were not of a magnitude that could be borne only by the public or an individual. For this reason, the building commissions created the construction budget by providing income sources in various ways in order to meet the construction costs. After the building commissions established the construction budget, a construction specification was prepared in line with the decisions taken in the public assembly, and tenders were organized as an agreement platform with these contractors. The

constructions were tendered to the contractor offering the lowest price through dutch auction. (Thür, 1984). Sometimes the contractors were the building owners themselves, and they made the contract with the building commission. In Miletus, the employer of the Temple of Didyma, that is, the owner and builder of the temple is the city administration. The city administration undertook the construction of the temple itself by making a contract with the building commission established by the people's assembly. (Bingöl, 2004).Tegea Athena Alea Temple which was unearthed in Piali, Greece (today's Alea) in 1860, had a general list of specifications for its construction, which laid out the legal rules regarding the tender. The building, after being burnt down in 395/400 BCE, was rebuilt where Skopas of Paros also worked as an architect. The stone plate numbered IG II/III (2).I.1.6. which includes the text of the specifications prepared by the Building Commission set up in Tegea, is given in Figure 8.
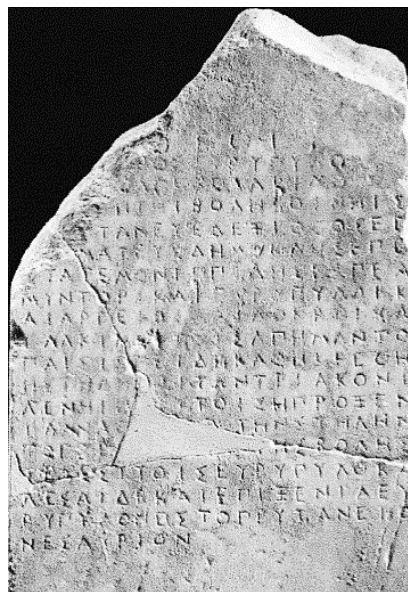
Figure 8. General Specification Prepared by the Building Commission for the Reconstruction of Tegea Athena Alea Temple (http ://aleshire.berkeley.edu),(2020).

The epigraphically analysed explanation of the specification text, which consists of six articles, is shown below (Thür, 1984: 475).

1 . The building commission shall be in charge of solving a problem that may arise between contractors. The complainant is obligated to report their complaint to the commission within three days after the incident and to ensure that a decision is taken.

2. In a state of war, if the construction process has stopped or the completed structural elements have been destroyed, the decision of the Boule on this issue shall be binding. This council shall make the necessary investigation and take the decision. If the situation is determined to be true, the necessary compensation shall be made from the loot. In cases where an outbreak of war occurs before the construction process begins, the building commission shall annul the contract, and the contractor shall return the prepayment that was received. Should any person prevents the tender to be awarded, or vitiate the tender, he shall be punished.

3. Not more than two contractors shall participate in any tender, and one contractor shall not participate in more than two tenders simultaneously without the consent given by the "haliast" unanimously (the name given to the People's Assembly in the Doris region). Otherwise, for each extra work undertaken, the contractor shall be obligated to pay a fine of 50 Drachmas each month until the end of the work.

4. Should the contractor damage religious, social, or private structures in defiance of the agreed-upon contract, he shall be obligated to repair the inflicted damage at his own expense and within the working period determined in the contract.

5. Legal action shall be initiated in cases of indiscipline, riposte to the discourse of construction supervisors, or non-execution or non-payment of penalties.

6. These provisions shall be valid and binding for all labor after the award of the tender.

Another task of the building commissions in the classical Greek period was to issue a certificate of acquittal after the construction was completed. Similar to today's certificates of completion, acquittal certificates consisted of a report recorded by the scribe members of the building committee during construction, in which the breakdown of the work done, the work groups, the money paid to the contractors, and the cost of the workgroups, and the names of the guarantors of each work group were written item by item. The primary purpose of preparing these account reports, defined as a certificate of acquittal written on stone and on which no corrections are allowed, is to determine whether the resources provided for construction were used correctly and to prevent embezzlement (Wittenburg 1978). These documents, prepared by the building commissions, are approved by the Senate, and the people's assembly and the construction are acquitted (Bingöl, 2004). The account documents of the Parthenon in Athens first indicate the source of the money and its intended use. First, the amount remaining from the previous commission, namely from the previous year, was recorded in the document. Especially from the second year (446/5 BCE) until the 14th year (434/3 BCE) for 15 years, at the top of each account list, it is recorded that 70 gold Stater from Lampsakos (Lapseki) and 271/6 gold Stater from Kyzikos (Erdek, Belkıs) were continuously transferred and not spent. The amount of money remaining in hand is written at the end of the record. The document also includes expenditures on purchased materials and wage earners. Expenditures on purchased materials and wage earners are also included in the document. There are records of payments in general, but payments to workers in Pentelikon marble quarries, including transportation of blocks from Pentelikon and their processing, are expressly mentioned (Budford , 1969). In this context, the findings obtained in the research were evaluated and the construction management and organization chart, together with the titles of the members of the building commission, who took part in the building production processes in the Classical Greek period (Figure 9).

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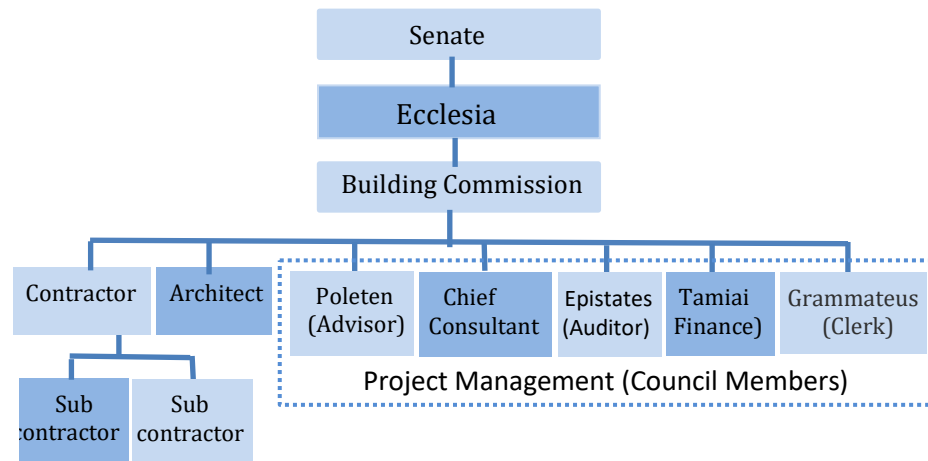
Figure 9. Organizational Chart of Construction Process in Classical Greece

C. Architects

Greek philosopher Plato, who wrote that the architects who were not involved in the building commissions but worked in the construction and management organization, also stated that the architect was in a leadership position in the construction site and was also responsible for coordinating the contractors (Sekler, 1959). Bundgaard (1957); stated that there were no detailed plans and general models prepared for the structures constructed in the Classical Greek period, only the stone inscriptions that explained what should be done until the final stage of the construction. It is clear that in such a work style, the fact that the architect explained what had to be done within the framework of the traditional plans to the subcontractors in writing, and rarely by using plans and models, shows that the architects played an active role especially in the construction phase Plato also emphasized that a Greek architect must be trained by practicing with an experienced expert (Sekler, 1959). This shows that in the Classical Greek period, the duty of an architect was not only to design a new temple or to construct a new structure, but also to carry out the construction of a building that was decided to be built under different ground conditions. Therefore, the architect had to have sufficient knowledge about buildings and conventional plan types, and in the construction process, carry out all organizations in the construction site (Ricken, 1977). As it can be understood from here, it is seen that the architects independently managed and supervised the construction technically.

FINDINGS AND COMPARISON

The findings of the evaluations made on building production processes, stages and management, which have been obtained based on the analysis of the stone inscriptions of the Classical Greek period and the literature review, are given below with their general characteristics:

• In the Classical Greek period, financial, administrative and technical organizations, which were designed according to the laws prepared regarding public productions, led to the formation of a production-management system and organization that shaped functions and duties.

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- Building production processes consist of multiple phases that follow each other but are not separated by definite boundaries, which started with the establishment of the Building Commissions by the People's Assembly after the approval of the construction decision in the Senate.
- There were also specific administrative and technical organizations formed by certain institutions and people who were involved in the building production processes. The construction management and organization chart were shaped accordingly.
- In the reviewed period construction expenses were too high to be covered by the public or an individual alone. In the financing of the construction, besides the use of public resources, solutions were produced such as contributions made by the high-ranking officials through their foundations, or citizens' undertaking a part of the construction costs.
- The construction works were awarded to the contractors who made the lowest bid, in accordance with the technical specifications prepared before the construction. Down-payment was given to the contractors who won the tender and guarantees such as guarantor collaterals were received from the contractors in return. Advance payments made to the contractors aimed at securing the builder, while the guarantors' collaterals aimed at securing the construction.
- After the construction was completed in the period under review, Release documents" were drawn up as a report showing the total cost of the construction together with expenditure items. After these documents were approved by the highest institutions of the state, the phase of use in construction started.
- During that time, there were laws explaining the rules to be followed regarding the construction. These were Building Control Law and Construction Regulation Law.

Table 2 shows the findings based on the stone inscriptions relating to the stages followed in the building production processes in the classical Greek period, the institutions and people involved in the stages.

Table 2. Building production process stages and management table specific to the period examined

Stages	Institutions	Actors	Regulations	Project Management and Construction Method	Collaterals and Guaranties	Architectural Organization
Construction Decision Approval Design Cost calculation Tender Construction Acquittance document General acceptance	Senate Ecclesia Building Commission	Chairman Chief consultant Financier Auditor Clerk Architect Contractor	Building Control Law	Building Commission Tender Contractor)	Guarantor	Freelance architects

The purpose of construction management in ancient times, as it is today, was to effectively manage the production processes in a

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construction project and build and deliver the targeted structure. Construction management strategy was the coordinated set of decisions that drove a construction project organization. Construction teams in a construction project consisted of employers, designers, managers, builders and auditors (Akbıyıklı & Dikmen, 2019). In addition, project structure organizations were usually "coalitions" formed as "ad hoc multi-organizations" (Hobday, 1998). When the production was completed, the organization disbanded. In the period under review, the construction team consisted of employers (public assembly and senate on behalf of the public), designers (architects), managers (building commissions) and auditors (architects and Epistats). Although the strategic decisions regarding the construction were taken by the public assembly and the senate, the main actors of planning and production management in the construction processes were the Building Commissions. For each new construction project, new building commissions consisting of different members were established depending on the type of building, and these temporary organizations were dissolved after the construction was completed and delivered. This situation shows an analogical overlap with the current project-based construction management organization scheme. The project-based construction management organization chart, specific to the Classical Greek period, created by adaptation from PMOBK (2009) is shown in Figure 10.
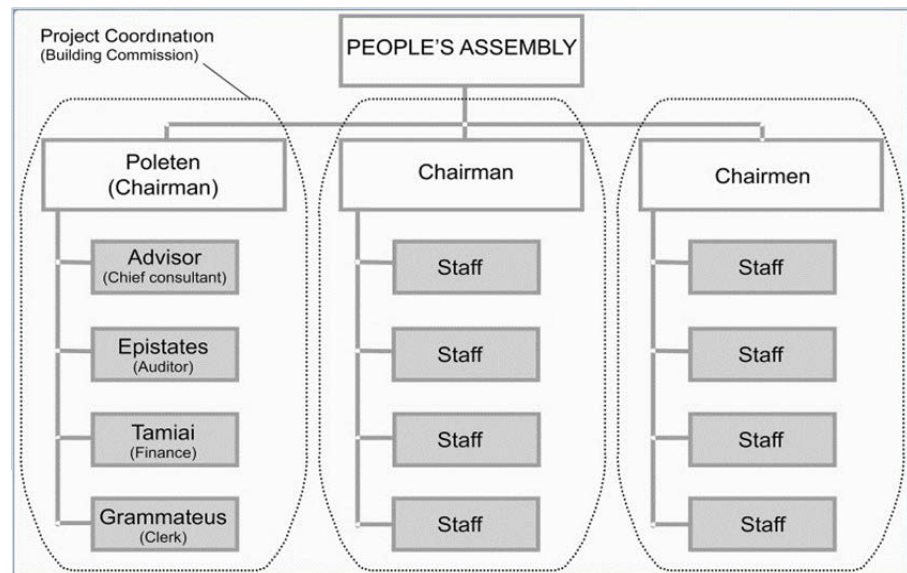
Figure 10. Classical Greek Period Project Based Production Management Organization Chart

On the other hand, according to the "transformation view" that emerged as the dominant approach in the 20th century, production has been conceptualized as the transformation of inputs into outputs. Here, production envisages the division of total transformation into smaller transformations, jobs and minimization of each job independently (Koskela, 1999). In the period under review, the productions were similarly divided into small business groups, each work group was

independently awarded to different producers and many production contracts were signed. However, the fact that the construction was divided into work groups and built in small parts in the period under study was due to the lack of a general contractor to construct a building completely, rather than the cost minimization purposes. The managerial and performance problems that would surely arise especially during the construction process due to the multi-part structure of the construction projects specific to the periods examined, were sought to be eliminated by effective audits as well as administrative sanctions and financial penalties imposed on construction contracts. Also, every construction project had a life cycle. Turner (2006) emphasizes the natural existence of five steps in the life cycle of projects (stages): Concept, Feasibility, Design, Application and Closure (Turner, 2006). In the project life cycle stages presented by Turner (2006), It seems that the first three steps cover the pre-production process; the fourth step includes the implementation process, and the fifth step covers the post-production process. These steps are also valid for the project life cycle stages specific to the period examined. The general diagram created by adaptation to PMOBK (2009) and which shows the project management processes corresponding to the current project life cycle steps and the levels of those involved in cost and project management in the Classical Greek period is shown in Figure 11.

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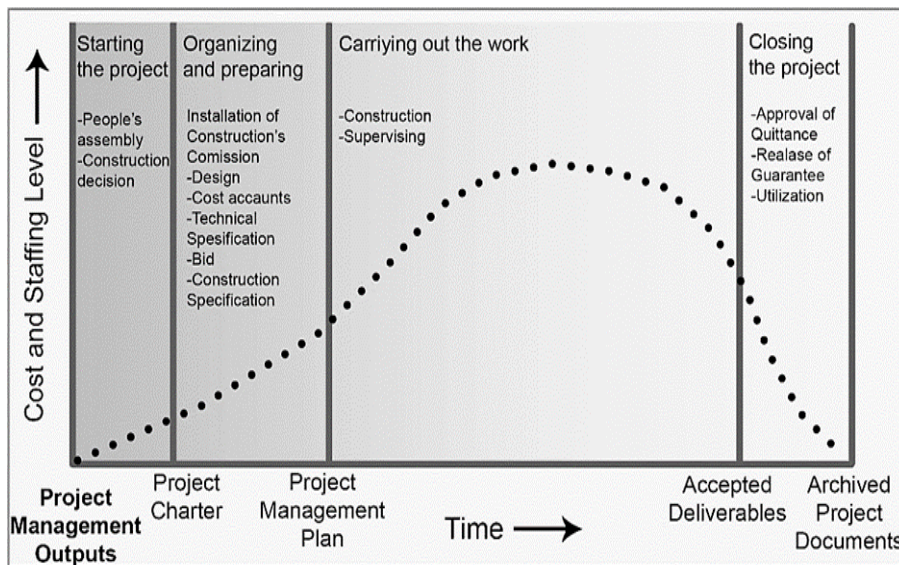
Figure 11. General Diagram showing the construction processes and the level of those involved in cost and project management in the period reviewed Organization Chart

The Project Management Knowledge Guide (PMI Guide, 2017) prepared by the Project Management Institute also models and defines the project management processes and activities that should be used in the execution of a project. PMBOK approach is based on three theories; planning and organization (pre-construction process), execution and control (construction process), completion and termination of the project (post-construction process). In this approach, the project life cycle management shows an analogical overlap with the period examined as

seen in Figure 8. Project life cycle stages managed in the Classical Greek period were compared with project life cycle steps created by Turner (2006) and European Commission (2012) Etogether with project life cycle steps mentioned case analysis table in the "Construction Methods and Management" work by Nunnally (2001), (Table 3).

Table 3. Comparison of life cycle stages and operations performed in construction projects

Nunnally Project Life Cycle Stages	European Commission Project Life Cycle Stages	Turner Project Life Cycle Stages	Classical Greek Period Project Life Cycle Stages
Construction idea Concept and feasibility works	Construction idea Conceptual analysis Economic and technical feasibility Construction approval	Construction Idea Concept Feasibility	Construction idea Construction decision Construction approval
Engineering and Design	Design and engineering Works Cost Calculations	Design	Design Cost calculations
Supply	Technical and Administrative Specification Payment terms Tender	Supply	Technical and administrative specification Payment terms Tender
Construction	Production (audit)	Application Monitoring performance (audit)	Production (audit)
Implementation (trial)	Provisional acceptance	Implementation (Trial)	**Provisional acceptance**
Operation Usage	*Final acceptance Usage*	*Final acceptance Usage*	*Final acceptance/* Certificate of release Usage

As can be seen in Table 3, the phases and activities managed in building production processes in the period under study coincide with the modern project life cycle steps, which are put forward under different opinions, in terms of their basic characteristics. The steps and activities that make up today's "Project Life Cycle Management" system, such as determining the project idea (building idea, analysis, approval), planning and scheduling the project (specifications, financing, duration, tender), implementing and supervising the project, and completing the project, are found to be applied during the period. As can be understood from the research, in the classical Greek period, as in today, effective supervision-based construction management and organization techniques based on post-production accountability were used in the construction processes. Thus the organizational, financial, and legal systems developed for the construction processes as well as the approach of civilizations towards a building or a building group reveal the construction management schemes of their periods.

CONCLUSION

It would be appropriate to emphasize the following fact that emerged as a result of the research and observations on the production processes and management of public construction projects in the Classical Greek Era, which established civilization in Europe and Anatolia and played an essential role in the development of building art. In the construction

processes of the period under study, as well as in the Roman and later periods, the financial, administrative, and technical organizations that were defined in relation to construction led to the formation of a construction-management system and organization in terms of its functioning and duties. In ancient times as well as today, the basis of quality building production was formed by construction processes carried out in regular and disciplined phases and construction management practices in which effective control was ensured at each stage.

The construction and management of public buildings were carried out by writing texts on stone slabs during the Classical Greek Era. In addition to the information obtained from the literature, historical data consisting of stone inscription examples presented in the article on the subject of the study contributed to the understanding of the construction practices of the time. Table 4 presents examples of which data are derived from which stone inscription, their epigraphic sources, and their catalog numbers.

Table 4. Examples showing which data is taken from which stone inscription

Explanations	Stone Slab Number	Name of Structure	Epigraphic Explanation Sources
Ecclesia construction decision	IG I.3.35 IG II/III(2)1.6 IG IV2.1.102	Nike Tempel Athena Alea Tempel Epidaurus Asklepios Tempel	www2.huberlin.de/winckelmann Thür, 1984 Budford, 1969
Establishment of the building commission	IG I.3.35 IG II/III(2)1.6 IG IV2.1.102 IG II 167 - -	Nike Tempel Athena Alea Tempel Epidaurus Asklepios Tempel Eleusis Telesterion Parthenon Tempel -	www2.huberlin.de/winckelmann Budford, 1969 Budford, 1969 Lattermann, 1908 Ousthues, 2014 Dörpfeld, 1882
Architect selection	IG I.3.35 IG IV2.1.102 IG II/III(2)1.6 IG II 167 -	Nike Tempel Epidaurus Asklepios Tempel Athena Alea Tempel Eleusis Telesterion Parthenon Tempel	www2.huberlin.de/winckelmann Pfarr, 1985 Thür, 1984 Lattermann, 1908 Pfarr, 1985
Tender data	IG II/III(2)1.6 IG II 167 -	Athena Alea Tempel Eleusis Telesterion -	Thür, 1984 Lattermann, 1908 Dörpfeld, 1882
General and technical specifications	IGII/III(2)1.6 IG II 167 -	Athena Alea Tempel Eleusis Telesterion -	Budford, 1969 Lattermann, 1908 Dörpfeld, 1882
Acquittal Documents	IG IV2.1.102 -	Epidaurus Asklepios Tempel Parthenon Tempel	Budford, 1969 Budford, 1969

As shown in Table 4, construction decisions were made by the popular assembly during the Classical Greek Era. Based on the construction decision taken, building commissions were established in hierarchical order with the decisions of the popular assembly in order to ensure the architectural, technical, financial, and administrative execution and supervision of the building to be built, and the construction management

and organization scheme was shaped accordingly. Although their names vary depending on the region, such as "Epistatai," "Erlogistai," and "Esdoteres," building commissions are the primary actors in the planning, organization, and management of construction production processes. As "project management," building commissions played an active role in all production processes until the construction was completed and put into use, such as the creation of the construction budget, preparation of technical and administrative specifications, bidding, signing contracts, making payments, supervising the construction, and preparing accreditation documents. Building commissions, which were established as project-based organizations, as is still the case today, are "temporary multi-organizations," a "coalition" consisting of several members: the chairman (Poleten), the chief sage (consultant), the auditor (Epistat), the organizer of financial affairs (Tamiai) and the clerk (Grammateus). Once the construction is completed, this multiple organization disintegrates.

As is the case today, it is observed that the state was the major employer in public construction in the period under study. Since the state bears public responsibility, it has also determined building production and management principles. In both periods, there was a civil servant logic order dominated by the state and formed by appointments. For this reason, the principles of construction management and organization used in the building production process were determined through the implementation and supervision of institutions established by the state. Additionally, it has been observed that three basic processes across both periods shaped building production processes: pre-construction processes started with the decision to build, during which planning, programming, design, economic and technical feasibility studies were conducted; construction processes, and post-construction processes, during which final acceptances were made. In both periods, the constructions were tendered to the contractor offering the lowest price in accordance with the general and technical specifications prepared in the pre-construction process, and then the construction process started. Currently, the construction of public buildings is managed and supervised by the technical staff of architects and engineers within state-owned institutions or by independent auditing firms based on plans and details prepared in advance. In the period under scrutiny, architects appointed by the decision of the people's assembly, although not taking part in the building commissions, explained to the contractors what should be done within the framework of traditional plan types in writing, but very rarely using plans and models, indicating that they took part in the construction process, especially at the construction site stage, and managed the construction in terms of technical aspects. Epistates serving on building commissions, on the other hand, are recognized to have supervised the administrative and technical aspects of construction. After the construction was completed, completion certificates were prepared, and in the Classical Greek Era, acquittal certificates were prepared, and after the acceptance of these documents by the public authorities, the

building was put into use. The construction processes taken as a basis for both periods overlap with the project lifecycle phases identified by the European Commission.

