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ICONARP International Journal of Architecture and Planning as a free, open access, academic e-journal considers original research articles and viewpoints in peer-reviewed.

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

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

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

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ABSTRACTING AND INDEXING

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Research Article

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Colour Perception and Visitor Experiences of Urban Parks as Influenced by an Intense Colourful Urban Artefact: An In-situ Quasi-experiment

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Abstract

Purpose

Colourful street furniture, fitness and playground equipment has become increasingly common in contemporary urban green spaces. The study aims to increase knowledge about their influence on human perception of urban park settings, and explore the perceived interaction between an orange-coloured urban artefact and the colour schemes of a public park.

Design/Methodology/Approach

This study consisted in first reviewing 794 park visitors through formal observations, and applying the semantic environmental description (SMB) on 102 individuals (park visitors). The analysis of the SMB dimensions used an analysis of variance with a 3x2 factorial design and the perceived colours measured with Royal Horticultural Society (RHS) colour charts.

Findings

The findings from the study show that placing intense colourful artefacts in various park environments can both increase and decrease experienced pleasantness and change the overall perceived characteristics of colour (colour contrast).

Research Limitations

The limitation of this study was that only a monochromatic coloured (orange) object with a specific structure and scale was used and that complementary colour combinations were not investigated. The experimental design did not allow a completely randomized design of the individuals in the study.

Social/Practical Implications

Given the results from the study, we propose that municipalities and landscape architecture offices involved in the planning, design and management of urban green spaces should pay just as much attention to the placement of urban artefacts in a public outdoor context as to the design of the artefacts themselves. Discussing these issues across the planning and management level can help increase consciousness of the impact of intensely colourful street furniture on park visitors colour perception and experiences.

Original/Value

The number of studies on this subject is very limited and performing this study is considered to contribute to the understanding of coloured urban artefacts in urban green spaces.

Keywords: aesthetic value, colour contrast, semantic environmental description

INTRODUCTION

Visual qualities in an urban area plays an essential role in the relationship between humans and environment. Understanding human conceptualization and visual qualities in an urban environment entails humans to refer to the meanings that commonly associate with their spatial experiences (e.g. Alpak et al., 2020; Tsaur et al., 2014; Tuan, 1979). From that aspect, visual and spatial experiences and related visual qualities are key attributes for human perception and judgements of aesthetic liking. In order to satisfy aesthetic perception and related positive experiences of the audience, an outdoor environment should be carefully designed and planned (Li & Gao, 2020), where the visual components (light, form, and colour) should be arranged in satisfying patterns (Dee, 2012; Bell, 2012). Visual qualities in outdoor environments have proved to be an essential part of human experience of the landscape (Arriaza et al., 2004), and studies on visual quality have often focused on the characteristics of a landscape and the individual features within it (van den Bosch & Ode Sang, 2017; Wang et al., 2016; Ode et al., 2009; Arriaza et al., 2004). Studies have also shown the visual qualities generated by a high level of vegetation (Wang et al., 2019; Peschardt et al., 2014; Nordh & Østby, 2013; Arriaza et al., 2004), where flower colour diversity can generate positive aesthetic response (Hoyle at al., 2018). Other research has examined the interaction between colours (e.g. Foster, 2011; Green-Armytage, 2006). For example, Oleksiichenko et al. (2018), Polat and Akay (2015) and Arriaza et al. (2004) found that colour contrast in a landscape context is a positive parameter in the assessment of visual beauty. These studies also showed that perceived lack of colour contrast, both in urban and rural landscape contexts, reduces landscape visual quality (Polat & Akay, 2015; Arriaza et al., 2004).

This paper explore a colourful urban artefact interaction between visitor's visual experiences and public park environments. According to Calafiore et al. (2017) urban artefacts relates to elements in an urban environment that are designed to be included in an urban system, a component that are constructed (physical structure and qualities), with specific thoughts of usefulness and normative constraints. In the planning process of urban artefacts it is crucial to recognize the actual use of the functional (expected) and social (unexpected) aspects of the urban artefact (Calafiore et al., 2017), this in order to be aware of the different roles and multiple perspectives that an urban artefact can give rise to depending on its actual use.