On the other hand, based on the information obtained from the stone inscription texts and comparisons, the main point that is tried to be explained here is to emphasize the universality of the theory of construction and management as the roots of today's building production strategies and managerial theories date back to ancient times. Despite the scientific development of construction and management occurring over the last few centuries and continuing to use modern techniques today, construction and management has developed throughout the ages and achieved their current values with accepted methodologies as a universal and multidisciplinary field. The study shows that the construction and management techniques and managerial strategies such as planning, design, tender, commitment and supervision, which are relevant in the construction of today's public buildings, were also used in the Classical Greek period (6 - 4 th BCE). Based on the research findings, it shows that today's conditions and the conditions of the Ancient Greek period are compatible with the basic principles.

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RESUME

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Transfer of Social Uses, Meanings and Values through Landscape Design; Case of Karagöz Square

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Abstract

In this study, how landscape architecture students associate the traces of the past of a given site with their conceptual approaches and spatial components in the design process is discussed. Karagöz Square, located in the city center of Trabzon, has undergone dramatic and mostly negative changes from the past to the present in functional, visual and semantic terms. the area which is under urban transformation process in order to revitalize, to make it a part of urban life and in this context to regain its old functions has been given to students as the subject of design within the scope of Environmental Design Project IV course. Within the scope of this paper, how students investigated the past of design area and physical and social dimensions of collective memory, how they reflected on their conceptual approaches and main design decisions, and then through which spatial components and usage types these decisions were reflected on projects are determined and explained. In a design group of 9 students, 5 designs, conceptual approaches of which were based on the history of the city and the design area and traces left in collective memory were discussed in detail. As a result of the content analysis of the presentations and reports of the students it was determined that some students were inspired by the past functional (such as socialization) and semantic dimensions of the area (such as entertainment and play) or the physical components of the area (such as olive trees, amusement park-entertainment equipment). The other students were inspired by the historical features of the city of Trabzon (the empires of the past) or the traces of cultural features in the society such as Trabzonspor and determined their design approaches based on these. In line with these, spatial components and usage types-activities in the final products are detailed in this study. How collective memory can be a tool for determining conceptual approaches in landscape design is also discussed.

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INTRODUCTION

No such urban landscape exists without bearing the traces of any social class." (Halbwachs, 2018)

The objective of the urban landscape designs is to create a preferred landscape with the ability to remain lively and vivid within the day and throughout the year, fulfill its functions successfully and tally with the collective identity and the memory of the society it belongs. Urban outdoor landscapes, which can be defined as the infrastructure, stage, actor, trigger, influencer of and affected by the daily life of the society (Gehl, 2010; Carr et al., 1992; Mehta, 2014) are required to be the sites for meeting, reconciliation and amalgamation of the individuals, incidents, values and feelings. Therefore, it is aimed to propound an urban landscape which is to be adopted and used by the society it belongs. In this direction, approaches focusing on the user and society, considering the spatial behavioral factors, that is, defining concepts that are the product of human-space interaction (such as sense of place and identity, belonging, etc.) often make an appearance. Attributing a meaning associated with the society to the landscape, establishing a landscape reflecting the societal identity and creating a sense of place for the users, presenting its own values and meanings to the society through landscape are the expansions of these approaches. Urban areas contain the memories of the urbanites as well as physical and social characteristics thereof. The collective memory where these memories are shared with other urbanites; "can affect some key theme areas of social sustainability such as social networks, health, identity of community, civic pride, neighborhood perceptions, and community participation (Jahanbakhsh et al., 2015)." For this reason, in this study, conceptual approaches based on memory and past are particularly emphasized in the designs of the urban landscape.

Even though the world has been constantly evolving, ties with the past are associated with the people knowing their roots and connected to one place and other people. Lowenthal (1975) acknowledges this as one of the most basic needs. "Without the past as tangible or remembered evidence we could not function (Lowenthal, 1975)." Therefore, according to Lowenthal (1975), the ongoing status of the past to the present is a general source of comfort. Hoelscher and Alderman (2004), referring to the relationship between the changes and the past, stated that "ours is an age of both rapid social transformation and a search for roots, of time-space compression as well as people looking for a past seemingly removed from the unrelenting social–political–economic forces that have come to be called globalization." Halbwachs (2018) stated that although everything is constantly evolving, the society has to convince its members that it has not changed at least for a certain period of time and to the extent of certain points. "The built environment is just one of the factors for communities to feel rooted in a location and to construct a local identity with values and meanings attached to place, and social capital

may be even more important, but urban design which is respectful toward the past can help. (Van Dijk & Weitkamp, 2018)." For this reason, concepts such as the past, memory, cultural heritage, and conservation frequently come to the fore in the urban outdoor landscape designs and research thereof.

The collective memory creates a sense of mutual past within the society by means of the objects and places remained from the past and has an influence on the attachment to the urban environments (Jahanbakhsh et al., 2015). Dwyer, (2004) asserts that "there can, in effect, be no memory-less places since the process of producing a place requires that a portion of space must be imbued with meaning. Likewise, a primary condition of enduring collective memories is the linkage of meaning with place". A consequence of the supporting of the landscape and the memory concurrently is that the entire landscapes are sort of remembrance-commemoration area — they must have loaded with a memory to occupy a place in the mind (Dwyer, 2004).

"Landscapes of memory" appearing at the intersection of space and memory are defined as a social phenomenon and include daily life activities and association thereof with collective memory (Maus, 2015). According to Maus (2015) landscape and memory concepts require a holistic approach. Discourse plays a substantial concept in comprehension of the association and correlation between the components constituting the landscape and the memory. Discourse expresses an abstract view in society, which can be written or verbal, and it is reported that discourses lead to the collective decisions of the society, and this results to a "tangible landscape element" (Schein, 1997).

Schein (1997) states that the cultural landscape has transformed into a tangible example of a materialized discourse with the formation of the process of discourse. Discourses integrated with the cultural landscape introduce insight through a particular region, inhabiting people, social interactions and the culture accordingly. On the basis of the tangible landscape elements of the past, defining the past discourses appears as a method for researching the relationship of the memory-space. For instance, Sympson (2016) defined discourses such as "the value of familial ties ", "nostalgia and the value of the past" and " being prideful in one's hometown", based on the ruins of the past amusement park landscapes and the memories of the people visiting.

These entire discourses, in the context of the landscape design, hold the potential to be a design concept. In this case, for the purpose of establishing a connection between society/individual and the space in an urban landscape design, the questions come to mind such as which discourses the designers are required to choose from the social memory, which concepts they transform in their designs, with which landscape components they materialized and what kind of an impact they endeavor to create on the society with that. Herein, how the cultural, functional, physical and semantic components of the past have been defined and transformed into a design concept through an urban square designed by

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the landscape architecture students will be discussed. The process of reflecting this concept to the spatial components and elements and the activities supported by them through landscape design shall be explained in detail, and the memory functions indicated by them shall be addressed accordingly. The project process and the outcomes thereof within the scope of the course Environmental Design Project IV of the students of the Department of Landscape Architecture of the Karadeniz Technical University shall be examined. Karagöz Square, which is the design area located in the city center of Trabzon, has experienced dramatic and adverse changes in functional, visual and semantic terms from past to present. The area, which was considered as an urban transformation process for the purpose of restoration, becoming a part of the city life again and restoring its former functions in this context, has been evaluated as a study subject by the students. In a design group consisted of 9 students, 5 design projects, of which conceptual approaches were based on the history of the city and the area and the traces remained in memory have been addressed and discussed accordingly.

From Landscape to Memory-From Memory to the Landscape

The landscape and the human memory are in an interaction and interrelation- memories retain the landscape from changing to greater extents, while the landscape maintains a certain type of recall (Unt, 2008). Landscape is both a material entity and a symbolic meaning, it is both formally permanent and can undergo changes semantically. In this context, it is expressed that a memory landscape is required to be defined not only as a background where the activities take place, but as a scene actively constructs the performance (Maus, 2015). In another approach, it is further expressed that the objects secure the time, in this context, the landscape consisting of objects embodies memory and secures the social and individual past to the space (della Dora, 2009). Halbwachs (2018) stated that in the event that the material environment surrounding people is not preserved, impressions would chase each other and that for the revival of any category of memories, space is required to be the thing people should be focused on (Halbwachs, 2018). "... Thanks to its constancy feature, it is only the image of space that offers us the illusion of not changing over time and finding the past in the present." (Halbwachs, 2018). Pierre Nora's concept of "sites of memory" (cited from Hoelscher and Alderman, 2004) compels the attention to the various spatial components of the memory. According to Nora, memory is attached to concrete and physical spaces, as well as the intangible sites (the celebrations, ceremonies, rituals that remind the past). Therefore, sites of memory encompass, geographical locations, monuments and buildings, historical figures, social performances and commemoration ceremonies (Hoelscher & Alderman, 2004). In other words, the fundamental relationship between memory and space is observed most clearly in the field of material culture, which is the landscape, while at the same time, practices such as rituals, festivals, performance parades, social

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dramas and civil ceremonies involving bodily activities and daily activities are the acts of remembrance practiced by the societies (Hoelscher and Alderman, 2004). Maus (2015) further advocates a similar approach and states that landscapes of memory contain numerous commemorative performances and corresponding monumental arrangements, namely, it emphasizes the physical space and performances within it (Maus, 2015). Mitchell (2003) further defines the two basic components of memory landscapes through monumental areas as follows: monumental spaces always contains the interplay of the "fixed" (1) components such as monuments, stages, structures, flags or lights and "mobile" (2) components such as remembering, ritual and gatherings. In this study, this approach has been adopted to understand the intersection of memory and space in the design of the students, and the spatial components proposed in designs, namely the physical space, and the types of activities these will support, such as the performances, are addressed accordingly.

Collective Memory-Space Intersection; Functions and Contributions to the Social Life

Another aspect required to be considered in the designs is for which purpose the physical and activity components of the past are included within the design. Revealing the answer to this question requires a better understanding of the functions undertaken by the collective memory in urban outdoor landscapes and the axes of the social life. Thus, it is aimed to discuss the reflections with the societal aspect of the design decisions students make in the spatial aspect.

Contributing to social sustainability: Collective memory contributes to social sustainability by forming the social perceptions of time or a past which is shared. It further supports the creation of personal identity and space identity. This reveals the identity of the society, and this identity gives rise to the pride of being the urbanite, which is one of the substantial concepts of social sustainability (Jahanbakhsh et al., 2015). It can also be used as a teaching tool of collective memory in the context of social sustainability. According to Wang (2008), the senior member of a community can use the shared past to socialize young people, and thus the moral and intellectual continuity and social cohesion of the society are ensured accordingly.

Belonging to a group-society:

Collective memory refers to the reservoir of memories based on the collective identity of a society by members of the society (Hirst & Manier, 2008). It is regarded and considered by most of the thinkers as belonging to the community, creating a consensus on the common memories and experiences of the group, as a feature of collective memory. In a sense, it is underlined in sharing the common past, accepting to be a member of the community and internalizing the culture, identity, traditions and beliefs of that particular community (Doğu & Varkal Deligöz, 2017). Similarly, Harris et al. (2008) state that the main function of collective

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memory is to serve the requirements such as group identity, group cohesion, and the creation and maintenance of a sense of group continuity. This function of the collective memory is closely associated with the social sustainability. Therefore, making a complete distinction between these two functions is not feasible. Wang (2008) further expressed that collective memory maintains its identity and makes the continuity of cultural cohesion and social life possible by going through its association and correlation with the identity. The collective memory is a binder in establishing the relationship between the space and the identity. In case the space consists of physical location, activity, and meaning, collective memory creates a clear sense of past by binding the memories with places and strengthens the sense of meaning and place associated with the place by revealing meanings and identities (Jahanbakhsh et al., 2015).

Serving as a bridge in the association among the human, space and time: In the modern times, in where the face-to-face interactions are increasingly replaced by remote communication such as e-mail and social media, memory is regarded as an increasingly substantial social bond in establishing the interpersonal bonds. On the other hand, in rapidly evolving and changing modern societies, sometimes past and present times differ so much that past experiences do not have any value or knowledge, and as a consequence, memory functions may eventually disappear (Wang, 2008). In fact, this condition increases the significance of rendering the spaces related to memory, because urban spaces, which turn into place through memory, maintain the memory constantly alive in the daily life they are engaged despite the rapid changes and prevent these disconnections from occurring.

Coalescing different perspectives, improving social understanding, healing societal griefs:

Looking through the past reflected in the landscape design towards the different point of views and understanding it can create a sense of caring for each other in the city, thus this may render feasible to imagine a more egalitarian future. Despite the fact that the social groups sometimes have radically different understandings of their space, landscape and their past, the respectful-sensitive establishment of the spaces they encounter can encourage a sense of responsibility for justice towards the others (sometimes even no longer alive) (Till & Kuusisto-Arponen, 2015). Moreover, it is stated that the constructive and transcendent structure of collective memory provides the society and the individuals with the opportunity to establish an understanding of the past, transform and heal the pain experienced by individuals. (Wang, 2008).

Creating an archive of the past and serving as a learning tool: Landscape as an area of application of stratified social and material meaning is both a material work and a concretized discourse. It functions as a snapshot and evidence of social and cultural practices of the past, the present and the future (Hannum & Rhodes II, 2018). Meining (1979), with

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a similar explanation, defines landscape as an accumulation. Landscape is a rich source of data about the people and societies involved in the creation of it. Moreover, landscape is an exhibition of consequences (Meinig, 1979). It is further stated that the memory traces remained in the landscape indicate the political, cultural and economic forces effective in seeing and reflecting the society at their respective times (Mitchell, 2003). Through the influence of these entire forces, the landscape as a combination of man-made materials creates a palimpsest-like cultural record in time and space, and these records can be reviewed as symbolic signifiers of meanings (Osborne, 2001).

In the context of this study, the functions indicated by students through design concepts and approaches shall also be emphasized accordingly. For the purpose further understanding the design decisions and products of the students, first of all, the field of study and then the project process of the students were explained. Afterwards, the past and memory-based projects were analyzed accordingly.

MATERIAL AND METHOD
Design area; Karagöz Square of Trabzon

Karagöz Square of Trabzon was defined in the 1950s as the square, the place hosting the entire entertainment activities and where children played ball outside of the religious holidays and festivals. Information received indicates that the place, which is defined as the biggest square in the city, slightly slopped, is surrounded by residences, educational institutions and buildings and the street. It is reflected as a playground where there are various shows hosting a carousel and a swing carousel are mounted during the holidays, apart from that where football is played, and also Karagöz shows (Turkish traditional shadow theatre-the square is named after it) are held on religious holidays (Bal, 2011). Zeytinlik (Turkish version of olive grove) Neighborhood, on which the area expands in the south direction, was a neighborhood covered with the olive trees in the past. Today, Cudibey Secondary School and teacherage are located in the wider parts of the project area. The decision for the urban transformation of the area as Karagöz Square when the construction of these education buildings was completed in another part of the city, has been rendered in 2016 (Figure 1). Many Ottoman-period historical buildings are available enclosing or neighboring the field of study. It is also adjacent to the liveliest as well as old pedestrian shopping street of the city, such as Uzun Street from the North. Another crowded shopping street passes through the south of the area. Its central location has been a feature that increased the conflicts of income. Recently constructed high-rise buildings create a distorted view in the silhouette of the area.

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Figure 1. Location of the area within the city center

The students with their analysis study, have determined that the old historical identity feature was disappearing, and the area's circulation and visual attributes contain confusion; they further stated that, with its natural and historical features, the area has the capacity to attract users to the area (Figure 2).

Figure 2. The design group's analysis-synthesis presentation

Method: Design Process

The Environmental Design Project (EDP) IV course is taught in the 3rd Grade / 5th semester. Previous to EDP IV the students practice topography design in EDP I and residential landscape designs in EDP II and EDP III as prerequisite courses. In the course EDP IV, expansion of the scope by directing the subject towards the urban public spaces and increasing the diversity and capacity in the users come to the fore. Thus, the students are expected to be able to define a more complex design problem in the context of diversifying user needs and the characteristics of an urban public space, define a design concept and approach, and present these with a activity program and scenario.

Students are expected to perform survey, analysis and synthesis studies, along with the design area and the study topic. During the survey and analysis phases, analyzes such as immediate environment analysis, visual analysis, use analysis, and the ecological analysis are performed accordingly. Since the centrally located design area was functioned as an intensely used square in the history of the city, the group emphasized the importance of the archive work and scanning various sources accordingly. The students tried to reveal findings in the documentation such as the uses and physical features of the area, how the users were described it in the memories, as well as the spatial components and elements found in the field, and visual features. While the survey and analysis reveal the collected data and findings, the general situation of the area (problems, opportunities, risks, possibilities and impossibilities) is defined by synthesizing the entire analyzes and the synthesis concurrently (Week 1 and 2). Elements of the past of the design area (such as physical features, types of use, functions, meanings-values) have been addressed at this stage in terms of their reflection on the design concept along with the other elements. Subsequently, each student was requested to define a design problem with his/her own approach in the context of the general state of the site, develop a solution strategy, accordingly, deliver the main design decisions, and accordingly transform the design concept into scenario and use of space (Week 3 and 4) (Table-1).

Inspiration by past of the site or another source is entirely at the student's disposal, the lecturer criticized the chosen subject for providing a productive field of study in terms of landscape design. As a result of the individual layout presentations of the students, 5 students from a group of 9 chose a concept based on the past. The inspiration of the majority of the group from the past indicates the emphasize attached to the subject and the ability of the student to associate the landscape design with this topic. Later, students are requested to organize a design scenario under the subheadings of "who shall perform which activities, when and where, and depending on which spatial features" and to identify them as patches on the map of the site through a land use presentation (Table 1). While the students had discussed an abstract design concept until this stage,

they started to define the features based on physical space and use in a solid manner. This means that students have delivered their decisions regarding the physical components, types of activities or meanings/values and the symbols thereof they deem appropriate to draw out from the past and reflect on their projects. Subsequently, stages such as sketching, preparing options and selecting from these, revealing the preliminary project and determining the spatial components and elements of the project, deciding elevations, revealing the technical details, planting design (Weeks 5-15) are performed accordingly. Thus, within the scope of EDP IV course, each student presents his/her own unique product. For the purpose of illustrating this process, different stages of works of the student are presented in table 1. However, the phases mentioned herein are presented for the purpose of summarizing and illustrating the main stages of the process, and these phases can be expanded or narrowed through the different approaches.

Table 1. Basic stages of the design processes of the students' projects
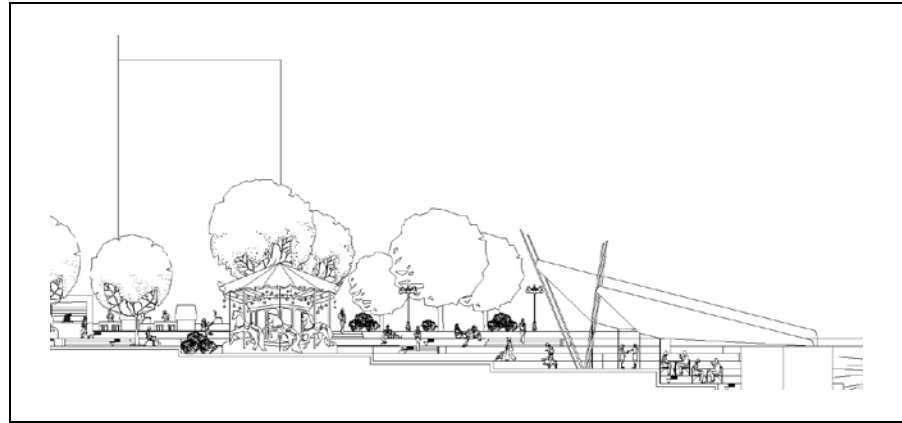
Student projects have been analyzed in the context of the concepts and the spatial components and activities included depending on the past. The presentations of design concept and area use, reports and visuals of the application projects submitted by the students by the end of the term, as well as the observations and experiences of the instructor within the process have been utilized and benefited. Content analysis technique has been applied in the products of the students. Content analysis is a technique that involves systematically defining the content and forms of written or oral materials (Sommer & Sommer, 2002). Researchers have adopted a qualitative approach, thus aiming to emphasize the meaning in the content and reveal the descriptive or distinctive characteristics. The various explanations presented by the students in the prentations and reports as problem definition and design strategy have been grouped and based on these, spatial components and activity types have been identified. Subsequently, spaces-components designating a past use, spatial component or value have been colored on the plans and these were brought together by means of a table (Table 2-6). In addition, the memory components (physical, functional, cultural or semantic) emphasized by the students have also been discussed in terms of the functions they have undertaken.

FINDINGS

Discourses Transformed into the Design Concept by Means of the Collective Memory and the Functions Undertaken by the Memory

Analyzes performed on the collective memory have provided the opportunity to define the discourses (such as entertainment, playground, olive grove, Karagöz-Hacivat, festival enthusiasm) in where the uses-functions, semantic, cultural and physical components of the area in the past have been transformed into memory. These discourses inspired the students to define the design concept and scenario. The photographs in limited number (such as carousel, swing carousel) about the past uses of the area have been effective in creating the scenarios of certain students. Some students set out from historical buildings and ruins belonging to Greeks and Ottomans, which they revealed in the design area and in the city. Moreover, documented works on the history of the city and the area

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have also been effective in this regard. This situation reveals the significance of maintaining the data sources rich while performing the field analysis of the students.

The discourses of the 5 students initiated the design process with inspiration from the past in their projects or the discourses they identified about the concepts or collective memory include the "Social Heritage", "Reflect Your Identity-Passion of the City", "Journey Among Empires", "Living Square" and "Olive Tree" (Table 2-6.). Upon the content analysis of those, it has been revealed that the students have addressed the concept of past within the scale of;

1) city (Social Heritage, Reflect Your Identity-Passion of the City, Journey Among Empires) or

2) including the boundaries of the area of the immediate surrounding (Living Square, Olive Tree). In other words, students have demonstrated the diversity of reflecting the urban-memory relationship to the design site in micro and macro scales by means of their discourses about the past.

Macro-scale conceptual approaches focusing on the history of the entire city, the Empire of Trebizond and the Ottoman Empire in Trabzon, past achievements of the football club Trabzonspor and the supporters of Trabzonspor, the important social practices associated with the identity of the city, chansonnette events, dance and singing, as well as other cultural activities (such as Karagöz play, drive-in theatre). Among these, the concept of "Social Heritage" is based on the intensity of social activities in the past and the disappearance of strong social ties in parallel with this, and as the student stated that "there are mainly compulsory activities performed in the area, social activities are at a very low level. In the old days, everyone was considerably close to each other and there was sincerity. It was used to be easier to socialize". Socio-cultural practices both at the site and the city in general, defined in the memory with the objectives of "socialization experienced in past times at the area should be active today and keeping the social heritage alive" are further included (Table 2). The problem and purpose definitions expressed herein are primarily related to the functions of memory to contribute to social sustainability and to establish a bridge for the human-space-time relationship.

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Table 2. The design process and memory components of Student 1

Concept of Design : Social Heritage		
Problem Definition and Design Strategy	**Concept Presentation Board**	**Scenario Presentation Board**
Problem Definition: Active recreational use, which took place in the former use of the area, does not manifest itself today. The area is visited for compulsory use, mainly compulsory activities take place, while social activities take place on very few levels. In ancient times, everyone was intertwined with each other, and there was intimacy. It used to be easier to socialize. Although the name of the area is Karagöz Square, Karagöz-Hacivat games are no longer played. Although it is now a weight trading area, there are no areas where users can sit and rest. However, noise pollution and lack of green space are also seen as other problems. **Design Strategy:** Socialization experienced in ancient times in the field should be more active today. In order to keep the social heritage alive, an open-air cinema, a demonstration area where Karagöz-Hacivat games will be played, selling points where peddlers will be located (bagels, chestnuts, corn, ice cream), areas for street demonstrators to play music, fight mania and dance, and flexible spaces where children can play are designed.	EDP IV City Square Project EDP IV City Square Project **Stage Sketch** **Application Project and Components of memory** Music and Dance Performances, Scene	

Another design concept aiming to express or exhibit the identity of "Resident of Trabzon" in urban scale has been identified as "Reflect Your Identity-Passion of the City". It develops and expands over the passion and supporting the football club, Trabzonspor. This student said, "squares have historically been the center of societies and traditionally an auxiliary element to raise the awareness of urban identity. Trabzon is a city that is highly fond of football. This passion for football has become the identity of the city. But the passion for Trabzonspor football club cannot be fully reflected in the city". The student, with this statement of her, brought together the relationship between memory and identity with the space. It is observed that the memory's function of belonging to a group-society gains importance (Table 3).

Table 3. The design process and memory components of Student 2

Concept of Design : Reflect Your Identity; The Passion of The City		
Problem Definition and Design Strategy	**Concept Presentation Board**	**Scenario Presentation Board**
Problem Definition: Squares have historically been the center of societies, and have traditionally been an element that helps raise awareness of urban identity. Trabzon is a very fond city of football. This passion for football has become the city's identity. But Trabzonspor's passion is not fully reflected in the city. **Design Strategy:** Trabzonspor's love, which people love and depend on, should be reflected in the city. For this purpose, the activities in the field are: Trabzonspor can watch the match when there is a match and on days when there are no matches, movies, etc. they are displayed on the amphi with an open-air cinema, Trabzonspor football club's history and founders and other sports were introduced at the same time as a particularly famous footballers, including the presence of various memories and the achievements described and signing of the exhibition area,	**Phase of Sketch** **Application Project and Components of memory** Scene, Mass match viewing and Demonstration Area, Monument, Sculpture area, Exhibition Area

Another urban scale approach addresses the concept of "Journey Among Empires". Reflecting the student approach, "the historical traces of cities, socio-economic structure of past societies, a philosophy of life, and aesthetic sensitivity, those are places that have witnessed history and already taken place in the memories of people. In order to ensure cultural sustainability, places with important historical traces at the city scale are required to be preserved, transformed and reutilized. In this context, the study explains that the empire culture the city experienced in the past was forgotten in the urban memory over time and this is the biggest problem" (Table 4). It is observed that the area is once more reminded of the history of the city of which it is a part, and a design purpose is observed in which the forgotten pieces in the collective memory are replaced. This purpose reflects the functions of memory serves as a bridge in the human-space-time relationship, creating an archive of the past and thus, serving as a learning tool.

Table 4. The design process and memory components of Student 3

Concept of Design : Journey Among Empires		
Problem Definition and Design Strategy	**Concept Presentation Board**	**Scenario Presentation Board**
Problem definition: Historical traces of cities are areas that reflect details about the socio-economic structure, philosophy of life, aesthetic sensitivity of societies in the past; they bear witness to history and are included in people's memories. In order to ensure cultural continuity, places with important historical traces on the urban scale must be preserved and converted and reused. In this context, the forgetting of the imperial culture that the field of study had in the past over time in urban memory has been described as the biggest problem. **Design strategy:** Trabzon is a city that has been home to two empires, each part of which is history. Again, the area that we have identified as the city square is also a historical square. We can feel the texture of this project in the history of the Empire in the foreground two historical, almost we can travel between both of the Empire, culture, tradition, history, seeing, learning, in short, we can think and feeling to spend time with living history as a city square. In this context; Greek dishes in dining areas Ottoman dishes, old carpet weaving art, local music, mosaic art, calligraphy, etc. arts belonging to such empires are included in the organization of space.	**Phase of Sketch** **Application Project and Components of memory** Local Cooking, Street Vendors, Rug Weaving, Craft Making, Scene	

One of the designs based on micro-scale, proceeding through the past of the site and its immediate surroundings, has been introduced with the concept of "Living Square". In the past, the area focused on serving as a playground, entertainment area and an exhibition area for the shows of Karagöz-Hacivat. The student identifying this discourse by reading a book of memories has based her approach on this memory; "it is a place hosting the entire entertainments, a square we used to play ball outside of the festivals… Children used to have minor fights in Karagöz Gardens while playing football and enjoy the carousel in the religious festivals… It was a festival day when they said they were organizing a game in Karagöz Garden. When we went there, we saw the swing carousels and most importantly, teens riding their bikes within the cylinder-tunnel… Such shows and events used to take place at Karagöz in every religious festival. Karagöz was entirely a full-scale playground (Bal, 2011)." Thus, based on the definitions of the space in the collective memory of entertainment and playground, a nostalgic discourse referring to the childhood memories of today's adults with accessories such as swing carousel is emphasized (Table 5). Upon this discourse, the effect of social entertainment on social bonds and socialization processes, the loss of this function and the extent of loss of meanings for the city and its citizens can be discussed accordingly. Thus, it is observed that reference is made to the functions of contributing to social sustainability, serving as a bridge in the human-space-time relationship, and belonging to a group-society.

Table 5. The design process and memory components of Student 4

Concept of Design : Journey Among Empires		
Problem Definition and Design Strategy	**Concept Presentation Board**	**Scenario Presentation Board**
Problem Definition: "The place where all the fun is, where we play ball except for the holiday, is the square. It was the largest, somewhat bumpy Square in the city. ... In the Garden of karagez, there were fights, football was played, and carousels were set up during the holidays. ... Karagöz grew as a playground in my eyes." " On religious festival day, they said that there is a game in the Garden of Karagoz. We went to revolving cabinets, carousels and, most importantly, boys riding motorcycles in cylinders... these shows were held in Karagez on every religious holiday. Karagöz was a playground." In the past, this square, which is the largest playground and		
	Phase of Sketch	
	Application Project and Components of memory	

garden in the city center in the history of Trabzon city, has lost its fun and dynamic feature. It should be made a fun square again by carrying the traces of the past found in the area to the present day.

Design strategy: Designing event spaces that appeal to all age groups to diversify the user audience,
To keep the tradition alive by bringing the old activities that have lost the value of the field back to life,
Its aesthetic quality, which comes from its historical feature, has been considered as bringing it to the forefront with its modern texture.
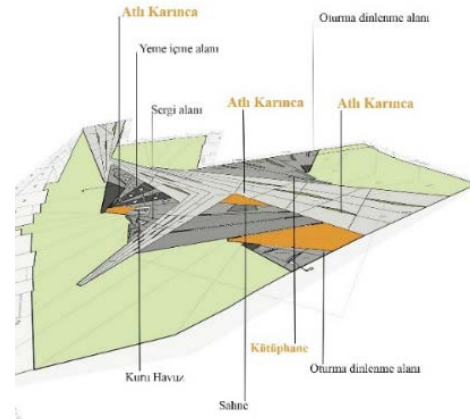
Carouselle, Library, Stage, Exhibition Space

Another design, "Olive Tree" concept, based on the site and the immediate surrounding, addresses the relationship between the area and the olive trees eponym of the Zeytinlik Neighborhood next to the area and the nature, existing in the past of the city and decreasing with each passing day. The expression, "the findings reveal that the province of Trabzon has moved away from the olive culture and has come up to the present day only as the name of the neighborhood. It has been known that during the Ottoman period, Trabzon province contributed to the economy with its planted 7662 olive trees. Today, there are no olive trees serving as the eponym of the neighborhood. The main objective is to reunite the society with the olive trees" (Table 6). Thus, the lost values of environmental awareness could be made available for the discussion through the discourse of the ecological connection that the society established with its environment in the past. The aim herein has reflected the functions of memory as an archive of the past and being a learning tool and a bridge in the human-space-time relationship.

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Table 6. The design process and memory components of Student 5

Concept of Design : Olive Tree		
Problem Definition and Design Strategy	**Concept Presentation Board**	**Scenario Presentation Board**
Problem definition: Among the findings that Trabzon province has moved away from olive culture and has only come to the present day as a neighborhood name. During the Ottoman period, Trabzon province is known to have contributed to the economy with 7662 olive trees. Currently, the olive trees that gave the neighborhood its name no longer exist. Bringing society back with olive trees is the most basic goal. **Design strategy:** Nature awareness must be gained in order to improve the quality of life. Outdoor education programs for the environment should be conducted, more awareness should be created. Outdoor education for environmental awareness, public presentation of dishes made with olive products, olive oil narration, increasing the importance of Olives and olive Trabzon made from the display and sale of products, olive trees, exhibiting, and living in the vicinity of the trees, rest and rain water collecting the fruits, the articulation of the children, the trunks of the trees, branches, leaves, and the land is can play with.		
	Phase of Sketch	
	Application Project and Components of memory	
	  Olive Trees, Green Space, Scene, Olive Products Sales Units	

Through these macro and micro-scale approaches, students are able to learn from the past functional (such as socialization) and semantic (such as entertainment-game) dimensions of the area, the physical components of the past (such as olive trees, amusement park-entertainment equipment), the historical and cultural identity components of the city (sovereign empires, the affection towards football and Trabzonspor football club) of the urbanites (Table 7). It has been identified that the students tried to reflect these aspects in the scenarios and spatial details they proposed.

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Table 7. Analysis of the memory within the designs through different aspects

	Design Concept	Reflected Elements from Memory	Scale Addressed by Memory	Sending Function of Memory
Student 1	Social Heritage	Functional-Cultural	City	Contributing to social sustainability, Being a bridge in the human-space-time relationship
Student 2	Reflect Your Identity, The Passion of The City	Cultural-Semantic	City	Belonging to a group-society
Student 3	Inter-Imperial Journey	Cultural-Semantic	City	Being a bridge in the human space-time relationship Creating an archive of the past and being a learning tool
Student 4	Living Square	Semantic-Functional-Physical	Immediate environment	Contributing to social sustainability, Being a bridge in the human space-time relationship, Belonging to a group-society
Student 5	Olive Tree	Physical	Immediate environment	Creating an archive of the past and being a learning tool, Being a bridge in the human-space-time relationship

Characteristics Reflected on The Landscape by Means of Collective Memory and The Types of Use

The spatial components and types of activities included by the students in their designs through the discourses in the memory have been reviewed (Table 8). It has been observed that the students showed a tendency for the creation of a new and different square design by using various features or components defined in the memory rather than restoring the area to its physical state in the past. Spaces such as the show area-stage, exhibition area, outdoor library (Table 2-6) included in the projects are new suggestions that were non-existent in the past and emerged as the most common spatial types. These reflect functions of providing information and memories of the past rather than bringing back the use intentions of the past, meaning or feature directly to the area. Therefore, students were able to address the memory with tangible and intangible approaches, such as taking some features and intended uses from the past and bringing the past to the space and accompanying the users to the past with such activities.

Table 8. Spatial components based on collective memory and event types and proposals

	Design Concept	Spatial components and elements		Event Types	
		Past	Proposed	Past	Proposed
Student 1	Social Heritage	Game and (Karagöz, open-air cinema) show areas	. Music-dance areas . Cinema-theatre-mania conflict area .Children's play areas	. Local-traditional music making-listening, local dance performances, chansonnette events	. Street artists-music, caricature . Dance shows . Chansonnette events . Local tastes with peddlers .Children's play
Student 2	Reflect Your Identity; The Passion of The City	Square	. Sales and exhibition area . Gathering and demonstration area . Trabzonspor monument and football player statues	. Coexistence of football passion and excitement .Championship celebrations, shows of joy	.Mass match monitoring, demonstration and rally . Football, history of Trabzonspor, exhibitions about former footballers . Peddlers, food and drink .Trabzonspor products-shopping
Student 3	Inter-Imperial Journey	Historical ruins and artifacts in the city	. Local music and dance-show area . Historical-learning and exhibition areas of local arts - carpet weaving, mosaic .Tasting local tastes-cafes	. Music and dance . Crafts	. Listening to music, watching dance shows . Rug weaving, mosaic making. . Tasting local tastes, learning to do . Library . Exhibition
Student 4	Living Square	Game and (Karagöz) show areas, Carouse,l Ferris wheel Motorcycle aerobatic field	. Karagöz-Hacivat shade playground . Carousel . Open-air cinema . Theatre show . Festival .Exhibition	. Karagöz-Hacivat shadow play . Carousel . Children's play	. Karagöz-Hacivat Shadow game monitoring . Open-air cinema, theater viewing . Watching local music and dances . Exhibition
Student 5	Olive Tree	Olive groves	. Olive groves and green areas . Sale of olive products-stands, stores .Local food-cafes	. Olive cultivation and related activities	. Sitting under olive trees, picnicking . Tasting, buying olive products . Olive picking . Nature trainings for students .Integration with nature

Another common spatial component and type of use are the venues where the local music, dance, and food and the activities related to them are addressed accordingly, these have been found to be more associated with social sustainability and belonging to a group. The design approach emphasizing the identity and belonging to a group has developed over Trabzonspor football club. The most fundamental characteristics of spaces based on memory with the use of monuments and sculptures are reflected in this project proposal. Moreover, the common aspect of these entire projects based on the past is that they contain a show area or stage, the importance of both physical components and the social performances in the spatial aspect of collective memory have often been emphasized. Especially the stage is one of the most fundamental components of commemoration-remembrance acts.

Finally, the concept of Karagöz and Hacivat shows and entertainment, for which the area was named, was frequently emphasized in the context of spatial components and elements. The uses and components such as local music, drive-in theatre, exhibition of shadow theatre, carousel are the fine examples of the past entertainment functionality of the area to be adapted to the present.

The spatial components students refer to memory and their positions in their projects are indicated in Table 2-6.

DISCUSSION

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The project area, which had been in a substantial use in the city center in the past, lost its qualification and features over time and included it in urban transformation for the purpose of gaining that particular importance and use again, prompted the entire students to conduct research on the history of the area. Although there was no limitation in a group of 9 students studying the same area, the adoption of a design approach by 5 students connecting with the past was an indication of the adaptability of memory components to design and the importance given to the functions undertaken by the memory. The visual and written archive surveying conducted by the students in the early stages of the design enabled them to identify the traces left by the area in the collective memory and connect with the organization of the space. Likewise, Dwyer and McCourt (2012) have stated that students can apply this knowledge in the production of a potential memorial space once they acquire the required fund of knowledge on the cultural landscapes and remembrance-commemoration. Folkerts (2015) states that in the context of landscape expressing a meaning and enabling remembrance, the historical backgrounds of the areas and their immediate surroundings are frequently used in the Berlin School of Landscape Architecture, and it is aimed to establish a direct relationship between the ecological and social elements of the area and the design. By such an approach, he expresses that the landscape is meaningful and serves as a reminder, the space itself communicates with its user, and that landscape is a storage space for the memories (Folkerts, 2015).

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The products revealed as a consequence of a design concept based on the past are actually entirely and completely new and different designs. This situation that can be defined as the present interpretation of the past has also been expressed by Van Dijk and Weitkamp, (2018), and it was stated that the places actually have many past memories and the choice of which to preserve and emphasize on is a normative decision accordingly. In fact, it has been stated that this does not refer to conservation and preservation but creation. Likewise, Tyner et al. (2012) state that there is never a single memory, or a single way of remembrance, and different memories compete in the direction of preserving and presenting the past.

In the projects of the students, identifying and determining a design concept as a consequence of research conducted on memory has yielded different results in various aspects. For instance; design approaches, concepts, spatial components and types of use have been examined in the topics such as addressing memory at the urban scale or on the site and its immediate surroundings, focusing on physical, functional, semantic or cultural features indicated by memory, or directing towards the different functions of the use of memory (Table 7). This situation reveals that the collective memory can be addressed and engaged in a multi-directional and layered way within the design process, and it provides the students with the chance to demonstrate the diversity and flexibility while identifying their approach. In conclusion, these students, engaged in the same project area, produced completely different products from each other over the space of the area in the social memory.

The analysis of the projects of the students has revealed that the two fundamental components of the memory are noticed and regarded accordingly. These two components are defined by Mitchell (2003) as fixed and moving elements. The show area and stage were included in the entire projects of the students, as well as "components" (fixed components) such as exhibitions, monuments, sculptures, carousels were frequently included in the projects. The exhibition of the Karagöz-Hacivat Play, local music and dance performances, visiting exhibitions, obtaining information from the outdoor library are also defined as elements of remembrance (moving components).

Ultimately, the functions of memory such as social sustainability, bridging the past, belonging to a group, and being a learning tool have further been discussed. Research on collective memory has reflected that the past is generally considered as associated with the trauma in landscape design (Dwyer, 2004; Folkerts, 2015; Gallier, 2015; Stephens, 2014, Tyner et al., 2012). However, in this study, it has been observed that the students did not establish such an association, and that they adopted various discourses such as social bonds, entertainment, urban belongingness, identity within the daily life of the city. In other words, collective memory and encompassing landscapes, contrary to the common view, are not only a record of traumatic events, but also include activities, meanings and environments in the daily routine of urban life.

These ordinary and insignificant elements of daily life are actually very important because our experiences and evaluations about cities are mainly based on these.

CONCLUSION

The spatial behavior concepts in design of the urban squares required to be the landscape of the entire citizens such as establishing bonds with the past, having the sense of roots and as a result of those, development of an identity or identification of the spatial identity as well as the formation of the sense of sense of place are of utmost importance. The landscape design, the physical and social components of the landscape through the past are required to be regarded and considered at these areas.

How the landscape architecture students starting off with this approach have been inspired by the past with their design approach and how they reflect the past to the present are analyzed in this study with the spatial components and activity types. Reviewing of various sources by the students in visual and written, printed and electronic, field and archives, that is, analysis based on collective memory, helped them to identify various spatial characteristics and types of use or social practices in the past, that is, discourses about the past, and reflect them to a design concept. During the design process, the students have applied to define new areas and their intended uses based on the past rather than to preserve certain features in the memory area. In fact, it is a new product selected and produced by students, inspired by the past rather than being inspired by the past itself.

These applications of the students regarding the history of the area and the physical and social traces in the city not only made them qualified and well informed with this project, but also provided them with experience for the subsequent cultural landscape project applications and increased their sensitivity to concepts such as past and memory. However, the design products discussed herein belong to a single group. Addressing other studies of the students in line with factors such as the professional experiences of the project lecturer, personal awareness and conscious levels and cultural backgrounds of the students shall provide a better understanding of the elements of collective memory. Moreover, comparing urban and rural areas in other functions shall enriched the research topics such as the memory landscapes and the use of collective memory in the landscape design. However, the student designs discussed in this study have been demonstrated that defining the past and historical background of design site provides conceptual diversity and affluence in the design scenario with the components of the space.

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Resume

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Research Article

Interior Arrangement in Children Libraries during the Covid 19 Pandemic Process: The Example of Konya Seljuk Municipality KPP Children's Library

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Abstract

The aim of this study is to analyse the compliance of the Seljuk Municipality Konya Plain Project Children's Library in Konya, Turkey with the design principles in line with the recommendations of the International Federation of Library Associations and Institutions. This descriptive study, which aims to analyse Konya Plain Project Children Library from a spatial point of view, was conducted according to the case study from qualitative research methods. In this study, the physical, ergonomic, and social suitability of the library was evaluated by photographing technique by making observations and measurements, presented with visual materials and the inadequacies in its structure were revealed. The fact that the building was designed as a municipal building and later converted into a library caused some of the parameters recommended by the International Federation of Library Associations and Institutions to not meet sufficiently. The fact that the library is located on the third floor has limited its relationship with the environment, its location in the centre of the city and on a noisy street, and the inability to control the sound in the study rooms have increased the noise level. The natural lighting of the library is determined to be uncontrolled and insufficient. It was determined that there were no building elements to control the sun, direction finding signs and a care room for babies or children. In addition, it was determined that ergonomic criteria were ignored in the design of the space. As a result of this study, it was determined that the Konya Plain Project Children's Library should be redesigned in terms of location, noise level, natural and artificial lighting, signage and wayfinding signs, child or baby care room. In addition, it has been determined that comfort and aesthetic elements have been at the forefront of the Konya Plain Project Children's Library, and it has been tried to keep up with the requirements of technology institutionally. Space design has been emphasized and suggestions have been developed in order to increase the use of children's libraries and to make the service appealing to wider audiences.

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INTRODUCTION

Libraries are safe, functional, easily accessible and changeable places that support physical, mental, social and cultural development in the light of knowledge and skills, allow disadvantaged groups to move freely, and encourage communication and interaction (Gönen, Temiz and Akbaş, 2015). Libraries that prepare the society for the future have many responsibilities such as gaining the habit of reading books, supporting the learning process, creating a reading culture, and ensuring socialization. Within this area of responsibility, children's libraries that serve children are of immense importance.