From the above perspectives, contemporary landscape architecture's frequent use of colourful urban artefacts (Figure 1, left), e.g. benches, planter boxes, fitness and playground equipment or large-scale 'painted' neighbourhoods like the 'Red Square' in Superkilen, Denmark (BIG, 2012) in urban green spaces, raises questions regarding the impact of urban artefacts on human experiences and social interaction. The relevance of addressing such questions is underlined by studies showing that intense

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coloured urban artefacts (red, orange, yellow) placed in an urban landscape have the ability to affect levels of arousal (Wilms & Oberfeld, 2018; Al-Ayash et al., 2015) and thereby also visual experience of pleasantness (Abdulkarim & Nasar, 2014a; Motoyama & Hanyu, 2014). It is also notable that urban artefacts have the ability to make urban environments more liveable in the perspective of being visitable and have restorative effects on the visitor´s (Abdulkarim & Nasar, 2014b).

According to Berlyne (1971), positive human experiences, such as a perception of pleasantness, are linked to the experienced optimal level of arousal (immediate response and intensity level to a stimuli) and moderate novelty (the quality of being surprised), where pleasantness is connected to aesthetic values (Berlyne, 1971). In contrast, perceived distressing stimuli can lead to changes in levels of arousal and overwhelm humans, which again generate changes in perceived pleasantness (Berlyne, 1971). Abdulkarim & Nasar (2014a) and Motoyama & Hanyu (2014) showed that urban artefacts with both subdued and powerful colour schemes incorporated in various urban green contexts (green and grey environments) can change human perception and influence human experiences. For example, an orange artefact placed in an environment with a low proportion of vegetation has been found to increase arousal and reduce pleasantness, and the presence of a silvery art work placed in surroundings with a high proportion of green environment reduced experiences of being safe and relaxed (Motoyama & Hanyu, 2014).

The interrelationship between visual qualities and humans is essential in understanding public art in outdoor environments (Knight, 2008) and, by extension, how we perceive and experience urban artefacts in urban green spaces. Since colours on urban artefacts and visual properties, such as colour contrast, can affect humans' visual experiences, it must be considered that placing, e.g., coloured street furniture in an urban landscape, does not automatically make that bright and intense artefact appreciated by humans.

The main objective in this study was therefore to understand how a colourful urban artefact influences human experience of urban green space with varying amounts of vegetation. Combined studies of colour perception and environmental assessments methods can likely contribute to an increased understanding of human experiences in urban green contexts. From that perspective, the semantic environmental description (SMB), abbreviation from the Swedish terminology (Küller, 1991) is used in this study to relate park visitor experiences to coloured artefacts placed in a public park in southern Sweden. This method does not connect individual landscape features to the assessed results (Karlsson et al., 2003; Küller, 1991), so inclusion of an interpretation step to validate the outcomes was applied. In this study, we use colour assessment as an interpretation step, where the degree of pleasantness in relation to colour space is measured with the standardised SMB method (Küller, 1991).

The study was guided by the following research questions:

- How are visitor experiences in relation to a public park environment, measured with the SMB scale, changed when an orange urban artefact is added?
- How do visitors experience urban park settings with different proportions of grey and green surroundings, and how is the experience influenced when an orange colourful urban artefact is added?

Figure 1. Left: Intense yellow and orange street furniture in a public square in Sweden designed by Karavan landskapsarkitekter, 2016. Photo: Alex Giacomini. Right: Contemporary landscape architecture in Yongningjjang river park, China, designed by Kongiian Yu and Turenscape, 2004. (The photos are used with permission)

MATERIALS AND METHODS

The study was conducted as a quasi-experiment during late summer (August-September). This time was chosen since the weather was likely to be good, encouraging outdoor activities such as visits to urban parks and other green spaces. During the study hours, the average daytime temperature was 22 °C, with sunny/partly sunny weather.

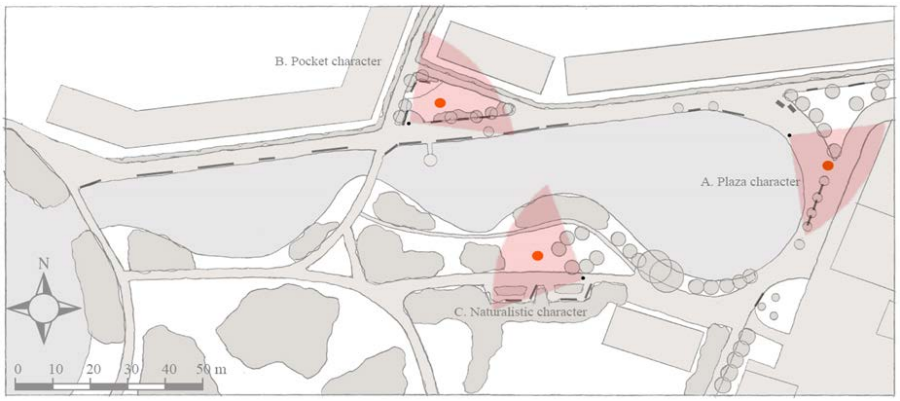

Figure 2. Map of the study area in Strandparken, Lomma, Sweden, showing A. Plaza character, B. Pocket character and C. Naturalistic character as used in the experiment. Orange dots indicate the location of the orange urban artefact, black dots the visual basis and the light pink angle the perceived landscape.

The study comprised a pre-study to identify the everyday park visitor by using formal observations (walk through the park), followed by two main phases. These two phases included a self-completion questionnaire (SMB) and determination of colours using RHS colour charts. The pre-study and the studies in the areas B (Pocket character) and C (Natural character) were conducted in 2015. In 2018, area A (Plaza character) was evaluated.

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Study site and environments

The study was implemented in the northern part of Strandparken (Figure 2) in the municipality of Lomma, southern Sweden. This park was selected because of the mixture of urban and nature-inspired park setting, common in many public parks in Europe. The park was established in the 1980s and is surrounded by residential buildings, homes for the elderly, and preschools, and contains a variety of green environments (solitary trees, thickets of trees and shrubs, hedges, lawns) and grey environments (paths, buildings).

Three areas in the park were chosen to represent differences in terms of the relationship between grey and green environments: A = Plaza character; B = Pocket character; and C = Natural character.

The proportions in the investigated sites were as follows:

A: Plaza character: 75% grey environments (buildings, etc. 36%; paths 39%), 23% green environments (solitary trees and hedges 19%; lawns 4%) and 2% water.

B: Pocket character: 45% grey environments (buildings, etc. 30%; paths 15%), 50% green environments (solitary trees and hedges 25%; lawns 25%) and 5% water.

C: Naturalistic character: 15% grey environments (buildings, etc. 3%; paths 12%), 85% green environments (thickets of trees and shrubs and solitary trees 60%; lawns 25%).

The park environments were assessed from a fixed location, with an observation range of approximately 60°. The fixed locations were the visual basis for this study (see black dots in Figure 2), and were selected to ensure the visual representation of the three common urban park characters in the study. The orange artefact was positioned between 12 and 17 metres from the fixed location in areas A, B and C (orange dots in Figure 2).

To obtain an overview of the observed relationship of grey and green environments, the percentage of grey-green environments in the perceived areas was calculated from photos using the grid tool in Adobe Photoshop CS6. The images were taken to form a photomontage with a 60° angle, and to, as far as possible, represent the perceived landscape from the fixed locations in area A, B and C (see light pink angle in Figure 2).

Coloured urban artefact

The orange urban artefact was made of wooden sticks (2.5 cm in diameter), ranging in length from 1.50 to 1.70 m, painted in an intense orange hue and placed in a distinct circular pattern with a diameter of 2.5 m. The orange hue was chosen to reflect today's common practice of placing orange street furniture, e.g. benches, planter boxes, fitness and playground equipment, in urban green spaces. Orange hues are used to attract attention and create contrast in landscape architecture. Examples are the orange art installation 'The Gates' (Christo & Jeanne-Claude, 1979-2005) placed in Central Park, New York City, the hospital garden

'Rigets have' in Copenhagen, Denmark (LAND+, 2008) and the Yongningjjang river park, China (Turenscape, 2004) with orange contemporary landscape architecture (Figure 1, right) as well as intense orange street furniture forming a focal point (Figure 1, left) in a public square in Bollnäs, Sweden (Karavan landskapsarkitekter, 2016). The orange hue was also chosen for its capacity to influence levels of arousal (Hanada, 2018; Costa et al., 2018; Al-Ayash et al., 2015) and its ability to enhance activity in the human body (Clark & Costall, 2008). Figure 3 shows the orange urban artefact incorporated in area A (plaza character), area B (pocket character) and in area C (naturalistic character) in Strandparken, Sweden.

Figure 3. Photomontage (60°) showing the perceived landscape from the fixed locations (see Figure 2). From the top to the bottom: Plaza character (A), Pocket character (B) and Naturalistic character (C) with the presence of the orange urban artefact.