The aim of children's libraries is to contribute to the personality-speech-language development of the child, to teach the information correctly, to give the habit of reading and to expand the imagination. In addition, these libraries are social environments that enable the child to spend effective time with his environment (mother, father, and friends) during the socialization process. In the U.S., the new goals of children's libraries under the "Every Child Is Ready to Read Program" are literacy, telling, singing, and playing games (Neuman, Molan and Celano, 2017). In addition to traditional information sharing, there should be many artistic activities such as concerts, conferences, workshops, outdoor activities, painting workshops, art studies, intelligence games, robotics and coding, virtual reality, exercise exercises, camping that contribute to the socialization of the child. (Akkaya and Odabaş, 2019). In addition, these libraries, which serve disadvantaged children, are expected to contribute to the different physical, spiritual, social, and psychological development of the child. In addition, new measures were introduced with the COVID 19 pandemic in Turkey in March 2020. Within the scope of these measures, the capacity and usage periods of the library spaces have changed. With the effect of the pandemic, the unsuitability of the areas in the libraries, the rapid breakthroughs in digitalization and the closure process have seriously disrupted the use of the libraries by children. In this context, the change in the purpose and importance of children's libraries over time, the increase in the diversity of users and activities, and the pandemic process have necessitated spatial differentiation and arrangements.

Spatial differentiation and arrangements; It should be in a design that will educate the child, support the imagination, provide social possibilities and develop while exploring. Unlike traditional library design, new library designs that encourage interdisciplinary work, facilitate group work, eliminate hierarchy, are more active and some departments are noisier need to be introduced. In the study conducted by Al Şensoy and Midilli Sarı (2020), it was reported that new generation libraries differ from traditional libraries, gain technological and digital content, offer functional spatial diversity to their users, allow flexible and aesthetic spatial organizations by melting the strict boundaries in the interior, and gain a remarkable and inviting appearance. In order to design a striking, inviting and flexible environment, interior spaces

should be transformable, modular interiors should be created with the presence of movable dividers and elements. Study and reading areas should range from single to multi-person desks, individual and group study rooms and comfortable seating, and should encourage interactive learning. Various furniture designs, including table dividers, bookcases or squares, should also create workspaces that are insulated from sound and visuality to varying degrees.

In spatial arrangement, color is one of the most important factors in determining the relationship established with the environment. Appropriate use of color can transform a boring space into a lively one (Hashempour and Taghizadeh Sapchi, 2015). In multi-storey library buildings, the use of the same color in the sections that are connected to each other and the use of different colors for each floor will help the users to find certain areas. In fact, the colors of the books and journals should be taken into consideration when choosing a color. Natural lighting should be preferred instead of artificial lighting, large glass surfaces should be used and attention should be paid to the use of solar control elements. Inadequate use of solar control elements can cause dazzling in the users, overheating of the interior in the summer environment, and heat protection in winter security (Dewe, 2016). Therefore, solar control systems should be integrated into the facades.

The functional and effective use of furniture in space design, its presence of form and aesthetic elements, increasing the visual quality of the space accelerates the arrival of children to the library. The features such as size, formality, colour, texture, ergonomics, comfort, durability, functionality, and socialization of the reinforcement elements used in the space help children to adopt this space (Yavuz Önen, 2021). In addition, the lighting, ventilation, noise freeness of the library, the presence of visual signs, accessibility and security contribute to the physical, spiritual, social, and psychological development of the child (Kakırman Yıldız, Yalçınkaya and Saydam, 2018).

IFLA (2018) suggested that children's libraries should be served under equal conditions without making any distinction between the target audience (age, race, gender, economic and social level, education, etc.). Similarly, Altay (2020) emphasized that children's libraries should be provided not only for the children of Turkish families living in our country, but also for the children of families under temporary protection status. In this context, the city in which the study was conducted has an important place as it hosts many refugees or immigrants with different cultures in terms of different nations, different beliefs, different ethnic groups and linguistic diversity.

According to the Public Libraries Regulation (2012), children's libraries must be in every province. In Konya, which served as the capital of the Anatolian Seljuk State for many years and is a city that learns with its historical past and cultural heritage and conveys what it has learned, many libraries were opened during the Seljuk and Ottoman period, and some of them have been preserved until today. Today, 69 of the libraries

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in Konya consist of schools, eight public libraries and one children's library. Seljuk Municipality KPP Children's Library is the first and only library in the city.

In addition, this study is important in terms of processing the "space theme" in the design of the space and creating a "new dream world" for children and being the first and only example of the city. The adoption of the thematic design, which aims to attract the attention of children and is decorated with space visuals, is interesting for the provision of repeated visits by children. The fact that the historical texture of the city is taken into consideration in its design will prevent the loss of culture by establishing a connection between the past and the future and ensuring that children adopt the urban texture and values.

One of the important advantages of the library is that it enables children, parents and educators to interact with different activity areas. The library is planned as an institution away from the perception of a nursery, where children spend time with their families and engage in educational and instructive activities.

In this context, the aim of the study is to analyse the compliance of the Seljuk Municipality Konya Plain Project (KPP) Children's Library, which is the first and only one in Konya, Turkey, with the design principles in line with the International Federation of Library Associations and Institutions (IFLA).

METHODOLOGY

Purpose and Scope of the Study: The aim of this study is to analyse the Seljuk Municipality KPP Children's Library in Konya from a spatial point of view. In this context, the suitability of the library in terms of physical (user age ranges, lighting, colour, noise, comfort, signage and directions, accessibility), ergonomics, health and safety parameters and social distance were evaluated.

Type/Design of the Study: This descriptive study, which aims to analyse the KPP Children's Library opened in 2019 in Konya, which is among the largest provinces and top 10 most populous cities of Turkey in terms of surface area (Figure 1), was carried out according to the case study from qualitative research methods. Case study is a methodological approach that involves an in-depth examination of a limited system using multiple data collection to systematically gather information about how it functions and works (Chmiliar, 2010). Multiple data can be observations, interviews, documents, and audio-visual materials. This data collection source can also be extended to movies, photographs, video recordings, life stories, and nonverbal communication (Yin, 1984). In this qualitative study, observations and measurements were made and the spaces evaluated by photographing technique were presented with visual materials.

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Figure 1. The location of Konya on the map of Turkey

Sample of the Study: The sample of the study was selected from Seljuk Municipality KPP Children's Library. KPP Children's Library was opened in 2019 with a project conducted by Seljuk Municipality, Seljuk District Directorate of National Education and KPP Administration. The library serves children between the ages of 4-10.

Collection of Data: In this study, observation and measurement methods were used to perform the spatial analysis of the Seljuk Municipality KPP Children's Library during working hours between June and October 2021. Observations and measurements were made from the researcher's tar. There are no universal stands for the size and design of the children's library facilities (Polat et al., 2020). In this study, the articles in the study proposed by IFLA (2018) (International Federation of Library Associations and Organizations) for space design and translated into Turkish as "Guide to Library Services for Children in the 0-18 Age Group" (Polat et al., 2020) were evaluated. These items/criteria are:

Criterion 1. Central location on the ground floor

Criterion 2. Suitable design for users with age-specific requirements

Criterion 3. Enough space for books, newspapers, magazines, and non-print collections

Criterion 4. A flexibility that allows for a variety of activities

Criterion 5. Appropriate navigation signs

Criterion 6. Space for childcare, including breastfeeding and diaper changing

Criterion 7. Family friendly and toilet for all genders

Criterion 8. Noise factors by age range

Criterion 9. Suitable and sufficient natural or artificial light

Criterion 10. Suitable room temperature to ensure good working conditions throughout the year

Criterion 11. Spaces and furniture suitable for child safety (Polat et al., 2020).

Collection of Data: In this study, observation and measurement methods were used to perform the spatial analysis of the Seljuk Municipality KPP

2.5. Limitations of the Research: In the study, the problems or solution suggestions of the library staff regarding the space were not included in

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the scope of the research. In addition, the results obtained from this study can only be generalized to the library where the research was conducted.

3. Results and Evaluation

In this study, Seljuk Municipality KPP Children's Library was evaluated from a spatial point of view and analysed according to IFLA criteria. Accordingly, the analysis of the criteria considered is as follows:

Criterion 1. Central location on the ground floor

Seljuk Municipality KPP Children's Library is located on an area of 300 m2 in Aydınlıkevler, Seljuk district of Konya province (Figure 2). It is close to the Children's and Gynaecology and Maternity Hospital, in a central and busy area in terms of transportation. The library, which is on the third floor of the Family Life Centre, started to serve in 2019. The library has 3 staff members as 1 principal and 2 instructors. The library consists of a single floor. The lower floors of the library belong to the municipality and are used by different units of the municipality.

Figure 2. Location of Seljuk Municipality KPP Children's Library

Seljuk Municipality KPP Children's Library is a library that will contribute to the mental and socio-cultural development of our children, to ensure that they are equipped with knowledge and skills, and that has functions as a social development centre (Seljuk Municipality KPP Children's Library, 2022). Although it is easily accessible and designed to allow them to move comfortably in disadvantaged groups, it is located on the third floor (Figure 3). The fact that the library is located on the third floor has limited the child's relationship with the environment. Although it is also important to give the idea that the book can be read anywhere in the book-space relationship, the fact that it is not on the ground floor has caused the child's relationship with the external environment to be broken.

Where the library will be located is especially important in terms of accessibility. In addition, a study conducted by Kakırman Yıldız, Yalçınkaya and Saydam (2018) reported that the location of libraries affects child psychology. In this respect, libraries should be in a central location, on a route suitable for public transportation, in a single storey, gardened, accessible place. Although it is disadvantageous in terms of noise that the building is on the ground floor, it is the most suitable floor in terms of access (Küçükcan, 2015).

Figure 3. Entrance of Seljuk Municipality KPP Children's Library

Criterion 2. Suitable design for users with age-specific requirements

Children with different ages, educations, abilities, tendencies, needs, culture, social support systems and economic status constitute a heterogeneous group (IFLA, 2018). Anthropometric measurements of children (height, weight, body mass index, head, neck and shoulder measurements, arm circumference, chest and waist measurements, skin fold thickness, lower and upper extremity measurements) are affected by their age. In the literature, 0-2 years of age is accepted as infancy, 2-6 years as play, 6-12 years as school and 13-19 years as adolescence (MNERT, 2009). Although every individual up to the age of 18 is defined as a child according to the UNICEF Convention on the Rights of the Child, the Public Library Regulation states that the upper limit of the age group in which children's library services are provided is 14.

In this study, Seljuk Municipality KPP Children's Library serves the 4-10 age group. According to the data of the Turkish Statistical Institute (TSI) 2021, the population between the ages of 0-17 is 22,738,300 and constitutes 26.9% of the country's population. In Konya, the child population is 2,277,017 and its proportion in the total population is reported as 28% (TSI, 2022). In Konya, which hosts one-tenth of the total child population, the number of children's libraries to serve this population is only one. This shows that approximately 2.5 million children use the same library. In a different study conducted in Istanbul, it was reported that the number of children's libraries was insufficient (Kakırman Yıldız, Yalcınkaya and Saydam, 2018). In addition, in the study conducted by Günes and Canatar (2020), it was emphasized that there are no libraries for babies, but the number will increase over time.

In this study, Seljuk Municipality KPP Children's Library provides services to children aged 4-10 years. The areas in the library are designed with age groups in mind. For example, "collective book reading areas" are designed for children aged 0-7 and "children's playgrounds" are designed for children aged 4-6 (Figure 4). The reorganization of children's libraries considering age groups is important for the physical, cognitive,

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emotional, spiritual, and social development of children (Tapkı and Canbay Türkyılmaz, 2018). With this logic, it should be ensured that libraries adapted to all developmental periods of childhood are created and continuous updates are made to meet the needs of generations.

Figure 4. Collective book reading area.

In addition, in the Children's Libraries Workshop held in 2018, "reading, learning, entertainment and recreation areas", "child-oriented areas", "areas for disadvantaged groups", "activity areas for family-children", "interaction areas", activity areas that contribute to the development of creativity (Lego, DIY workshops, etc.), "nutrition areas" and "children's playgrounds in the library garden" (Polat, Yılmaz, & Kakırman Yıldız, 2018). In this study, the space of the library is designed with the "space theme" (Figure 5). This is important in terms of processing the "space theme" in the space design and creating a "new dream world" for children and being the first and only example of the city. The adoption of the thematic design, which aims to attract the attention of children and is decorated with space visuals, may be interesting for children to ensure repeated visits.

Figure 5. Game room with space visuals

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In addition, the space is divided into five separate activity areas (Figure 6). In the activity areas, children between the ages of 4-10 are served in groups of 20 people. estimated groups of 20 people can be up to 40 people. Students from schools can use the place with their teachers between 10:00-12:00 and 14:00-16:00 on weekdays. On weekends, parent-student meetings are held in the same time zones.

The fact that the library consists of a single space causes more than one activity to be done together. Although the furniture in the space was used as dividers in delimiting the white activity areas, it could not clearly separate these areas from each other. Activities are planned in different places in each activity area (individual and collective book reading areas, drawing area, intelligence games area, children's playgrounds, drama-theatre-fairy tale telling and education area, digital recreation area for the visually impaired). In different activity areas, students can see and interact with each other. This can cause the child to be distracted. For example, a child who is in the field of literacy or drawing can be influenced by children in the fields of play and dance-theatre-storytelling. In order to improve this situation, the boundaries of the activity areas with equipment and equipment should be determined more clearly and the area should be customized for the activity.

In addition, care was taken to have books in all activity areas. In this way, it is aimed that the interaction of children with books is not interrupted in any activity. However, the fact that the space is not divided by certain separators causes attention to be distracted in a short time and different activities cannot be organized at the same time. The spatial areas of the libraries should be of a nature that will increase the motivation, efficiency, and bio-psycho-social development of child users.

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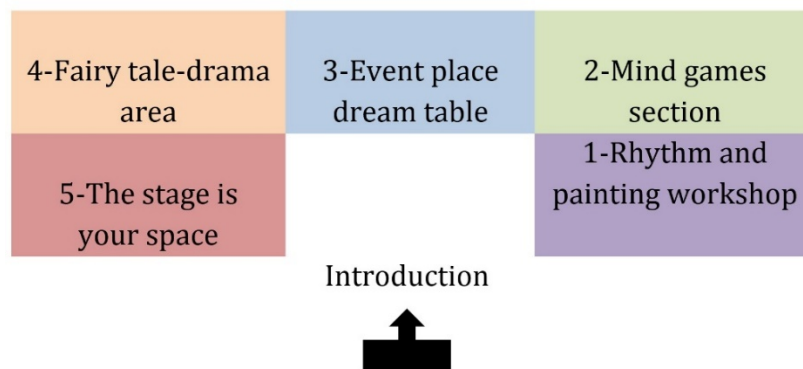
Figure 6. Five different activity areas of the library

Criterion 3. Enough space for books, newspapers, magazines, and non-print collections

Children's libraries should contain all kinds of materials suitable for children's development, including printed materials (books, magazines, comic books, brochures), media (CDs, DVDs, cassettes), toys, learning games, computers, software, and internet connection. Seljuk Municipality KPP Children's Library provided books, magazines, other printed and digital publications. In addition, all kinds of technical equipment and internet infrastructure were provided for access to digital educational

content and data banks (Seljuk Municipality KPP Children's Library, 2022). The storage of the collections of the library was done in two ways. First, the seating area in the centre of the library also serves as a book storage (Figure 4). Another storage element is designed with the function of working in circular form and storing books (Figure 7).

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The physical and digital resources of a children's library include tools, equipment, and a collection of resources (Polat et al., 2020). Materials should be as downloadable as possible. Library websites and digital content products must comply with WCAG 2.0 (Web Content Accessibility Guidelines). The increase in both the production and use of electronic publications has brought about many conveniences. The gradual transfer of libraries to the electronic environment and the establishment of websites in parallel have accelerated access to information (Sayer, 2007). In this direction, varied materials in the libraries can be accessed in a brief time. In a study conducted by Kakırman Yıldız, Yalçınkaya, Saydam (2018) in Istanbul, Turkey, the most successful library in terms of collection development was reported as Selimiye Children's Library. However, it is emphasized that there are 13 libraries that do not have this qualification (Kakırman Yıldız, Yalçınkaya, Saydam, 2018). To become a reading society and to raise a generation that has acquired a reading culture, the child-library interaction should be increased. In this direction, the child's connection with the library can be increased by organizing foreign language studies, concerts, conferences, debates, cinema, and art activities outside of book reading hours in libraries (Göktürk, 2010).

Criterion 4. A flexibility that allows for a variety of activities

Children of all ages need to see the library as attractive, inviting, and not creepy. Ideally, children's services need their own places that are easily recognizable (e.g., children's furniture, decoration and colours) and that differ from other parts of the library.

The space of Seljuk Municipality KPP Children's Library is designed to be divided according to different activities. Besides that, it is not divided by clear limits to allow larger multi-user events. In addition, determining the concept of space as a theme in the design process and supporting this concept from the reinforcements and visuals in the activity areas in the space to the lighting used on the ceiling is an interesting and exciting choice both for design integrity and for the users. Although the concept

of space is an interesting and entertaining choice for users of this age, the harmony of the colours used in the article and its interaction with this theme are also important. The colours in the space have the task of giving a sense of freedom and attracting the attention of children. In some areas, vibrant colours are used to direct a child's attention to books or activities.

In the study by Edwards and Fisher (2002), ten criteria proposed by Harry Faulkner-Brown for designing a successful library are mentioned. These criteria are flexible, compact, accessible, extendible, varied, organized, comfortable, constant in environment, secure, economical. Edwards and Fisher (2002) added sustainability and uplifting to the sprit criteria. In order to attract more child users, the engines should develop their collections according to the needs and expectations of the children, make their spaces comfortable and fun so that the children feel themselves in the moth, organize and announce many activities.

Criterion 5. Appropriate navigation signs

Navigation is when individuals can find the path to their goals without experiencing delay and unwarranted anxiety. Sometimes it is as ordinary and easy as moving from one place to another; sometimes it can become a situation that causes fear and distress to the individual who loses his way (Erçevik Sönmez, Erinsel Önder, 2015). As in all areas, navigation signs are important in children's libraries. The location, size, shape, colour, character, legibility distance, content, lighting of the signs is important. In the study conducted by Erçevik Sönmez and Erinsel Önder (2015), visual access to spatial clues, architectural differentiations, use of sign systems and plan formation were reported as variables affecting the experience of navigation. In this study, Seljuk Municipality KPP Children's Library consists of a single space and all areas can be seen at the entrance. There are no signs of navigation in the library or inside the space.

Criterion 6. Space for childcare, including breastfeeding and diaper changing

There is no care room for babies or children in the library examined within the scope of this study.

Criterion 7. Family friendly and toilet for all genders

One of the important criteria of IFLA is that there are male and female toilets that can be used by students, parents and library staff. The toilets and sinks in the library in this study are suitable for the use of children (Figure 8). It is suitable for children's height, sink floors are so that they do not slip. But parents can't find a different toilet to use.

In multi-storey public libraries, it is more convenient to have toilets on each floor. The materials used for toilets must be of excellent quality. Ventilation and windows in toilets should be adequate. Iron railings should be installed on the windows. Criterion 8. Noise factors by age range

In today's libraries, where the number of users is increasing rapidly, noise is among the biggest problems. Especially for children who are distracted very quickly, there is a need for sound insulation in libraries. Covering the dividing walls on the exterior and interior with sound insulation materials will prevent the noise coming from the outside from entering the interior and unwanted sounds in the computer and project rooms from reaching the side sections. In addition, noise in libraries can be controlled by sound-absorbing materials and furniture. In addition, in areas where plumbing pipes are located, noise in the building can be reduced to a minimum level by using sound-absorbing materials. The volume in the open reading areas should be 40-45 decibels (Onat, 1989).

In this study, the noise level in the Seljuk Municipality KPP Children's Library was made by phone and sound level measurement using the Decibel application. The volume was measured separately in each section. In the sound level measurements made in the reading rooms, the noise level was measured as 50 decibels. The noise level in the reading rooms is higher than it should be. The fact that the KPP Children's Library is in the city center and on a noisy street had a negative impact on the noise level. At the same time, the air conditioning units in the library increased the noise in the reading rooms. In the observations made, it was seen that acoustic control and noise-cancelling measures were not taken in the library. While carpets should be used as sound-absorbing materials in places, sound control could not be achieved by using laminate flooring in some sections (Figure 9). In the study conducted by Kuru and Canbay Türkyılmaz (2019), 55% of the users evaluated the noise level of the

library moderately, 20% evaluated it well, and 15% evaluated it very well. It is emphasized that the evaluations of the users and the data obtained because of the measurements are similar. The results of this study and the study conducted by Kuru, Canbaz Türkyılmaz (2019) are me. In this direction, different sound insulation solutions are required for each section of libraries.

Figure 9. Use of laminate flooring

Criterion 9. Suitable and sufficient natural or artificial light

Lighting is one of the important elements of the interior spaces. Lighting, which has both functional and aesthetic properties, is divided into natural and artificial in libraries. Natural lighting is usually done through windows on the walls or skylights. Libraries should mostly provide a natural bright environment. However, artificial lighting should also be used in cases where natural lighting is insufficient or not at all (Kuru, Canbay Türkyılmaz, 2019). In the literature, the use of both natural and artificial lighting in libraries is recommended (Arat and Parlak, 2020; Temel and Canbay Türkyılmaz, 2018; Yılmaz and Ekici, 2011).

One of the places that should be bright in libraries is the reading rooms. In these sections, light that does not tire the eye should be used and both general and local lighting should be done. For lighting to be efficient, the ceiling, walls and floor must be designed from light colours (Zahoar, 1960). In areas where library users are located, the lighting measurement should be at least 400 lux (Faulkner-Brown, 1999). In the study conducted by Delice Güler and Bilbay (2016), it was reported that the windows should be arranged to the east and the reading area, play and activity areas to the south for the effective use of daylight. Windows for children should be 50 cm high, access to the window handles should be blocked. In addition to natural light, it is also important to provide adequate lighting in every area where you can read books.

In this study, natural lighting is provided by large floor-to-ceiling windows (Figures 10 and 11). As the space moved away from the window, the need for artificial lighting increased (Figure 10). Although

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there are building elements in the space to control the sun, it is not enough. The inner walls of the building are painted in white and light colour is preferred on the floor. In this way, it is ensured that the space is brighter and more spacious.