Data collection

Walk through the park – a pre-study phase to capture the everyday visitor

In order to capture the everyday visitors in the studied park, formal observations (Robson, 2011) were conducted on three randomly chosen weekdays (Tuesday, Thursday and Friday) during one week in three periods per day: 9.00-11.00, 12.00-14.00 and 15.00-17.00. The observation involved a systematic walk through the park, visiting four sub-areas each hour and making a 15-minute visual scan in each area. The sub-areas were chosen to cover the everyday park visitors in the best possible way, and were located in the north, east, south and west parts of the park.

During the walks, a total of 794 individuals assessed to be older than 20 years old were visually observed and categorised in terms of age and

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gender (Table 1). Generally, the number of visitors in the park between 9 am and 5 pm was low.

Visitor´s younger than 20 years were not included, because there were too few visitors in this age range. To ensure the correct classification of gender and age, the observations were made at a distance of two to ten metres from the individuals. It could be a difficult task to determine a person's age and in some cases gender, so the ages and genders of the observed visitors shown in Table 1 are estimates.

Table 1. Park visitors in Strandparken, divided into estimated age and gender during three weekdays in August 2015. Number of observations: 794.

Variable	Category	n (%)
Age	20-35	103 (13.0)
	36-50	79 (9.9)
	51-65	100 (12.6)
	Over 65	512 (64.5)
Gender	Female	491 (61.9)
	Male	303 (38.1)

Semantic Environmental Description (SMB)

In the second phase of the study, the semantic environmental description (SMB), was employed. SMB involves the use of a standardised questionnaire developed to systematically describe an interior, exterior or simulated environment (Bengtsson et al., 2015; Küller, 1991; Küller, 1975). The questionnaire comprises 36 adjectives scaled from 'slightly' (1) to 'very' (7), and is clustered into eight dimensions (Table 2).

The SMB questionnaire was distributed to a representative sample of 102 individuals (park visitors) in six groups (n = 17), with attention paid to a balanced age and gender distribution (Table 1). There were six situations, with the following notation:

Area A: Plaza character with no urban artefact (A1),
Plaza character with orange urban artefact (A2).
Area B: Pocket character with no urban artefact (B1),
Pocket character with orange urban artefact (B2).
Area C: Naturalistic character with no urban artefact (C1),
Naturalistic character with orange urban artefact (C2).

A group size of 15-20 individuals is considered to be reliable with high stability when a systematic description of the environment (SMB) is desirable (Küller, 1975). The participants who responded to the SMB questionnaire were selected to match the everyday (weekday) park visitors and were all familiar with the park environment, which is argued to be an important factor in increasing the consistency of the SMB methodology (Karlsson et al., 2003). All respondents answered directly adjacent to the studied areas and each respondent only participated in one experimental setup.

Table 2. Descriptions of the eight (SMB) dimensions, and adjectives included in each dimension. A plus sign indicates adjectives for which the answer 'very' (7) was positive, while a minus sign indicates adjectives for which the answer 'slightly' (1) was positive. To make the adjectives comparable in the calculation of the mean value for a SMB dimension, the adjectives with a minus sign were transformed as "8-given answer".

SMB dimension*	Description	Adjective in each SMB dimension
Pleasantness	The degree of pleasantness, beauty and security in the environment	stimulating (+), secure (+), idyllic (+), good (+), pleasant (+), ugly (–), boring (–), brutal (–)
Complexity	The degree of variation, intensity, contrast and abundance in the environment	varied (+), lively (+), composite (+), subdued (–)
Unity	The fit of the different parts of the environment into a coherent whole	functional (+), of pure style (+), consistent (+), whole (+)
Enclosedness	A sense of spatial enclosure	closed (+), demarcated (+), open (–), airy (–)
Potency	An expression of power latent in the environment	masculine (+), potent (+), feminine (–), fragile (–)
Social status	Evaluation in socio-economic terms and in terms of maintenance	expensive (+), well–kept (+), lavish (+), simple (–)
Affection	An age aspect and a quality of recognition	modern (+), new (+), timeless (–), aged (–)
Originality	The unusual and surprising in the environment	curious (+), surprising (+), special (+), ordinary (–)

*Source: Küller (1975), Küller (1991) and Bengtsson et al. (2015).

Statistical analysis

Analysis of variance was used to explore the effect of the Plaza, Pocket and Naturalistic character and the urban artefact. The argument for using analysis of variance is that a group size of 17 in a completely randomized balanced design with Likert items ranging from 1 to 7 is enough to guarantee that the test quantities are distributed as stated in the test. In all statistical analyses, the significance level was 0.05, and Tukey's test was used to test for pairwise differences. Since the effect of age of the respondent had no significant effect, it was not included in the final models.