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Figure 10. Natural lighting

Artificial lighting in the library is provided by fluorescent lamps in the reading rooms, in the sections where the bookcases are located and in the staff office. Fluorescent lamp is the right form of lighting for library lighting. However, the worktables are not arranged in accordance with the lighting elements. In library buildings, both general and local lighting allows readers to work more comfortably.

There are no local lighting elements on the desks in the library. In the observations made, it is seen that the daylight entering the place is uncontrolled during the daylight hours. Reading in an area where there is too much light becomes tiring and can cause a loss of interest in the child. For this reason, an efficient lighting design is needed in all areas where the child can read.

Figure 11. Natural and artificial lighting

Criterion 10. Suitable room temperature to ensure good working conditions throughout the year

The average temperature in the libraries is 18-20°C. In the study conducted by Onat (1989), it was reported that every 5°C increase in the

temperature inside the library doubled the deterioration in books. For this reason, it is emphasized that daily temperature changes should not exceed 1 °C.

Figure 12. Saloon type split air conditioner

Criterion 11. Child-safe space and furniture

To ensure comfort in libraries, the dimensions of the spaces that make up the library, the limits of use, and the dimensions of the equipment in the space should be designed in line with anthropometric data (Kuru, Canbay Türkyılmaz, 2019). When the planning of the library is examined in this study, the main entrance is spacious enough for the preparation of children and parents. At the entrance of the library, sufficient space is left for parents and children to prepare, square cabinets and hangers are designed where children can leave their belongings. In the entrance areas of the libraries, there are no complex corridors and places with elevation differences. Considering the pandemic conditions, masks, disinfectants, and galoshes are kept in the entrance area and sufficient warnings are positioned for the children entering the interior to comply with the social distance rules. Immediately after the entrance, there is a tendency to the left side. Near the entrance there is awaiting area where parents and staff can observe the children. There is no information and lending area at the entrance. In the library, tables and chairs are in the middle of the space and shelves are against the wall. Although the tables and chairs are designed to suit children's ergonomics, they are not intended for parents. The distance between the two tables and between the tables and bookcases should be at least 600x900 mm (Kuru, Canbay Türkyılmaz, 2019). The distance that must be required for the passage of a person is at least 60 cm, and for the passage of two ki shins is at least 120 cm. In this study, the distance between tables and bookcases, the distance between two tables and the transition distances in the circulation areas were solved in accordance with the standard measurements. The design of the space should be made considering the anthropometric measurements of children, parents, and employees. As a result of the

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measurements made in the library, it was determined that the dimensions of the libraries were in accordance with the ergonomic criteria for the child.

The purpose of ergonomics in children's libraries is to ensure that the environment is arranged according to child users. In the design of children's libraries according to ergonomic conditions, it is ensured that productivity is increased by creating areas suitable for children's ages, anthropometric characteristics (Erten Bilgiç and Surur, 2016), perceptions and thought structures. Areas designed by considering ergonomics criteria support the physical, mental, and social development of the individual on the one hand and play a vital role in the formation of positive health behaviours and the reduction of the risk of accidents on the other hand. In this study, when the bookcases are examined, it is seen that the depth of the single-sided shelves is between 25 and 35 cm and the depth decrease as the shelves in the middle of the bookshelves are moved to the tops due to the design. The depths of the other double-sided shelves ranged from 55 to 65. It was determined that the transition distances between the libraries varied between 90 and 100 cm. It was determined that the inter-library measurements were suitable for the anthropometric data. The attractive design of the bookcases will allow children to interact more with the books and increase their desire and motivation to learn (Figures 13).

Figure 13. Different shelf design for children

Staff work office spaces do not meet the standards that should be in size and usage limits. The working area per librarian should be between 10 and 20 m² (Neufert, 2008). However, one study office is designed in the entrance section for individuals working in the KPP Children's Library. The average area of three people in the working office is 20 m². When we evaluate the suitability of three people, it is again an insufficient area. If the staff makes a meeting during the observations, the fact that their guests are in this office space shows that they are insufficient to meet this need.

The furniture used in the library is designed in accordance with the norms suitable for fire and accidents. Tables and bookcases are laminated

veneer. Although wood is positive in terms of human psychology, wood is a dangerous material in terms of fire. Thanks to the laminate coating used in the furniture, both the feeling of wood is created in the psychology of people and the accidents that may occur in case of fire are reduced. Transparent protectors are not placed on the surface of the tables, which can prevent injuries that may occur in accidents (Figure 14). In addition, some details in the library, such as cabinet doors and hangers, are made of unnecessary designed and poor-quality materials.

Figure 14. Event place, dream table.

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In addition, IFLA (2018) states that space and furniture should be made considering child safety regulations in the design of spaces (IFLA, 2018). The children's library should be a safe place and staff should be aware of local legislation regarding health and safety. In this context, there is a first aid kit in the library, the stairwells are suitable for children, the stair railings are suitable for children, the stair treads are not slippery, the necessary notifications have been taken for door and glass mouldings to prevent possible accidents, there is a smoke-fire and water detection system, the material edges are not sharp, there are emergency assembly centres, the heaters are in areas where children cannot reach, the electrical outlets are closed, There is an automatic fire extinguishing system.

The implementation of measures related to the COVID 19 pandemic in the recent period is among the issues that need particular attention. Social distancing, masks and cleanliness are to be considered by library staff. It is recommended to create areas where children are allowed to live away from each other.

CONCLUSION

This study, which aims to analyse the spatial design of library structures through the Seljuk Municipality KPP Children's Library in line with IFLA (2018) recommendations, reveals the inadequacies in the library structure thanks to the multidimensional approach to space

(physical (user age ranges, lighting, colour, noise, comfort, signage and directions, accessibility), ergonomics, security and health) and addresses them. As a result of the study, the design of the building as a municipal building and its subsequent conversion into a library caused some parameters proposed by IFLA (2018) to not be adequately met.

• The fact that the library is located on the third floor has limited its relationship with the environment. Although it is also important to give the idea that the book can be read anywhere in the book-space relationship, the fact that it is not on the ground floor has caused the child's relationship with the external environment to be broken. Considering that it has an impact on child psychology, it is recommended that the libraries be located on the ground floor during the design phase.

• The location of the library in the centre of the city and on a noisy street adversely affects the noise level. At the same time, the air conditioning units in the library increase the noise in the reading rooms. In the observations made, it was seen that acoustic control and noise-cancelling measures were not taken in the library. While carpet should be used as a sound-absorbing material in places, sound control could not be provided by using laminate flooring in some sections. It is recommended to use reinforcements and elements that reduce sound.

• The natural lighting of the library is used uncontrollably. Building elements (light shelves, prismatic panels of photochromic glasses, etc.) that will provide control of the sun have not been used in the space. As the space moves away from the window, the need for artificial lighting has increased. An efficient lighting design is needed in all areas for the children atypical.

• Uncontrolled sunlight in the library during daylight hours causes the temperature to increase. Itis difficult to provide a comfortable climate environment as the space is tried to be cooled with two hall-type split air conditioners. Too much heat can cause distraction from users and employees. It is recommended to increase the building elements that will provide control of the sun in the space.

• In the library, interior design was realized by considering the anthropometric characteristics of the child, parents and working staff. It has been determined that transitions are appropriate in the distances between the bookcases, between the books and the desks and in the circulation areas. It is necessary to rearrange the equipment (bookshelves) in the space in accordance with the body measurements and standards of the children.

• The fact that the library consists of a single space has led to the disregard of the need for navigation signs. The lack of markings, especially for disadvantaged children, is a big shortcoming.

• There is no care room for infants or children in the library examined within the scope of this study.

• When the library is evaluated in terms of pandemic measures, it has been observed that no other measures have been taken apart from

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measures such as user capacity and time limit. It is recommended to pay
attention to the social distance rules in terms of space.

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Resume

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Visibility and Globalization Levels of Architectural Firms under the Influence of Internet and Internationalization: A Speculative Research

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Abstract

In a world dominated by the Internet, visibility is becoming increasingly important, and the visibility of architectural firms has also increased with the impact of internationalization. Architectural firms are increasing their visibility, both through the rapid dissemination of information provided by the Internet and by starting to use social media tools. This article explores the relationship between the visibility and the globalization of architectural firms in the year 2022. The article challenges the perception that all well-known/visible architectural firms can be global. The research has two time periods. (before and after 1985, the Internet Revolution). During the data collection phase, 20,942 architectural firms were scanned; a cluster of 522 firms in 49 different countries was formed; 10 different variables were studied in these firms. The 10 variables examined were determined according to the common and majority characteristics of the globalized architectural firms (44 firms) founded before 1985. The investigated variables enabled us to determine the globalization and visibility characteristics of the architectural firms founded after 1985. In the analysis phase, the firms were separated according to their countries (49 countries) and the levels of visibility and globalization were calculated by taking the averages. The levels of visibility and globalization were determined at three levels: low, medium, and high. Not every architectural firm with high visibility has a high level of globalization; it has been determined that every company with a high level of globalization is not visible enough and that there is no homogeneous relationship between globalization and visibility levels. The originality of the research lies in the use of Archdaily, which allows the scanning of 20,942 architectural firms, as a data source and the documentation of its data in 2022.

INTRODUCTION

Changes often result in developing and staying far from permanence. The long-standing change / transformation of the world with the capitalist economic system continues unceasingly with the effect of globalization. Globalization has been mentioned extensively in the literature but does not have agreed / clear criteria. It transforms all the concepts with which it interacts. Economists, lawyers, sociologists, critics, urban planners, and architects still discuss its negative and positive effects. It is possible to question the realization level of globalization, an accepted tool of the dominant ideology / a tangible result in daily life.

"For me, architecture is a global issue. There is no ecological architecture, no intelligent architecture, no sustainable architecture— there is only good architecture. There are always problems we must not neglect; for example, energy, resources, costs, social aspects—one must always pay attention to all these." (Souto de Moura, 2011)

Architecture is both global in nature, as in the words of Souto de Moura, and has a structure that adapts and transforms to the globalized world. The acceleration of access to information has increased the speed of globalization and expanded its field. Being able to navigate in 3D environments thanks to advanced mapping methods, accessing architectural literature quickly, and following the architect's thoughts from all kinds of multimedia environments are today's developments. With all these developments, the "*visibility*" of architecture and architects has also increased. A global environment has emerged where everyone and everything is visible.

Considering the requirements of being global, it turns out that not everyone / everything that is visible is global. For example, from a global economic perspective, not all parts of the world have a global economy. As Knox and Taylor (1995: 6) stated, world cities are the centers where the economy is international, where information, telecommunications, commerce, and large corporations exist. World cities form nodal points for independent flows (economic, social, and cultural flows). In terms of visibility in the architectural media, for example, Apollo Architects & Associates has the highest number of projects (42) published on Archdaily in 2008, as cited by Cimadomo, García Rubio, and Shahdadpuri Aswani (2018). Although the number of projects followed in Archdaily has increased to 51 according to the 2022 data of Apollo, there is still no architectural production outside of Japan. In summary, the globalization spread worldwide may not be valid for all parts of the world, and everything visible may not be completely globalized.

The predictions and questions of this article, which questions the visibility-globalization relationship - dilemma, are as follows: Have the architectural firms opened after the Internet revolution become more globalized than those opened before the Internet revolution due to catching up with the period when globalization gained momentum? What

are the globalization and visibility levels of the companies established after the internet revolution? What are the qualifications of globalizing architectural firms? Since the concepts of globalization and internationalization can be confused, there is a need to separate them in investigating these questions. To keep the scope of the research as comprehensive as possible, all the architectural firms listed on the Archdaily platform, one of the most famous architectural media tools, are browsed and studied. Globalization strategies of 44 global companies established before the Internet Revolution were determined, and other companies were examined according to these strategies and their visibility. After the data collection process, the comparative method was applied in the research as follows: Firstly, the globalization of the architectural firms established before and after the Internet Revolution was compared. Secondly, the architectural firms established after the Internet Revolution were categorized by countries; their level of globalization and visibility were compared. The study may be unique in analyzing the visibility and globalization of architectural firms listed on Archdaily and documenting data for 2022. In this context, this article first establishes a conceptual framework: the concepts of globalization, internationalization, the Internet, and visibility and their relationships are examined. Secondly, the globalization qualifications of architecture before and after the Internet Revolution are discussed. Subsequently, the research on the visibility of firms that carry out contemporary architectural practice in the contemporary world of high globalization is presented.

CONCEPTUAL FRAMEWORK

Investigation of the etymological origin of globalization indicated that globalization was first used in 1959 (Online Etymology Dictionary, 2022). In the literal definitions, the definition of economics is emphasized first. Secondly, it is emphasized that different cultures become similar (Oxford Learner's Dictionaries, 2022; Cambridge Dictionary, 2022). It is safe to state that Britannica's definition "*to make (something) cover, involve, or affect the entire world*" is the most comprehensive statement in this regard (The Britannica Dictionary, 2022).

Globalization means the new organizational form of capitalism created by the developments in technological and institutional structuring and the functioning of capital worldwide (Yirtici, 2002: 10). Giddens (1990: 63) defines globalization as a social process by considering events, relations, and circumstances. "*Globalisation can thus be defined as the intensification of worldwide social relations which link distant localities in such a way that local happenings are shaped by events occurring many miles away and vice versa*". According to Urry (1999: 103), the globalization that feeds capitalism is based on the developments related to technology, satellite, communication, travel, the increasing number of institutions and organizations, and the use of the international

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language (English). All these definitions show that globalization is related to various concepts, such as society, economy, daily life, and commercial organization.

Jacobs (1969:38) states that cities did not grow independently of other cities throughout history without establishing relationships. Due to this situation observed in modern and pre-modern times, similar assumptions are made even for the pre-historic periods. In other words, the relationship between cities indicates development/growth. However, globalization started with modern periods and eventually, definitions of world-city or global city were needed for cities. The answer to why globalization started with the modern can be found in what Giddens (1990: 64) stated about the structure of modernity. ''*Modernity is inherently globalising-this is evident in some of the most basic characteristics of modern institutions, including particularly their disembeddedness and reflexivity.*'' The nature of modernity, where the relationship with the local/traditional is broken, is suitable for creating a single character.

The factors that create globalization cannot be considered new. Capitalism has had dynamics to create this order for a long time (Calhoun, 2018: 34). The modern world system that constitutes today's economic system is defined in three periods: mercantile modernity (sixteenth and seventeenth centuries), industrial modernity (eighteenth and nineteenth centuries), and consumer modernity (twentieth and twenty-first centuries). However, in the current times, the broadest form of global corporations has been reached beyond the consumption modernity with the development of information and communication networks. Multinational companies developed global strategies in the 1970s and became '*transnational*' and the largest '*global corporations*' respectively, increasing the pace of globalization in the 21st century (Taylor, 2004: 11-12). Castells (2010: 17) states that a new era has started since the 1970s (information age). The characteristic of this age is '*action of knowledge upon knowledge*'; this basis constitutes '*the space of flows*'. In short, it is safe to mention that the rapid dissemination and continuous production of information thanks to communication technologies is the factor that creates the '*space of flows*' defined by Castells. As the space of flows is formed, the formation of global networks causes the formation of global cities. To sum up, all these are the catalysts of globalization.

Since internationalization and globalization are closely related concepts, they may be interchangeable. However, it is necessary to emphasize the difference between them. The verb 'internationalize' is defined as ''*to make (something) involve or affect two or more countries*'' (The Britannica Dictionary, 2022). This concept, which emerged with the interaction between the two countries, cannot be synonymous with globalization. Being multinational, transnational, and finally defined globally results from this leap reaching beyond the pre-set borders.

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Therefore, it can be stated that the concept of internationalization is covered by globalization and cannot exist without internationalization.

"We are in the epoch of simultaneity: we are in the epoch of juxtaposition, the epoch of the near and far, of the side-by-side, of the dispersed. We are at a moment, I believe, when our experience of the world is less that of a long life developing through time than that of a network that connects points and intersects with its own skein." (Foucault, 1994)

Media addiction creates the feeling that globalization is inevitable (Calhoun, 2018: 66). The fact that media tools now have both visual and auditory qualities increases this dependence on media. Considering the difference between the TV and Internet society will also provide a better understanding of the pace and expansion of globalization. The history of the Internet demonstrates the changes that occurred upon introducing the '*WorldWideWeb*', which dates back to 1990, into daily life. Berners-Lee created the '*WorldWideWeb*' in 1990, and Internet enthusiasts set up their websites quickly (Science Media Museum, 2020) is revolutionary. Access to the Internet provides independence from space and includes synchronicity. The nature of the Internet is the enormous impulse to globalization. Although the acceleration of information flow is an incredible innovation in TV-dominated times, it is a reality that TV is dependent on streaming provided. Since the transition to the Video on Demand (VoD) system, users have been able to access the desired content at any place and time. In other words, with the Internet and simultaneity, the infiltration of information into every stage of daily life has been ensured, which is the reason why the Internet is constantly expanding globality.

A globalizing structuring becomes visible due to its nature. But as the number of things the Internet makes visible worldwide increases, it becomes harder to distinguish what is global and what is not. The relationship between the global and the visible may vary depending on the location, event and area. It is clear that globalization has many factors, impulses, and results. It can be stated that it is multidimensional with its structure nourished from every field while adding new dimensions to every concept it combines. Global cities and the networks between them, along with people's participation in globalization at various scales, became one large network system by 2022. It is possible to create a perception that there is only one global world within this network system. In this multidimensional globality and increasing visibility, the position of architectural practice for 2022 becomes a debatable issue.

RESEARCH METHOD

An approach has been developed in this study to examine firms practicing contemporary architecture, considering the conceptual framework built on globalization, internationalization, the Internet, and visibility. This research was carried out on the Archdaily platform, where

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the architect / architectural firms / projects / architectural literature are visible, and on the personal websites of the companies. Therefore, it is necessary to mention the content and the examined interface of Archdaily, one of the leading architecture platforms that emerged as a blog / magazine in 2006 but has been updated over time. According to the data 2020, the website, which reaches 13.6 million monthly visitors, is widely used by architects and architecture students (Petit & Infante, 2020). The platform provides many themes and there are many options, from projects to companies and news. Archdaily works like a machine that ensures architecture's visibility and the production of publications about architecture, creating an extensive database (Figure 1).
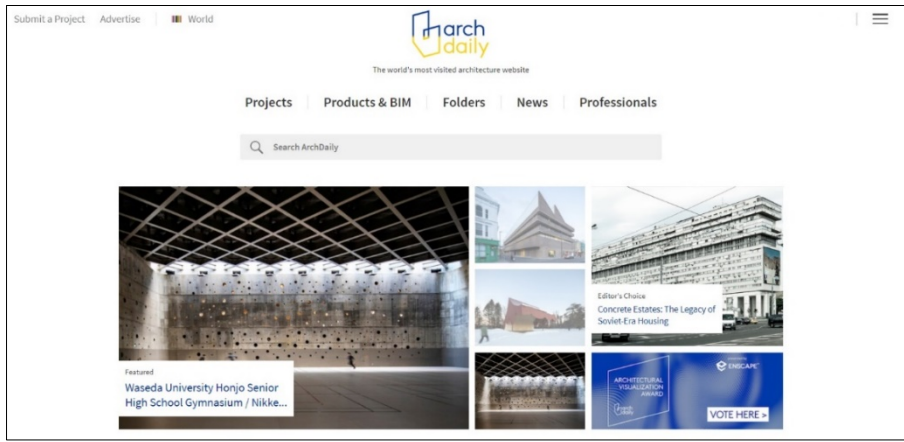
Figure 1. Archdaily Homepage (Archdaily, 2022)

After the latest updates, Archdaily has started to show the profile of architects, which can be accessed from the '*professionals*' section. It is possible to say that Archdaily, which provides the opportunity to follow, send messages, and watch / save shares like on Instagram or Facebook platforms, works as the social media of architects. According to Cimadomo et al. (2018), it could be estimated that architectural firms are regular users of Archdaily. In the mentioned social media platforms; numbers, in other words, visibility, are significant. Millions of people also follow the pages of architectural firms on Archdaily. In this context, it can be stated that the platform has a structure that serves visibility.
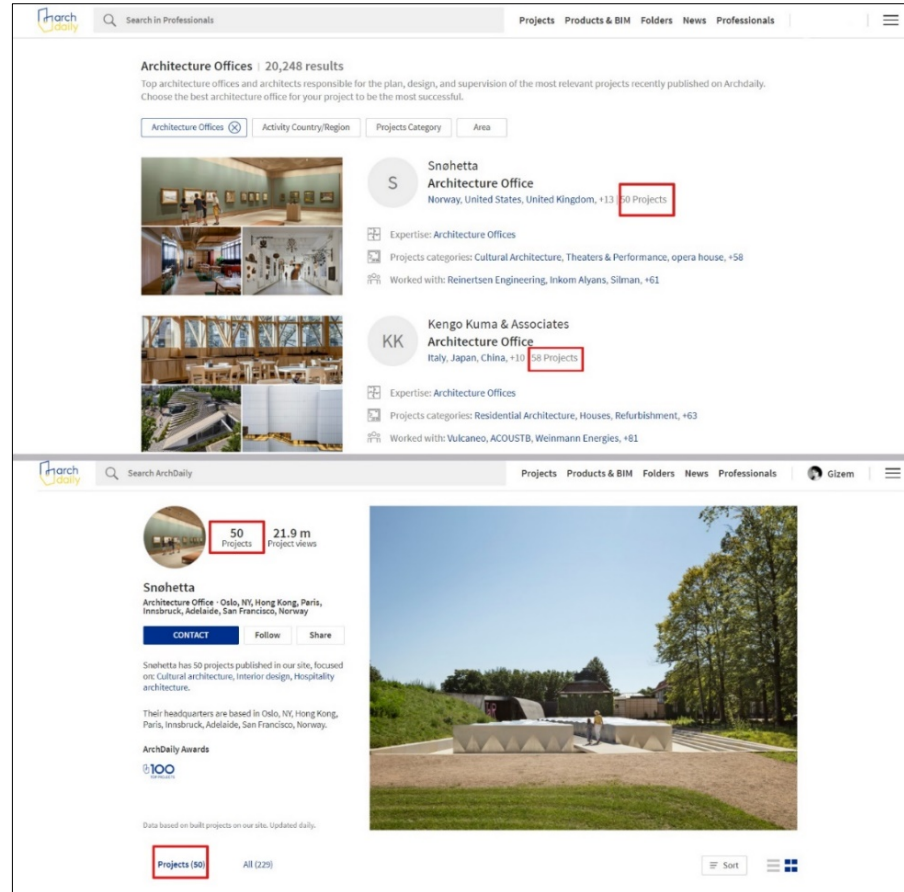
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When the '*professionals'* tab is selected in Archdaily, '*expertise*', '*activity country / region'*, '*projects category*', and '*area categories*' can be opened. The research conducted by selecting only the architectural offices showed 19,126 architectural firms in October 2021, 20,216 in May 2022, and 20,942 architectural firms in September 2022. On a daily basis, the number is updated, and accounts of new architectural firms are created. There are 100 different country filters in the '*Activity country / region*' category. The list of architectural firms includes the firm's name, office locations, and the number of published projects. It is possible to access all the articles / contents written about the selected architectural firm, except for the projects (Figure 2).

During the research period, 20,942 architectural firms constituted the most extensive repository used within the research. The data collection phase and then the analysis phase of the collected data to perform division into clusters will help explain the research method.

Data Collection Phase
Status definition

To facilitate the scanning, 100 country categories offered by Archdaily were used. The following was applied to the screening of 20,942 architectural firms:

• Only architectural firms were selected. Firms that only worked on interior architecture or urban design projects were eliminated.

• Countries were selected in alphabetical order.

• Firms with less than 10 projects in Archdaily were eliminated. The accounts of companies with ten or more projects were accessed.

• A dataset in which the establishment years of the companies and the number of existing projects on Archdaily are listed was created.

A total of 522 companies were listed in 49 countries. In the list, 392 companies were established in 1985, and later; 72 companies established before 1985 were identified. The establishment year of 58 companies could not be found.

Limitations in the data collection phase can be listed as follows:

1. Globalization studies worldwide are not carried out over changing country borders but through cities with globalized economies. However, since this research was limited to the Archdaily platform, 100 country categories were researched.

2. It has been stated in the previous sections that 1990 was the year the Internet entered daily life. Comparisons were made between companies born in the internet age and companies established before. However, the distinction was made in 1985 instead of 1990 because it was thought that 5-year-old architectural firms would be new and easily adapted to the Internet Revolution.

3. There have been 39 different architects who have won the Pritzker Architecture Prize since 1985. With this research method, firms of 39 architects were examined. However, they are not included in the calculations. This is because it is not logical to question the globality and visibility of the global and most prestigious architectural firms.

4. There are more offices in Archdaily whose establishment date is marked after the Internet Revolution than previously established offices. Since this research was limited to the Archdaily platform only, it was not necessary to take an equal number of samples from both date ranges. Only the result from the date ranges was evaluated.

Feature detection

As the article aimed to discuss the relationship between visibility and globalization, it was necessary to collect more information about the characteristics of firms.

In 2022, social media occupied a prominent place in daily life. The widely used social media platforms, which initially allowed the creation of personal accounts, have been updated to allow the opening of corporate accounts. The visibility of a corporate company in social media accounts provides advertising. Increasing visibility and having many followers are the goals arising from the nature of social media environments. Tags, various ways of sharing, being online, number of followers, registrations, and likes all serve the purpose of visibility. Being

included in these networks means being in a global network. Their visibility on Archdaily is based on the number of projects only. The reason for this is the information written in the interface encountered in Archdaily when the 'professionals' tab is clicked. After the statement '*Find the right team of professionals for your project to be the most successful*', the companies are listed. Therefore, it is clear that the first company that anyone will apply to when looking for the right place for their project will be a company conducting numerous projects.

The globalization-related position of architectural firms in 2002 was discussed by Knox and Taylor (2005) who, in their research examining the globalization of architectural practice through architectural firms, examined the extent to which architectural practice adopted globalization within the network formed by globalized world cities in 2002. They found that architectural firms globalized more slowly than firms with giant economies in world cities. Knox and Taylor (2005) explained the globalization strategies which were observed in architecture in 4 essential items:

1. Client focus
2. Location-independent, uninterrupted service
3. Ability to establish a relationship between the local and the global: To be able to produce global solutions by using the knowledge of the local
4. Ability to offer services packages other than architectural services

Companies may have their own different strategies in many different areas, such as growth and product/service development. However, the strategies that serve the purpose of globalization in the 21st century are similar. To understand whether the strategies determined by Knox and Taylor are valid in 2022, globalized firms that were established in the 20th century and still continue their architectural practices were researched. Forty four different global architectural firms[1], out of 72 established between 1905 and 1984 were examined in detail. The equivalents of four items explained by Knox and Taylor in the architectural practice examined in 2022 are respectively as follows:

Focusing on customers' wishes is common in architecture, like many elements and processes commodified with capitalism. Being customer-oriented is no longer an element that these companies especially emphasize since it has become an accepted and expected phenomenon. The act of providing an uninterrupted service has become entirely accustomed to the remote working order during the global epidemic (pandemic). Remote working methods are used in production and service process and continue developing. The benefit to be gained from the knowledge of the local, reflection on the context, the connection between the local and the new are specified as jury criteria in many architectural competitions[2]. Mennan (1999) emphasized that the differentiation of information access channels and storage methods made global development faster than in the industrial period. The structuring caused by today's epistemological framework creates an environment where the

[1] Gmp Architekten, WAA (Wiel Arets Architects), Richard Meier & Partners, Grimshaw, Pelli Clarke Pelli Architects, HOK, Olson Kundig, NBBJ, KPF, Diller Scofidio + Renfro, Skidmore Owings & Merrill (SOM), CannonDesign, Gensler, Goettsch Partners, Safdie Architects, GBBN, Steven Holl Architects, Sasaki (Hideo Sasaki), WilkinsonEyre, Woods Bagot, Coop Himmelb(l)au, Philippe Samyn and Partners, Foster + Partners, Sheppard Robson, BDP, Feilden Clegg Bradley Studios, Marcio Kogan, Henning Larsen, C.F. Møller, OOPEAA, Arte Charpentier, Mecanoo, Alberto Campo Baeza, Ricardo Bofill, IDOM, White Arkitekter, Sweco Architects, Renzo Piano Building Workshop, HIBINOSEKKEI, Tadao Ando Architect & Associates, Sordo Madaleno Arquitectos, LEGORRETA, Nordic Office of Architecture, ONG&ONG Pte Ltd.

[2] For example, in The Architizer / The 10th Annual A+Awards jury criteria (Architizer A+Awards, 2022), the desire was to bring a new and contemporary interpretation to the existing typology and to consider the relation of projects with the 'local context' in the RIBA Awards 2022: Jury application announcement (RIBA Awards, 2022).

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boundaries of disciplines are mixed with each other, resulting in transdisciplinary relations. It is inevitable for architecture to become multidisciplinary in a world where transdisciplinary is discussed. Therefore, companies cannot be expected to be limited to serving only in the field of architecture. For the ability to engage in multidimensional discussions in the multidimensional world, a multidisciplinary approach is required. In short, the items stated by Knox and Taylor are the characteristics of companies that continue their professional practice in 2022. The characteristics of 44 companies along with other observed common features have been updated and transferred to Table 1.

Table 1. Globalizing architectural firm qualifications

Characteristics observed in the majority of globalizing architectural firms	Descriptions
Customer centricity	In the majority of companies, there is an emphasis on being customer-centricity.
Establishing a relationship between the local and the global	It stands out as a jury criterion in most of the competitions won by the companies.
Being multidisciplinary	The majority of companies emphasize that they provide different services other than architecture.
Developing discourse on global issues	It is observed that most companies emphasize globality on their websites and underline current world problems (such as ecology, and sustainability).
Having multiple offices	Most have multiple offices, but there are exceptions. (See Marcio Kogan (Studiomk27, 2022).
Qualities observed in all globalizing architectural firms	**Descriptions**
Project production worldwide	Most companies show that they produce in different locations on world maps in their promotions. It is observed that all of them produce on at least three continents.
Achieving international awards + achievements	All companies emphasize the international awards they have won in their promotions.
Producing in the written /digital publications	All companies have printed publications; they advertise/sell these publications.
Being mentioned in the written /digital media	All of the companies advertise the publications written about them by others. Also, most offices have video/film releases apart from their written ones. (See Gmp Architekten (GMP, 2022), Legorreta (Legorreta, 2022).
Being visible on social media networks	It can be observed that all globalized architecture firms are present on various social media networks (such as Instagram, Facebook, and Linkedin). It is also possible to watch them on websites (Archdaily, Archello). Being accessible and up-to-date is what this environment provides.

Popularized digital architecture platforms make well-known projects, firms, or architects visible and make the lesser-known ones stand out (Cimadomo et al., 2018). Being able to access the visuals and information of architectural productions, the discourses and approaches of architects

faster than before, independent of space, may lead to the thought that all of them are globalized. However, whether each architectural firm with high visibility fulfills the abovementioned criteria can be investigated. Moreover, whether each architectural firm with high visibility provides the qualifications specified in Table 1 can also be investigated. The method of determining the characteristics of the rest of the data (architectural offices established after 1985) was decided according to the characteristics in Table 1 (the first three items were collected in the first stage).

1. The country where the companies are located (if there is more than one office, the location of the headquarter has been determined.)

2. Year of foundation

3. Number of projects published on Archdaily

4. Number of company offices

5. Existence of customer-oriented discourses on global problems

6. Whether they provide multidisciplinary services

7. Locations of the projects they produce

8. International / national award and achievement status

9. Status of website and social media

10. Presence of publications about themselves and about others

Analysis Phase

The list of information collected about the companies was created by dividing them into country categories. Analyzes were performed on this information. Certain limitations were presented in calculating the globalization score. What was mainly observed in the characteristics of companies established before 1985 and known to be globalized was also observed mostly in companies established after 1985. For example, it has been observed that a company that manufactures worldwide and has achieved international visibility with its awards has only one office. Therefore, the characteristics observed in all globalizing companies are based on Table 1, and the companies with all these characteristics are considered globalized. How many architectural firms established before and after 1985 became global was reflected.

After this general comparison, the relationship between globalization and visibility levels of architectural firms established in the Internet era was compared.[3] While calculating the visibility score, all companies in the list with and without global qualifications were considered. Separate scores are created for each country. For example, if five companies appeared on Archdaily in a country, the number of projects published on Archdaily by five different companies was added up; the average was calculated by dividing the total number by the number of firms. The resulting number was considered as the visibility score. All visibility scores were then summed, and the visibility score for each country was divided by the total score and multiplied by 100. In other words, the visibility percentage was calculated separately for each country. This

[3] It may not be correct to discuss the visibility of globalized companies established before 1985 and compare them with those established after 1985. The 44 visible architecture firms in question have already been visible for a long time, and discussing their visibility on Archdaily may be unrealistic. The qualities of these companies, which are known to be global, were researched in the companies established after the Internet, and it was investigated whether each visible company had global characteristics.

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gave the lowest (0.85) and highest (4.36) values, as shown in Table 5. Three equal intervals were created between these values: low, medium, and high visibility levels were thus determined (Table 2).

Table 2. Visibility level ranges

Low Level	Medium Level	High Level
0.85 – 2.01	2.02 – 3.18	3.19 – 4.36

The projects of all the companies researched were examined, and whether they were produced worldwide was understood. At the same time, whether the awards they won were national or international was also investigated. Offices that produce projects in at least 3 continents and more are producing worldwide; those which manufacture in their own country or two continents were accepted non-worldwide. These two attributes did not affect the score, as all companies were involved in at least 1 written or digital publication and all had social media accounts. The equation for the globalization score is as follows:

Number of offices that produce projects worldwide and have international awards = x; Number of offices that produce projects worldwide and have national awards = y; Number of offices that produce non-worldwide projects and have international awards = z; Number of offices that produce non-worldwide projects and have national awards = t

$$\frac{x \,/\, x+y+z+t}{100}$$

The resulting scores were calculated separately for each country. The globalization score for each country was then divided by the total score and multiplied by 100. In other words, the globalization percentage was calculated separately for each country. This produced the lowest (0) and highest (4.93) values, as shown in Table 5. Three equal intervals were created between these values: low, medium, and high levels of globalization (Table 3).

Table 3. Globality level ranges

Low Level	Medium Level	High Level
0.00 – 1.64	1.65 – 3.29	3.30 – 4.93

FINDINGS

The findings obtained as a result of the research are presented in this section. Of the architectural firms, 61% established in or before 1984 and listed on Archdaily were globalized. Moreover, 22% of architectural firms established in 1985 and later became globalized. The number of companies after the internet revolution was about 5 times more than before (Table 4).

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Table 4. Globalization percentages of architectural firms on Archdaily

Date range	Total number of firms	Worldwide and international award-winning	Others		Globalization percentage
Before 1985	72	44	28		61%
After 1985	392	86	293		22%

Visibility scores and globalization percentages can be compared in the analysis list, where 49 countries are listed alphabetically. The list (Figure 3) is of architectural offices established in 1985 and later.[4] It is necessary to examine the globalization strategies by checking the general list[5] of 522 companies created through Archdaily and the list in Figure 3 together:

1. Number of firm offices: Among 127 globalized companies, 63 had offices in different countries. Of them, 34 were established after 1985. However, an example had more than one office even though it has never been globalized. In Belgium, B2Ai had three separate offices. However, all offices were in the same country. Except for Belgium, it produced projects only in China. The architecture firm of Allford Hall Monaghan Morris in the UK and the SmithGroup in the USA had different offices within the country and were not globalized. In Brazil, SPBR Arquitetos produced projects worldwide; it had international successes and only one office. It is an example that was able to produce projects in different geographies without increasing the number of offices, and there were other examples, albeit few. Sordo Madaleno Arquitectos, founded in Mexico in 1937, is an example that had a single office but was globalized. Kokaistudios in China, Dorte Mandrup in Denmark, Manuelle Gautrand Architecture and ANMA in France, Rintala Eggertsson Architects in Norway, and KWK PROMES in Poland also had a single headquarter despite their globalization.

2. Developing a discourse on global issues and being customer-oriented: The publications and websites of the vast majority of globalized companies contain discourses on globalism and global issues. At the same time, they emphasize being customer-oriented. This is the impression obtained from the globalized ones among 522 companies. For example, BIG's United Nations Global Compact Report named 'COP 2020 Global Compact BIG—Bjarke Ingels Group' published in 2021, shows their approach to many global problems from climate crisis to discrimination (BIG, 2021: 1-27). On its website, the firm Snøhetta highlights the contribution of working globally to the designer. They state that cultural and economic knowledge can be acquired by globalizing (Snøhetta, 2022).

3. Whether they provide multidisciplinary services: What is observed in offices in both periods studied is that most offices, whether globalized or not, provide services other than architecture (such as interior

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architecture, lighting, urban design, furniture design, product design, graphic design, brand design). However, those that turned into building-construction companies other than architecture mainly are the ones which became globalized before 1985, and these companies provide service in the form of service packages.

4. Worldwide project production[6]: Out of 522 architectural firms, 232 produced projects only within the country where they were founded. Furthermore, 163 companies produced projects outside the country's borders, and they could not spread to the world.

5. International awards + achievements: All companies that produced projects worldwide had international awards and achievements. Out of 395 non-worldwide companies in Archdaily, 101 had national awards. Among the companies established after 1985, 160 non-globalized companies had international awards.

6. Being visible in social media networks: As an architectural media, Archdaily works like an architectural social media, as can be seen in Figure 2. It is essential for all companies researched to be listed on Archdaily. Presumably, these architectural firms use Archdaily regularly. Apart from this, many companies add Instagram and Linkedin addresses to the 'contact' tab along with their websites.

7. Producing / being mentioned in the written / digital media: There are publications written about all offices determined to be globalized. Most of them have their own publications.[7]

[7] In this study, the companies' monographs and annual project selections were accepted as the publications they produced.

Argentina — globalization percentage 0%

visibility score	global	non-global	Location	
	-	14	worldwide	non-worldwide
Awards	International		0	0
	local		0	4

Australia — globalization percentage 4%

visibility score	global	non-global	Location	
	15.5	16.09	worldwide	non-worldwide
Awards	International		1	18
	local		0	4

Austria — globalization percentage 20%

visibility score	global	non-global	Location	
	13	14.8	worldwide	non-worldwide
Awards	International		1	5
	local		0	0

Belgium — globalization percentage 0%

visibility score	global	non-global	Location	
	-	14.4	worldwide	non-worldwide
Awards	International		4	3
	local		0	6

Brazil — globalization percentage 18%

visibility score	global	non-global	Location	
	-	14	worldwide	non-worldwide
Awards	International		2	0
	local		4 (1*)	4

Canada — globalization percentage 7%

visibility score	global	non-global	Location	
	10	16.07	worldwide	non-worldwide
Awards	International		1	3
	local		0	8 (3*)

Chile — globalization percentage 0%

visibility score	global	non-global	Location	
	-	11.6	worldwide	non-worldwide
Awards	International		0	2
	local		0	3 (3*)

China — globalization percentage 11%

visibility score	global	non-global	Location	
	19.75	15.93	worldwide	non-worldwide
Awards	International		4	18
	local		0	11 (2*)

Colombia — globalization percentage 0%

visibility score	global	non-global	Location	
	-	17	worldwide	non-worldwide
Awards	International		0	1
	local		0	(1*)

Costa Rika — globalization percentage 0%

visibility score	global	non-global	Location	
	-	16	worldwide	non-worldwide
Awards	International		0	1
	local		0	0

Crotia — globalization percentage 0%

visibility score	global	non-global	Location	
	-	15	worldwide	non-worldwide
Awards	International		0	1
	local		0	1

Czech Republic — globalization percentage 0%

visibility score	global	non-global	Location	
	-	10	worldwide	non-worldwide
Awards	International		4	0
	local		0	1

Denmark — globalization percentage 55%

visibility score	global	non-global	Location	
	24.8	14.75	worldwide	non-worldwide
Awards	International		5	3
	local		0	1

Finland — globalization percentage 0%

visibility score	global	non-global	Location	
	-	17	worldwide	non-worldwide
Awards	International		0	0
	local		0	(1*)

France — globalization percentage 23%

visibility score	global	non-global	Location	
	10.8	12.88	worldwide	non-worldwide
Awards	International		5	7
	local		0	9 (1*)

Germany — globalization percentage 75%

visibility score	global	non-global	Location	
			worldwide	non-worldwide
Awards	International		6	1
	local		0	1

Greece — globalization percentage 0%

visibility score	global	non-global	Location	
	11	-	worldwide	non-worldwide
Awards	International		0	1
	local		0	0

Iceland — globalization percentage 0%

visibility score	global	non-global	Location	
	-	10	worldwide	non-worldwide
Awards	International		0	0
	local		0	1

India — globalization percentage 0%

visibility score	global	non-global	Location	
	-	12.69	worldwide	non-worldwide
Awards	International		0	7
	local		0	5 (1*)

Ireland — globalization percentage 0%

visibility score	global	non-global	Location	
	-	38	worldwide	non-worldwide
Awards	International		0	1
	local		0	0

Israel — globalization percentage 0%

visibility score	global	non-global	Location	
	-	38	worldwide	non-worldwide
Awards	International		0	1
	local		0	0

Italy — globalization percentage 40%

visibility score	global	non-global	Location	
	13	17.33	worldwide	non-worldwide
Awards	International		4	5
	local		0	(1*)

Japan — globalization percentage 19%

visibility score	global	non-global	Location	
	27.66	15.4	worldwide	non-worldwide
Awards	International		6	15
	local		0	7 (3*)

Latvia — globalization percentage 0%

visibility score	global	non-global	Location	
	-	10	worldwide	non-worldwide
Awards	International		0	1
	local		0	0

Figure 3. Analysis of the Relationship Between the Globalization and the Visibility After 1985. (*No awards.)

Lithuania	globalization percentage	0 %
visibility score	global: -	non-global: 13
Location	worldwide	non-worldwide
Awards International	0	0
Awards local	0	(1*)

Luxembourg	globalization percentage	0 %
visibility score	global: -	non-global: 10
Location	worldwide	non-worldwide
Awards International	0	0
Awards local	0	1

Mexico	globalization percentage	21 %
visibility score	global: 14.66	non-global: 12.72
Location	worldwide	non-worldwide
Awards International	3	3
Awards local	0	3 (5*)

New Zeland	globalization percentage	0 %
visibility score	global: -	non-global: 16.66
Location	worldwide	non-worldwide
Awards International	0	2
Awards local	0	(1*)

Norway	globalization percentage	40 %
visibility score	global: 33	non-global: 18.33
Location	worldwide	non-worldwide
Awards International	2	1
Awards local	0	2

Poland	globalization percentage	50 %
visibility score	global: 16	non-global: 14
Location	worldwide	non-worldwide
Awards International	1	0
Awards local	0	1

Portugal	globalization percentage	8 %
visibility score	global: 17	non-global: 15.36
Location	worldwide	non-worldwide
Awards International	1	6
Awards local	0	2 (3*)

Russia	globalization percentage	0 %
visibility score	global: -	non-global: 16.66
Location	worldwide	non-worldwide
Awards International	0	2
Awards local	0	(1*)

Singapore	globalization percentage	17 %
visibility score	global: 12	non-global: 29.4
Location	worldwide	non-worldwide
Awards International	1	5
Awards local	0	0

Slovenia	globalization percentage	40 %
visibility score	global: 22.5	non-global: 11.33
Location	worldwide	non-worldwide
Awards International	2	1
Awards local	0	2

South Africa	globalization percentage	100 %
visibility score	global: 43	non-global: -
Location	worldwide	non-worldwide
Awards International	1	0
Awards local	0	0

South Korea	globalization percentage	12 %
visibility score	global: 21	non-global: 14
Location	worldwide	non-worldwide
Awards International	1	4
Awards local	0	2 (1*)

Spain	globalization percentage	37 %
visibility score	global: 14.22	non-global: 13
Location	worldwide	non-worldwide
Awards International	9	13
Awards local	0	(2*)

Sweden	globalization percentage	50 %
visibility score	global: 10	non-global: 21
Location	worldwide	non-worldwide
Awards International	1	1
Awards local	0	0

Switzerland	globalization percentage	46 %
visibility score	global: 13.16	non-global: 11.42
Location	worldwide	non-worldwide
Awards International	6	1
Awards local	0	4 (2*)

Taiwan	globalization percentage	0 %
visibility score	global: -	non-global: 13
Location	worldwide	non-worldwide
Awards International	0	1
Awards local	0	0

Thailand	globalization percentage	0 %
visibility score	global: -	non-global: 12.54
Location	worldwide	non-worldwide
Awards International	0	6
Awards local	0	1 (4*)

The Netherlands	globalization percentage	39 %
visibility score	global: 19.42	non-global: 12
Location	worldwide	non-worldwide
Awards International	7	5
Awards local	0	5 (1*)

Turkey	globalization percentage	67 %
visibility score	global: 13.5	non-global: 10
Location	worldwide	non-worldwide
Awards International	2	0
Awards local	0	1

Ukrain	globalization percentage	0 %
visibility score	global: -	non-global: 13.33
Location	worldwide	non-worldwide
Awards International	0	1
Awards local	0	1 (1*)

United Kingdom	globalization percentage	54 %
visibility score	global: 17	non-global: 24.8
Location	worldwide	non-worldwide
Awards International	6	5
Awards local	0	0

United States	globalization percentage	42 %
visibility score	global: 14.53	non-global: 14
Location	worldwide	non-worldwide
Awards International	13	10
Awards local	0	7 (1*)

Uruguay	globalization percentage	100 %
visibility score	global: 14	non-global: -
Location	worldwide	non-worldwide
Awards International	1	0
Awards local	0	0

Vietnam	globalization percentage	0 %
visibility score	global: -	non-global: 18.63
Location	worldwide	non-worldwide
Awards International	0	7
Awards local	0	1 (3*)

Figure 3. (Continues...) Analysis of the Relationship Between the Globalization and the Visibility After 1985. (*No awards.)