The analysis of variance for the SMB dimensions used a 3x2 design, with the factors character, urban artefact, and the interaction between character and urban artefact.

In further analyses, the adjectives were considered separately, using the same 3x2 factorial design.

When the marginal effects of character and urban artefact were considered separately, PROC MIXED with LSMEANS and SLICE in SAS software[1] was used.

[1] SAS 9.4. Copyright (c) 2002-2012 by SAS Institute Inc., Cary, NC, USA.

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Determination of colours using the Royal Horticultural Society (RHS) colour chart

Colour assessment formed the basis of the third phase of the study, to examine how the SMB results relate to the park environment with particular focus on the colour spectrum. The main author, with professional qualifications in fine art and landscape architecture, conducted the assessment of the dominant colours. To ensure reliability, the Ishihara colour blind test (24 Plates Edition, 2017) was carried out before the colour assessment. The perceived colour schemes were assessed from the fixed locations (see Figure 2), in a visual scan (60°), lasting for at least 3 minutes between 10 am and 2 pm. The colours were assessed with similar weather conditions (sunny/partly sunny) as during the questionnaire sessions.

Analysis of the observed colours using the RHS colour chart

The three investigated characters (Plaza, Pocket and Naturalistic) were fairly uniform in terms of the colour spectrum, and each could be described by three colours considered to reflect the colour schemes of each area investigated. The three main perceived colours were determined with the RHS colour chart system (6th Edition) in each experimental setup, and named according to the same system.

RESULTS

An orange urban artefacts' effect on perceived dominant colours and colour proportions

Without the orange urban artefact the result was as follows. The dominant perceived colours in the Plaza character were light greyish olive, moderate orange yellow, and moderate yellowish green. In the Pocket character, strong yellow green, light greyish olive and pale yellow nuances were the dominant perceived colours, and in the Naturalistic character the yellow green hues dominated (moderate yellow green, strong yellow green, moderate yellowish green) (Table 3).

The presence of the orange urban artefact changed the perceived dominant colours. In the Plaza character, the dominant colours were pinkish grey, strong orange, and moderate yellowish green. In the Pocket character, the colour perception was dominated by moderate green, strong orange and light orange yellow. In the Naturalistic character, moderate green, strong orange, and moderate yellow green dominated the colour vision (Table 3).

The colour analysis revealed that distinct differences in the colour contrast between the characters occurred when the orange urban artefact was present in the investigated areas. In the Naturalistic character, the perceived bright orange hue was complemented with perceived green hues (moderate green, moderate yellow green), while in the Plaza and Pocket character the orange perceived hue was complemented with green hues (moderate green, moderate yellowish green), as well as light orange yellow and pinkish grey colours. The

analysis showed that a colour contrast effect was noticeable in the Naturalistic character, but less obvious in the Pocket and Plaza character. The visible contrast effect in the Naturalistic character was perceived due to the correct proportions between a lot of green vegetation in combination with a strong orange hue. In contrast, the proportions between the predominance of greyish colours in the Plaza character and the incorporated orange urban artefact gave rise to no such effect (Table 3).

According to Itten (2003), areas with the right quantitative proportions have the ability to give rise to a colour contrast effect. Our analysis showed that the Naturalistic character with presence of the orange urban artefact generated the right proportions between green and orange hues for a complementary and cold-warm contrast to occur (Table 3).

Table 3. Perceived dominant colours in the studied areas, assessed with the RHS colour chart system in sunny/partly sunny weather. The perceived dominant colours in each area (A1, A2, B1, B2, C1, C2) were assessed by the main author in partly sunny weather and determined with the RHS colour chart (6th edition). In A2, B2, C2 the strong orange hue refers to the perceived colour of the urban artefact.

Place character	RHS colour names	Pinkish Grey	Light Greyish Olive	Moderate Green	Moderate Yellowish Green	Moderate Yellow Green	Strong Yellow Green	Moderate Orange Yellow	Pale Yellow	Light Orange Yellow	Strong Orange
	RHS code	201 D	197 C	135 B	137 D	139 C	143 C	164 C	165 D	24 C	24 A
A1 – Plaza character											
A2 – Plaza character with urban artefact											
B1 – Pocket character											
B2 – Pocket character with urban artefact											
C1 – Naturalistic character											
C2 – Naturalistic character with urban artefact											

Semantic Environmental Description (SMB) of the physical characters and changes caused by adding an orange urban artefact.