Finally, when the relationship between globalization and visibility was examined, the companies with the highest visibility in Archdaily belonged to Norway with a visibility score of 51.33. The rate of globalization was 40%. The UK had a lower visibility score (41.8) than Norway, with a globalization rate of 54%. In Japan, which had a higher visibility score (43.06) than the United Kingdom, globalization was determined as 19%. In South Africa, with a high visibility score (43) and 100% globalization, only SAOTA was listed on Archdaily. (Table 5).

Table 5. Globalization percentages, visibility scores, and their levels summary table

Country	Globalization Percentages	Globalization Level	Archdaily-Visibility Score			Visibility Level
			global	non-global	total	
Argentina	0%	Low (0.00)	-	14	14	Low (1.19)
Australia	4%	Low (0.20)	15.5	16.09	31.59	Medium (2.68)
Austria	20%	Low (0.99)	13	14.8	27.8	Medium (2.36)
Belgium	0%	Low (0.00)	-	14.4	14.4	Low (1.22)
Brazil	18%	Low (0.89)	17.33	14	31.33	Medium (2.66)
Canada	7%	Low (0.35)	10	16.07	26.07	Medium (2.21)
Chile	0%	Low (0.00)	-	11.6	11.6	Low (0.98)
China	11%	Low (0.54)	19.75	15.93	35.68	Medium (3.03)
Colombia	0%	Low (0.00)	-	17	17	Low (1.44)
Costa Rika	0%	Low (0.00)	-	16	16	Low (1.36)
Crotia	0%	Low (0.00)	-	15	15	Low (1.27)
Czech Republic	0%	Low (0.00)	-	10	10	Low (0.85)
Denmark	55%	Medium (2.71)	24.8	14.75	39.55	High (3.36)
Ecuador	0%	Low (0.00)	-	10	10	Low (0.85)
Finland	0%	Low (0.00)	-	17	17	Low (1.44)
France	23%	Low (1.13)	10.8	12.88	23.68	Low (2.01)
Germany	75%	High (3.70)	28.5	12.5	41	High (3.48)
Greece	0%	Low (0.00)	-	11	11	Low (0.93)
Iceland	0%	Low (0.00)	-	10	10	Low (085)
India	0%	Low (0.00)	-	12.69	12.69	Low (1.08)
Ireland	0%	Low (0.00)	-	11	11	Low (0.93)
Israel	0%	Low (0.00)	-	38	38	High (3.23)
Italy	40%	Medium (1.97)	13	17.33	30.33	Medium (2.57)
Japan	19%	Low (0.94)	27.66	15.4	43.06	High (3.66)
Latvia	0%	Low (0.00)	-	10	10	Low (0.85)
Lithuania	0%	Low (0.00)	-	13	13	Low (1.10)
Luxembourg	0%	Low (0.00)	-	10	10	Low (0.85)
Mexico	21%	Low (1.04)	14.66	12.72	27.38	Medium (2.32)
New Zeland	0%	Low (0.00)	-	16.66	16.66	Low (1.41)
Norwey	40%	Medium (1.97)	33	18.33	51.33	High (4.36)
Poland	50%	Medium (2.47)	16	14	30	Medium (2.55)
Portugal	8%	Low (0.39)	17	15.36	32.36	Medium (2.75)
Russia	0%	Low (0.00)	-	16.66	16.66	Low (1.41)
Singapore	17%	Low (0.84)	12	29.4	41.4	High (3.51)
Slovenia	40%	Medium (1.97)	22.5	11.33	33.83	Medium (2.87)
South Africa	100%	High (4.93)	43	-	43	High (3.65)

Country	Globalization Percentages	Globalization Level	Archdaily-Visibility Score			Visibility Level
			global	non-global	total	
South Korea	12%	Low (0.59)	21	14	35	Medium (2.97)
Spain	37%	Medium (1.83)	14.22	13	27.22	Medium (2.31)
Sweden	50%	Medium (2.47)	10	21	31	Medium (2.63)
Switzerland	46%	Medium (2.27)	13.16	11.42	24.58	Medium (2.09)
Taiwan	0%	Low (0.00)	-	13	13	Low (1.10)
Thailand	0%	Low (0.00)	-	12.54	12.54	Low (1.06)
The Netherlands	39%	Medium (1.92)	19.42	12	31.42	Medium (2.67)
Turkey	67%	High (3.31)	13.5	10	23.5	Low (1.99)
Ukrain	0%	Low (0.00)	-	13.33	13.33	Low (1.13)
United Kingdom	54%	Medium (2.66)	17	24.8	41.8	High (3.55)
United States	40%	Medium (1.97)	14.53	14	28.53	Medium (2.42)
Uruguay	100%	High (4.93)	14	-	14	Low (1.19)
Vietnam	0%	Low (0.00)	-	18.63	18.63	Low (1.58)

In Figure 4, the graphic version of Table 5 is seen. The graph showed the total globalization and visibility levels of companies in 49 countries. Norway had the highest level of visibility at the medium globalization level. Israel, marked as a low level of globalization with a globalization rate of 0.00, had a high level of visibility. Uruguay had a high level of globalization and low visibility. Out of 49 countries, 29 had a globalization rate of 0.00. Moreover, 92 percent of low visibility countries were also at a low globalization level, and eight percent were at a high globalization level. There was no medium level of globalization. Half of the countries with medium visibility had a medium level of globalization, and the other half had a low level of globalization. Of the countries with high visibility, 25 percent had a high level of globalization, 37.5 percent had a medium globalization level, and 37.5 percent have a low level of globalization. The graph shows that there was not an entirely homogeneous distribution between globalization and visibility.
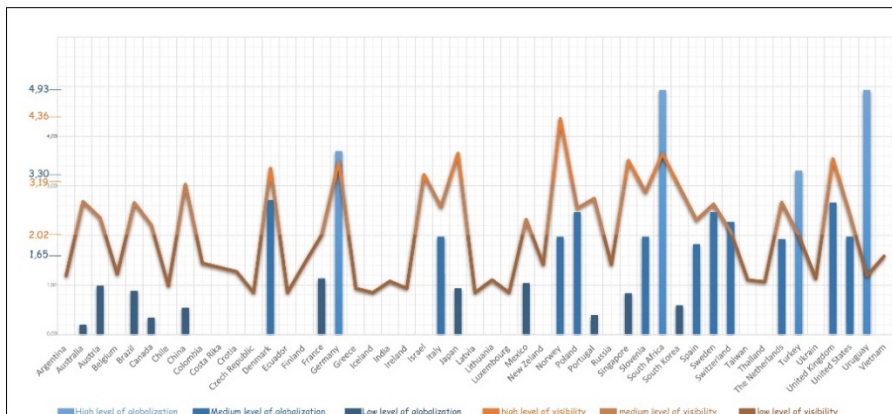

Figure 4. Globalization-visibility levels graph

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CONCLUSIONS

We live in a global world where everyone and everything can be seen in terms of information, politics, economy, architecture, and daily life. This global world causes the (false) perception that everything visible is global. This research showed that the relationship between visibility and globality was non-linear. There was not always a linear relationship between them. Because of such variability, visibility could not be expected to be a globalization strategy. Visibility scores and globalization percentages also showed no homogeneous globalization distribution worldwide (Figure 5).

It was thought within this study that architectural firms underwent a similar change according to their foundation years, based on the fact that globalization has expanded/accelerated very much with the Internet. However, in this study, which was limited to Archdaily, it was determined that companies established before the Internet revolution were more globalized than companies established after the Internet revolution, and the reason can be explained as follows: firms founded before 1985, which increased their capital in the process, might have grown more. Since every people and organization have adapted to the Internet, being established before or after the Internet may not make a dramatic difference. The rate of globalization of younger companies may also increase day by day. As understood from the result, companies provide most of the globalization strategies. In addition, it was revealed that the globalization characteristics used in the research are the characteristics of the companies that were established and globalized after the Internet revolution.

The global world is exposed to many flows. One of the flows affecting architecture is the information flow obtained through the Internet. Architecture, which adapts to emerging flows, is increasingly globalizing. It is safe to state that all architectural firms researched in this article are candidates for globalization. Updating themselves by considering the identified strategies will grow their economy and increase diversity in architecture. If the ability to develop projects in different geographies and have a global economy were valid for all the companies researched, architecture would become more vocal and richer than today. Globality can create sameness and similarity in different areas. However, by the nature of architecture, successful ones are original ideas. Considering that globalizing companies win awards on an international scale, architecture will not become the same in a fully globalized environment but will diversify. Future studies may investigate how globalization affects the architectural thoughts and designs of globalized architectural firms in contemporary architecture.

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Resume

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ICONARP

Determining and Ordering the Basic Evaluation Criteria in the Furniture Design Process

Adem Varol *

Abstract

It is seen that the design-oriented criteria in the furniture product have been analyzed through consumer or user preferences until today. However, the design criteria determined or evaluated through user preferences are not sufficient for the development of products. For this reason, it is necessary to determine the criteria in the design process in the furniture industry from an expert point of view, to determine the importance and weights of these criteria, and to develop standards. In this context, the aim of this study is to determine the criteria and sub-criteria in the furniture design process, and to analyze the importance ratings and weights of these criteria relative to each other. AHP, which is one of the multiple decision-making methods, was applied for the literature review and the analysis of the importance and weights of the criteria and sub-criteria determined by five different experts in the field. A total of 4 main criteria and 25 sub-criteria were determined in order to evaluate the furniture design process with the opinion of experts. Accordingly, the main criterion that has the most importance when evaluating the furniture design process is functionality. This criterion is followed by technical, conceptual and aesthetic criteria, respectively. Planning in accordance with the intended use (functional), material quality (technical), sustainability (conceptual) and form / shape (aesthetic) are the most important sub-criteria under the basic criteria. The findings of the study have the potential to contribute to the objective evaluation of the instructors working in the institutions providing education in the field, to determine the evaluation criteria in national-international design competitions, or to make a joint group decision by multiple decision makers in the sector.

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INTRODUCTION

The basis of the human-environment relationship is based on the space where the individual or society lives and the elements that define this space. Perception and use of the environment or space can be ensured by these elements that define the space. In a study analyzing the concept of home, furniture ranked first with 36% among the items defined as special or important by the individual (Csikszentmihalyi, 1991: 28). From this point of view, we can say that furniture is one of the most important elements in the relationship between environment and human. It can be said that furniture is very important in terms of the relationships it establishes for the individual or society, especially in a space surrounded by furniture.

We can say that the main basis of Csikszentmihalyi's (1991) finding on the importance of furniture by people is related to the communication and bonding established. This relationship can be formed through physical contact, as well as through sensory connection. Because the individual sees furniture as an expression of his identity and personality, is proud of owning the furniture and is emotionally affected by it (Ponder, 2013). For this reason, according to many studies on furniture preference, aesthetic criteria/values that stimulate the senses and emotions and give pleasure to the individual come to the fore more than technical or functional criteria (Crilly et al., 2004; Veryzer & Hutchinson, 1998; Barcic et al., 2021, Bloch, 1995). According to Er (2009), if people feel safer, more comfortable, efficient or happy when they relate to a product, they are more enthusiastic about buying that product. This result is associated with the success of the designer.

Each data in the physical and emotional communication process between the furniture and the user constitutes the reasons why the user prefers the furniture product. The data generated during communication can be associated with product features or user experience. The data associated with product features is generated by the skills of the designer and manufacturer, while the data associated with the user experience is generated by their personal history and perception process. The data from the user experience is evaluated within the framework of the user's relationship with the furniture, both during the process of purchasing the furniture and after the purchase (Tütüncü, 2011). The data associated with the product features, on the other hand, is shaped in the mind of the designer in the most basic sense. In general, there are some criteria for classifying and using this data. According to Tütüncü (2011: 42), these criteria decided by the designer are also important for influencing user perception. These criteria affect not only user perception, but also all inputs in the design activity, from the product's form, production, packaging to service.

Considering the criteria in the designer-furniture-user triangle, it seems that the studies conducted so far have mostly been examined on the reasons why users prefer or buy a furniture product. (Tütüncü, 2021;

Burdurlu et al., 2004; Öztürk, 2006; Andaç, 2008; Mosder, 2009; Dülgeroğlu, 2011; Akyüz, 1998; Göktaş, 2003; Erdinler & Koç, 2015; Çabuk et al., 2012; Okçu & Morkoç, 2017; Atılgan et al., 2018). One of the main reasons for focusing on user preferences is to attract their attention by identifying their preferences and purchasing habits. (Jost et al, 2020). As one of the sectors most affected by user behavior and preferences (Khosro et al., 2020), understanding the purchasing behavior of users in the furniture industry is crucial for companies to operate successfully and effectively (Oblak et al., 2020).

Criteria containing user preferences and concerns are the most important data in the design process, and the user does not want to buy a product that does not take these criteria into account again (İlhan et al, 2022; Browne & Tobin, 2013). When the criteria addressed by companies and designers operating in this sector are in line with user expectations, success can be achieved. For this reason, user data can be taken as a basis for determining design criteria in furniture and for product features to reflect these criteria and communicate with user perception. The designer can reveal a design process that is integrated with both his own design philosophy and approach and the values of the user. However, user values, including user requirements, change according to the sector or field in which the design activity takes place, and the basic evaluation criteria change at the same time. For this reason, the designer should take into account not only the evaluation criteria of the user, but also different criteria, including the production-technical capacity of the sector in which he operates and the company, his own principled stance.

When the studies on determining or classifying the criteria in the design activity are examined, it is seen that a large number of criteria are analyzed and sometimes handled differently depending on the user or customer (sometimes also the manufacturer-subcontractor). Examples of such evaluation or preference criteria are; durable, functional, having more than one function, aesthetic, reliable, easy to clean, service, shape and form, economical, suitable for space and place, fashionable, easy to carry (Yıldırım & Aslan, 2022; Akyüz, 1998; Göktaş, 2003; Kalınkara, 2008; Arpacı, 2014; Atılgan et al., 2018; Çabuk et al., 2012; Burdurlu et al., 2004; Öztürk, 2006; Andaç, 2009; Dülgeroğlu, 2011; Erdinler & Koç, 2015; Okçu & Morkoç, 2017). In the study of Tütüncü (2011) user opinions are taken as basis to evaluate the furniture product. In this study, based on the evaluation criteria of national and international design competitions, user opinions are evaluated on five different criteria: functional, technical, economic, aesthetic and conceptual. However, until today, the research on determining the criteria or determining the priorities of these criteria in all the processes of design (concept, final design, production, reverse production, marketing, packaging, assembly plan, etc.) of the furniture product, starting from the conceptual level, has not been reached.

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All of the criteria for furniture preferences examined in the literature are necessary and important to determine the design evaluation criteria. However, it is of great importance to determine what criteria are involved in the design inputs of the furniture product and to what extent these criteria will be effective in design evaluations. Understanding the criteria fully and using them correctly from the designer's point of view will help the product to establish a correct relationship with the user. However, since the literature evaluates and reveals the criteria mostly in the context of the user-furniture relationship, the research is based on developing a proposal on this subject in order to complete the lack of literature. In this sense, the criteria taken as a basis were selected based on literature studies and expert opinions, and the impact rates were determined by the Analytical Hierarchy Process (AHP) method, which is one of the multiple decision-making methods. The results obtained are aimed at determining the basic criteria in furniture design evaluations, and it should not be forgotten that the design criteria for other sectors and design areas may change depending on their internal dynamics and special conditions.

MATERIAL

The design criteria to be taken as a basis for determining the evaluation of furniture products include literature (Akyüz, 1998; Göktaş, 2003; Burdurlu et al., 2004; Öztürk, 2006; Andaç, 2008; Mosder, 2009; Dülgeroğlu, 2011; Tütüncü, 2011; Çabuk et al., 2012; Erdinler & Koç, 2015; Okçu & Morkoç, 2017; Atılgan et al, 2018), criteria of national and international design competitions (IDA Design Awards, A'Design Award & Competition, IF Design Award, Design Turkey) and expert opinions (5 expert opinions consisting of interior architects, industrial designers and woodworking engineers), 4 main criteria and 25 sub-criteria were selected and determined.
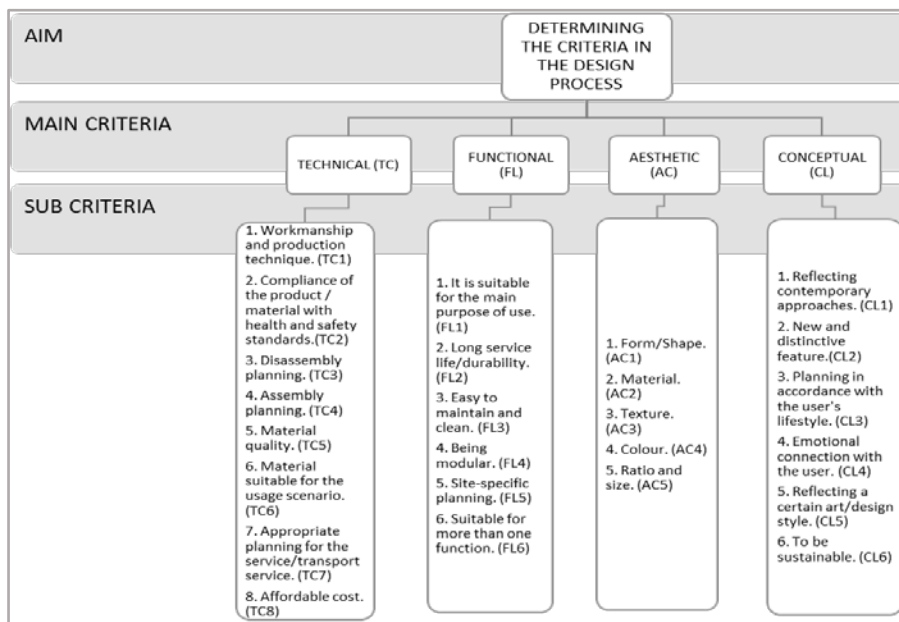

Figure 1. Analytic hierarchy process hierarchy structure.

The experts participating in the determination of the criteria for evaluation are a group of private sector employees and academicians with at least 5 years of experience in the field and qualified professional experience in the relevant sector. In this sense, it is considered that the competencies of determining and evaluating the furniture design criteria needed for research are sufficient.

Together with the expert opinions, the main criteria in the furniture design process were considered as technical (TK), functional (IL), aesthetic (EK) and conceptual (KL) as shown in Figure.1. The sub-criteria have been coded both to reduce the confusion in the analysis process and to make it more defined. Accordingly, sub-criteria workmanship and production technique (TC1), product/material, compliance with health and safety standards (TC2), disassembly planning (TC3), assembly planning (TC4), material quality (TC5), material selection suitable for the scenario used (TC6), planning suitable for service/transportation (TC7), cost-effective (TC8), suitable for the main purpose of use (FL1), long service life/durability (FL2), easy maintenance and cleaning (FL3), modular (FL4), site-specific planning (FL5), suitability for more than one function (FL6), form/shape (AC1), material (AC2), texture (AC3), color (AC4), ratio/size (AC5), reflecting contemporary approaches (CL1), having a new and distinctive feature (CL2), planning in accordance with the lifestyle of the user (CL3), establishing a emotional connection with the use (CL4), reflecting a certain art/design style (CL5) and sustainable (CL6) have been determined (Figure.1).

Technical Criteria

The technical criterion in the furniture design process deals with the details of all systems in the part-whole relationship such as planning the production process in the part and whole of the product, analyzing the details at different scales, and selecting the materials to be used. In these details, the competencies of the company-manufacturer are taken into consideration. Planning such as workmanship, the machine to be used and the production process are part of the technical issue. Technical features affect the formal and functional characteristics of the furniture (Tütüncü, 2011), as well as financial criteria such as cost and selling price, which directly affect the manufacturer and user. The decisions that the designer will make about production management and planning, the choice of materials to be used, the cost of the product, are the main factors that determine the sales prices.

Here, it is essential to plan not only the production process of the product, but also all the details so that the purchased product is ready for use. Accordingly, sub-criteria such as the service-shipping service of the product to the place where the product will be placed; the planning of information on how to assemble the parts in the place to be used may also be included in the technical issues within the decisions to be made by the designer.

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The best assumption for evaluating the technical criterion is that the furniture design can be produced. This criterion needs to be evaluated with a holistic approach from imagination to reality; technology, workmanship, materials used and selected, cost, assembly and service.

Functional Criteria

Serving its purpose or fulfilling its purpose in its relationship with the individual (Beyazıt, 2008) is the basic definition of the functional criteria we expect in furniture design. Accordingly, it can be said that the purpose of a furniture is to meet the needs of sitting, sleeping, listening, working and other similar needs. It must fulfill the needs or expectations it encounters in basic vital activities. For example, products such as desks, chairs, lighting suitable for working purposes, chairs, armchairs, bergere, etc. suitable for sitting purposes can take shape/form in accordance with these purposes.

The main purpose of furniture is to meet the basic expectations of the users. In this context, the user may want to see or meet more than one function in the same furniture. For example, an armchair suitable for a seating purpose may also need to meet the purpose of lying down and storage. For this reason, the designer can design furniture in accordance with the user's demands for furniture that can fulfill more than one function. Function is not only related to furniture; space and place also have their own specific functions. For example; the preliminary need that a product designed for a living room should meet is the need for sitting, resting, etc. For this reason, both the furniture and the space should have a harmony of function; the designer should identify the function of the product with the space he designs.

The furniture product should meet the basic physical needs of individuals such as sitting, listening and sleeping etc. in a durable way. (Üst, 2015). This criterion also includes a technical issue and is evaluated only within the scope of long-term use and its ability to fulfill its function for a long time. Along with the longevity of the product, one of the important criteria sought in furniture is that it is easy to maintain and clean. According to Atılgan et al. (2018), classic furniture is less preferred by consumers. Maintenance and cleaning criteria is an important factor on the reasons for purchase or preference. This may be related to the shape/form decisions made by the designer, as well as the surface materials or coatings to be used. However, furniture that meets the criterion of cleanliness, which is an important vital need of the user's daily life, is one of the functional criteria that the designer should evaluate.

Aesthetic Criteria

Aesthetic features can become defined when other criteria in furniture are analyzed in a meaningful integrity and perceived by the user. In other words, in aesthetic perception; qualities are comprehended holistically without being classified according to product parts (Yüksel, 2008). In

aesthetic perception, for example, the surface material used and the quality of workmanship may cause the user to make a holistic inference in the perception of color, material or texture. In this sense, when evaluated through the example given, the results formed by the technical and functional criteria together create an aesthetic perception.

In order for the designed product to be perceived by the target user, in addition to meeting the social, economic and technological expectations of the users, aesthetic decisions such as material, texture, color and form that provide the expression of the product must be presented correctly (Usal, 2004; Tütüncü, 2011). According to this definition; aesthetic criteria, which are directly related to an external reality and user perception, use the color, material and texture, proportions and dimensions, form and shape of the furniture. The perception of form and shape can be achieved through the components of proportion-size, color, material and texture decisions. These decisions are an external reality seen, felt or perceived by the user and can change instantly according to the individual and society.

Conceptual Criteria

Conceptual criteria include decisions where designer decisions and competencies are more prominent. We can also say that this criterion is one of the most powerful criteria that enables the interaction of the designer's intellectual competencies and user perception. The most influential data in terms of user perception or reasons for preference include the abstract and concrete decisions made by the designer when the product is in draft form. The criterion of reflecting the user's lifestyle and establishing an emotional connection with him/her may be the conceptual evaluation expected by the user, or it may be the designer's first starting point or main theme.

The first starting point or conceptual data of the designer can be any art/design style. In this context, the designer may not want a design product to be evaluated only as a technical or functional product, as a result of his principled decisions. Designers may want to meet the changing demands they foresee in the future beyond today's expectations in their decisions. For this reason, the designer is expected to have the competence to anticipate what will happen in the future or to evaluate the present with a different perspective. With his/her predictions and point of view, he/she should be different, new and distinctive (original) than what exists today or in the past.

METHOD

Analytical Hierarchy Process (AHP), one of the multiple decision making methods, was developed by Thomas L. Saaty in 1977 (An et al., 2007; Anderson et al., 2008). The method is a mathematical technique that takes into account the priorities of the group and the individual in the decision process and can evaluate qualitative and quantitative variables together (Dağdeviren et al., 2004; Lin et al., 2008). It is assumed

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that there are n decision options in AHP and that the people who will evaluate these decision options are experts at a level that can make relative comparisons with each other and qualitatively rate the criteria. (Saaty, 1980; Anderson et al., 2008). Decision makers or experts should consist of people who know the subject, are interested in the subject and have experience in the subject (Kuruüzüm & Atsan, 2001).

The criteria are compared among themselves and scored according to the AHP preference scale proposed by Saaty (1990) and a comparison matrix (n(n-1)/2 for n units) is formed. The general form of pairwise comparison matrices is shown in Table 1. While it shows the w_i/w_j ratio in the relevant matrix, it shows how many times the criterion i. is more important than the j. criteria. The criteria given in Table.2 are based on which their importance levels are determined (Saaty, 1980). In this way, the relative importance of each criterion according to the target and the relative importance of the decision option according to the relevant criterion are determined.

Table 1. Pairwise comparison scale (Saaty, 1980).

$$W = \begin{bmatrix} w_1/w_1 & w_1/w_2 & \dots & w_1/w_n \\ w_2/w_1 & w_2/w_2 & \dots & w_2/w_n \\ \dots & & & \dots \\ w_n/w_1 & w_n/w_2 & \dots & w_n/w_n \end{bmatrix}$$

Table 2. Significance rating scale used in the pairwise comparison matrix (Saaty, 1980).

Importance Values	Value Definitions	Criteria Explanations
1	Equally important	Both criteria are equally important
3	Moderately important	One criterion is slightly more important than the other
5	Strongly important	One criterion is strongly more important than the other
7	Very strongly important	One criterion is very important than the other criterion
9	Extremely important	One criterion is definitely more important than the other criterion.
2, 4, 6, 8	Intermediate value	Used when compromise is required

The first step of the AHP method is to determine the target, criteria, sub-criteria and alternative options, if any, that differ according to each problem. In the second stage, the pairwise comparisons of the criteria

with each other are determined by means of the criteria in Table.2 and their contribution to the purpose of the study is determined. Normalization is performed on the generated pairwise comparison matrix (Saaty, 1980). In this way, the priorities of the criteria and sub-criteria are determined. In the third stage, the contribution of the criteria and sub-criteria to the study target is determined. The priorities of the criteria and sub-criteria are determined by performing operations on the pairwise comparisons matrix described in the second step.

In the fourth stage, pairwise comparison evaluations are subjected to consistency analysis. Purpose of this; "X is more important than Y; If Y is more important than Z, X is more important than Z", but also "If X is 2 times more important than Y, Y is 3 times more important than Z, then X is 6 times more important than Z" in the form of proportional consistency (Saaty & Özdemir, 2003: 236). The consistency rate (CR) in AHP shows the consistency of the decision made by the decision makers (Ülger & Tosunoğlu, 2020). CR is expected to be less than 0.10. If the ratio is less than 0.10, the pairwise comparison matrices are consistent and the method continues to be applied. If the ratio is not consistent, decision makers are expected to reconsider their values until pairwise comparisons are consistent. The consistency indicator and the consistency analysis calculation are shown in Table.3.

Table 3. Consistency indicator (CI) and consistency analysis (CR) calculation

$$CI = \frac{\lambda\max - n}{n-1} \qquad CR = \frac{CI}{RI}$$

The randomness index (RI) in Table 2. is the indicator that corresponds to the number of criteria in the matrix. The randomness indicator changes according to the number of criteria. By using the random consistency index given in Table.4, reciprocal matrices are created and evaluated together with the results in the formula.

Table 4. Random value index (Saaty, 1980)

n	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
RI	0	0	0,58	0,9	1,12	1,24	1,32	1,41	1,45	1,49	1,51	1,48	1,56	1,57	1,59

The large number of criteria in the problems addressed reduces the possibility of obtaining consistent results when evaluated together with all the criteria (Kwiesielewicz & Uden, 2004). The relative importance levels given by the decision makers were converted into a single group decision by taking the geometric mean. The results to be analyzed by the single group decision AHP method were obtained. The importance levels given by the participants were analyzed using the Super Decisions program, which supports the AHP method.

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RESULTS

The AHP method was applied to determine the priorities and impact ratios of the main criteria and sub-criteria that the designer is expected to take as basis. In the literature, it is seen that in the studies where the criteria of furniture product preference or furniture design evaluation are examined and analyzed, it is seen that many different criteria belonging to the design are considered from one or more aspects. All of the criteria in the studies can play a role in the design process or can ensure that the design process proceeds in a more qualified process. However, determining the importance weights and degrees of the criteria to be taken as basis is important for the correct and qualified organization of the design inputs that will take place in the design process and guide the design decisions.

Table 5. Pairwise comparisons of design evaluation main criteria

MAIN CRITERIA	Technical	Aesthetic	Conceptual	Functional	WEIGHT
Technical	1	3	4	1/3	0.285
Aesthetic	1/3	1	1/2	1/5	0.081
Conceptual	1/4	2	1	1/3	0.125
Functional	3	5	3	1	0.509
Consistency Rate (CR) = 0.079					

The scale given by the expert decision makers to the relative importance of the design evaluation criteria was transformed into a single group decision by taking the geometric mean and the findings in Table.5 were obtained. According to this; the criterion that designers should concentrate on the most in the furniture design process is functional criteria with a rate of 50.9%. Functional criteria have the highest rate among the evaluations in the design process. The functional criterion, which has a higher ratio than the total ratio of the other three criteria, may be directly related to the effort to meet the basic needs of the users. In this sense, we can say that the most important criterion for evaluating the furniture product by experts is function. Function is followed by technical, conceptual and aesthetic criteria with 28.5%, 12.5% and 8.1% respectively. Designers should focus on functional furniture design for a successful design process. Consistency analysis was performed for the pairwise comparison matrices of the main criteria in design evaluation and the consistency ratio was found to be 0.079. Since the consistency ratio is below 0.10, the pairwise comparison matrix is consistent.

Table 6. Pairwise comparisons of sub-criteria by technical criteria.

TECHNICAL	TC1	TC2	TC3	TC4	TC5	TC6	TC7	TC8	WEIGHT
TC1	1	1/3	1/2	1	1/3	1	3	1	0.083
TC2	3	1	4	3	1	2	3	2	0.218
TC3	2	1/4	1	2	1/3	1/2	4	1/3	0.091
TC4	1	1/3	1/2	1	1/4	1/3	3	1/3	0.062
TC5	3	1	3	4	1	3	5	3	0.253
TC6	1	1/2	2	3	1/3	1	1/2	1/3	0.096
TC7	1/3	1/3	1/4	1/3	1/5	2	1	1/4	0.042
TC8	1	1/2	3	3	1/3	3	4	1	0.155
Consistency Rate (CR) = 0.072									

Pairwise comparison matrices of experts' design evaluation priorities in technical sub-criteria are given in Table.6. According to this, the top three criteria that the designer should focus on the most in technical issues are material quality with 25.3% (T5), compliance with health and safety standards in products and materials with 21.8% (T2) and cost planning with 15.5% (T8). The total weight of the first two criteria is close to the total weight of the other criteria. In this sense, the first two criteria, which are related to the material and the product itself, are directly related to the physical contact of the user with the product. In this way, designers can provide users with faster communication with the product. Criteria such as the selection of the material used in the furniture in accordance with the usage scenario (T6) 9.6%, the disassembly and assembly plan (T3) 9.1%, careful choices in workmanship and production technique (T1) 8.3%, the assembly plan of the furniture (T4) 6.2% and the planning of the service / transportation service (T7) 4.2% were identified as criteria that could be taken into consideration later. Since the consistency ratio in the pairwise comparison matrices of the technical sub-criteria was 0.072, the comparison is consistent.

Table 7. Pairwise comparisons of sub-criteria by aesthetic criteria

AESTHETIC	AC1	AC2	AC3	AC4	AC5	WEIGHT
AC1	1	3	4	2	3	0.398
AC2	1/3	1	5	3	3	0.278
AC3	1/4	1/5	1	1/3	1/3	0.056
AC4	1/2	1/3	3	1	2	0.122

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AC5	1/3	1/3	3	1/2	1	0.146
Consistency Rate (CR) = 0.082						

When the sub-components of aesthetic values were examined, it was observed that the form/shape (AC1) criteria was dominant at a rate of 39.8% in the evaluation of the design. It is estimated to be the best way to communicate with the user in general terms of the product. In user perception, the perceived form/shape is seen as a dominant criterion along with other aesthetic decisions. After form/shape decisions, the second most important criterion that experts consider in furniture design is material (AC2) with 27.8%. The first two most important criteria under the technical criteria are directly related to the material. However, in aesthetic criteria, the material is less important for the designer than the external contours of the product. Among these criteria, the texture criterion (AC3) was found to be the least important criterion with 5.6%. The consistency ratio of the matrices in the aesthetic sub-criteria was 0.082, indicating that the comparison was consistent (Table.7).

Table 8. Pairwise comparisons of sub-criteria by conceptual criteria

CONCEPTUAL	CL1	CL2	CL3	CL4	CL5	CL6	WEIGHT
CL1	1	1/3	1/3	1/2	1/3	1/5	0.054
CL2	3	1	1/3	1/2	2	1/3	0.110
CL3	3	3	1	3	4	1	0.284
CL4	2	2	1/3	1	2	1/5	0.121
CL5	3	1/2	1/4	1/2	1	1/5	0.078
CL6	5	3	1	5	5	1	0.352
Consistency Rate (CR) = 0.057							

In Table.8, the joint group decision of the decision makers is seen in the conceptual criteria that the designer handles in the furniture design process. According to experts, the criterion that the designer should consider and evaluate most intensively is that the furniture is sustainable (CL6) with a rate of 35.2%. For designers, recyclability of all materials in the product, minimizing the damage to nature or reusing the materials in the product are important criteria. In addition, the second criterion that the designer should pay attention to is the furniture design process suitable for the user's lifestyle (CL3) with 28.4%. For this reason, it is an important criterion for the designer to constantly take into account the wishes and needs of the users, to follow the design process that focuses on the user, to constantly update and develop himself according to the

changing and developing lifestyles. The third criterion to be considered in the design process was found to be establishing an emotional bond with the user (CL4) with 12.1%. When we consider the first three criteria, it is seen that the designers focus more on the user and nature or environmental factors. According to experts, the effort to reflect today's trend or contemporary approaches (CL1) is the criterion that affects the least with a relative rate of 5.4%. Since the consistency ratio is 0.057, we can say that the comparative matrix is consistent.

Table 9. Pairwise comparisons of sub-criteria by functional criteria

FUNCTIONAL	FL1	FL2	FL3	FL4	FL5	FL6	WEIGHT
FL1	1	3	3	5	2	5	0.358
FL2	1/3	1	3	7	3	5	0.275
FL3	1/3	1/3	1	2	1/3	2	0.086
FL4	1/5	1/7	1/2	1	1/5	1/2	0.041
FL5	1/2	1/3	3	5	1	5	0.186
FL6	1/5	1/5	1/2	2	1/5	1	0.054
Consistency Rate (CR) = 0.061							

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In the furniture design process, designing the product in accordance with its intended use (FL1) or planning a product compatible with its function is the criteria that the designer should focus on the most. Experts attach more importance to this criterion than other criteria by 35.8%, drawing the attention of designers to this criterion. Long-term use of the product, lifetime or durability (FL2) is the second most important criteria for designers with 27.5%. Accordingly, it has been determined that it is necessary to focus on material selection, production technology, workmanship and detail solution used in the design process. Although these details seem to fall within the scope of a technical issue, they ultimately affect how long the user can use the product or how much he or she can trust the product. The spatial planning criterion (FL5), which is in the third place proportionally with 18.6%, which should be included in the design process, shows the importance of the space-furniture relationship. The important thing here is that the furniture is compatible with the function or size of the space. The user should be able to use the furniture he/she chooses easily wherever he/she wants to use it, and place the furniture he/she chooses in the place he/she needs with peace of mind. When evaluated from the designer's point of view, the last three criteria to be considered in the furniture design process are, respectively, being easy to maintain and clean (FL3) with 8.6%, responding to more than one function (FL6) with 5.4%, and modular (FL4) with 4.1%. When the comparative matrix table of all criteria under the functional was

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examined, it was determined that the consistency ratio was 0.061. The pairwise comparison matrix is consistent because the consistency ratio is below 0.10 (Table.9).

CONCLUSION AND RECOMMENDATIONS

In the study, it was tried to determine the criteria and sub-criteria that should be included in the design process. In this context, the relative importance rankings and weights of the criteria and sub-criteria in the design process were analyzed by the AHP method. Problems such as the inability to clearly reveal the criteria in the evaluation of the design in the furniture industry and related academic fields constitute the main reason for the method in this study. Determining and grading the criteria that should be included in the design process, in what proportion and to what extent, is of great importance in terms of the quality of the design process. Problems such as how important the criteria are compared to each other, especially in the process until the final decision for the design product, and reaching a common and objective decision in the group evaluation process can be minimized with the AHP method.

The criteria and sub-criteria that should be considered in the design activity in the furniture sector were determined with the expert opinions and the data obtained from the literature. In the design process, the main criterion that the designer should focus on the most is functionality. Accordingly, the functionality criterion should be handled effectively in a furniture product. Functionality mostly includes sub-criteria that can be directly perceived with concrete data. It is thought that the influence of the designer's personal experience and subjective decisions on functionality is quite low. Because the most important task of a furniture is to fulfill its function and to be suitable for its function. One of the most important goals of the designer is to ensure that the product is understood by the user or the consumer quickly and accurately. In the furniture product, the function is known as the criterion that the user can understand and interpret even without physical contact with the product. In other words, it can be said that the function is one of the criteria that provides the fastest communication between the designer and the user.

The function sub-criterion that follows the design of the furniture in accordance with its intended use is that its useful life is long and durable. In this case, the designer is looking for answers to the questions of how long the users who buy the product can use the product and how long the product's useful life will be. For the solution of this, technical criteria can be applied. However, its long-term functionality and durability can form the basis of trust between the user and the designer. The fact that it is easy to maintain and clean, is modular and has more than one function is of low importance in terms of functionality. These listed features are criteria that should be evaluated and given importance for designers. Especially during the Covid-19 pandemic period, these features have become increasingly important as the working life is more involved in life. The fact that products that meet functions such as sitting and resting

can also meet functions such as working can be one of the most important reasons for furniture preferences. Similarly, the increase in daily cleaning actions under pandemic conditions reveals the need for easier cleaning of products. Designing furniture that can be easily cleaned and wiped and not damaged by these actions constitutes an important situation in terms of the importance that the consumer attaches to hygiene.

The technical criterion, which is seen as a factor in the preference reasons of the users, has been determined as the second most important criterion that should be included in the design process. In order for the furniture to fulfill its function, the designer must be able to analyze and apply technical details. The technical features of the product, which are perceived indirectly by the user, are directly affected by the decisions made by the designer. Details such as production technique and technology, workmanship capabilities and manufacturer competencies and technical details listed as solutions can vary greatly. Today, developing production techniques and technologies, increasing material types and details offer many technical alternatives for the designer. However, as the size and number of increasing diversity increases, the designer may experience indecision and loss of time in their choices. These problems that the designer may encounter may adversely affect the results such as the cost of the product and the quality of the material, depending on the decisions of the designer. The way to minimize these problems, which may be reflected in user preferences, depends on the competence and technical experience of the designer.

It is known that most of the injuries caused by the earthquakes in our country, which is located in the earthquake zone, are caused by the furniture-wall-floor relationship. Apart from fixing the furniture with the structure, technical solution alternatives due to the structure of the furniture can minimize these injuries, perhaps loss of life. Safety standards should be improved in terms of materials and structure used in furniture in all buildings, starting with public buildings. In this respect, legal regulations should be made and users, manufacturers and designers should be informed. In this context, for the designers of our country, which is in an earthquake zone, the design of furniture that is highly resistant to earthquakes, under the criteria of compliance with safety standards, should be considered as a necessity beyond expectation.

It has been determined that the conceptual criterion is the third most intensive criteria that designers should use. In terms of conceptual criteria, it has been seen that the most important sub-criterion to be addressed in the furniture design process is sustainability. Designers should consider the environmental impact and contribution to the natural environment, from the material selection to be used in the furniture design process, to the production technology, and consider the sustainable criteria in the most effective way in their decisions. In order to minimize environmental problems such as increasing air pollution, decreasing water resources and forest diversity, it should be sensitive. Indicating the sustainability principle in the product assembly or user

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manual informing the user and enlightening the user should not only be a marketing and sales policy, but also a design strategy. After the conceptual criterion, it has been determined that the criterion that the designer should consider and which has the least importance is aesthetics. After solving the basic needs such as technical and functional, the designer wants to reflect his personal experience and perspective on the product. When the designer wants to reflect his own principled stance and line, he seeks answers to how the product will be perceived or experienced by the user. In this case, the criteria that the designer should focus on the most are form / shape and material. In particular, the relationship between form and form reveals ergonomic results for the user, and these results are mostly the equivalent of the user's experience in the process.

The importance ratings and weights obtained by the AHP method can provide an objective analysis of a single and common result in group decisions. It can contribute to the evaluation scale of multiple decision makers, especially in the evaluation of furniture-related vocational training such as exams and juries, or in national-international design competitions. For example, a design that will be evaluated out of 100 full points can have a maximum of 50 functional, technical 29, conceptual 13 and aesthetic 8 points, respectively, each of the criteria according to the data in the findings. In this scoring, which means that a product can get a maximum of 50 points from its functional criteria, the sub-criteria of each criterion can also be distributed according to the results in the finding. Again, to give an example from the functional criteria, the criterion suitable for the purpose of use can be scored 18 points, durability 14, planning according to the space 9, ease of maintenance and cleaning 4, having more than one function 3 and being modular can be scored over 2 points. The values given show the value that should be given at most. After these distributions are proportionally distributed within the sub-criteria of each criterion, the resulting values are added up and the total score obtained by the product is obtained after dividing by the number of decision makers. Although the highest score or value to be given to a product varies according to the decision makers, the important issue here is the importance weights and order of the criteria and sub-criteria.

The evaluation weights and order obtained by the AHP method are for the design process in the furniture product. Evaluation criteria in other sectors and fields may vary depending on the sector and its internal dynamics. In addition, the furniture industry is divided into some classifications within itself. Furniture groups in other classifications such as office furniture, home furniture and kitchen furniture may also have different design dynamics within themselves. For this reason, future studies can reveal the evaluation criteria of the designs according to the distinction within the furniture field, and determine the importance and weights of these criteria. In this way, objective and objective joint decisions can be made, such as how to make evaluations according to furniture types. These evaluations, on the other hand, will have the effect

of objective results, not subjective thoughts and approaches, which can help multiple decision makers of the design product take a joint and single group decision in the industry, education and competitions. Objective decisions will not only minimize indecision in design evaluations, but will also help to quickly select the qualified and appropriate one among many options. In this way, while the loss of time will decrease, there will be a quantitative increase in the qualified products that will reach the end user.

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