Without the urban artefact, the results showed that the respondents characterised both Plaza character, Pocket character and Naturalistic character in the park environment as being attractive. The statistical analysis for the eight SMB dimensions showed significant results for the dimensions 'pleasantness' and 'originality'. The other six dimensions were not significant (results not presented) and therefore the analysis focused on 'pleasantness' and 'originality' and the adjectives related to them.

The only overall significant difference for the characters in the SMB dimensions was the average score for 'pleasantness', where the value was higher for Pocket than for the Plaza character.

The mean values and standard deviations for all SMB dimensions and the adjectives for pleasantness and originality are shown in Table 4. The

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standard deviation for some of the adjectives were large (maximum 2.3) expressing the fact that the interpretation of the adjectives could be different for different persons.

Table 4. Average scores and standard deviation (n = 17 for all sceneries) given by respondents for the SMB dimensions, and the adjectives included in the SMB dimensions 'pleasantness' and 'originality'. The table show the results from Plaza character without (A1) and with (A2) urban artefact, Pocket character without (B1) and with (B2) urban artefact and Naturalistic character without (C1) and with (C2) urban artefact.

SMB Dimension		**Area A1 mean (sd)**	**Area A2 mean (sd)**	**Area B1 mean (sd)**	**Area B2 mean (sd)**	**Area C1 mean (sd)**	**Area C2 mean (sd)**
Pleasantness		4.9 (1.2)	4.6 (1.0)	5.9 (0.8)	5.8 (0.7)	5.4 (0.9)	5.9 (0.7)
Complexity		3.3 (0.9)	3.3 (1.1)	3.6 (0.8)	3.7 (0.8)	3.9 (0.9)	4.1 (0.8)
Unity		4.8 (1.1)	4.6 (0.8)	4.9 (0.7)	4.7 (0.8)	4.6 (0.8)	4.8 (0.9)
Enclosedness		3.4 (0.9)	3.4 (1.4)	2.5 (0.9)	3.0 (0.8)	3.3 (1.0)	3.2 (0.8)
Potency		4.4 (0.6)	4.1 (0.9)	4.5 (0.7)	4.1 (0.5)	4.6 (0.7)	4.4 (0.7)
Social Status		3.8 (1.5)	3.4 (1.0)	3.8 (1.0)	3.8 (1.1)	4.2 (1.0)	4.1 (1.0)
Affection		4.3 (1.1)	4.3 (0.8)	4.3 (0.8)	3.9 (0.6)	4.2 (0.8)	4.1 (0.8)
Originality		2.9 (1.2)	2.9 (1.4)	3.3 (1.1)	3.9 (0.9)	3.4 (1.1)	4.0 (1.1)
SMB Dimension	**Adjective**	**Area A1 mean (sd)**	**Area A2 mean (sd)**	**Area B1 mean (sd)**	**Area B2 mean (sd)**	**Area C1 mean (sd)**	**Area C2 mean (sd)**
Pleasantness	Stimulating (+)	3.5 (1.7)	3.5 (1.9)	5.1 (1.5)	5.4 (1.1)	5.4 (1.5)	5.2 (1.7)
	Secure (+)	6.0 (1.1)	5.4 (1.7)	6.5 (0.8)	5.3 (1.2)	5.2 (1.4)	5.5 (1.2)
	Idyllic (+)	3.9 (1.8)	3.3 (1.6)	5.5 (1.7)	5.5 (1.5)	4.2 (1.4)	5.4 (1.3)
	Good (+)	5.2 (1.1)	4.6 (1.6)	5.9 (1.0)	5.9 (0.9)	5.1 (1.4)	6.1 (1.0)
	Pleasant (+)	5.5 (1.5)	4.2 (1.6)	5.8 (1.4)	5.9 (1.2)	5.5 (1.2)	5.9 (1.0)
	Ugly (–)	3.3 (2.1)	2.6 (1.9)	1.8 (1.5)	2.0 (1.6)	2.0 (1.7)	1.8 (1.0)
	Boring (–)	3.6 (2.3)	3.5 (1.9)	2.6 (1.7)	1.7 (0.9)	2.7 (1.7)	2.0 (1.1)
	Brutal (–)	2.1 (1.6)	1.9 (1.5)	1.6 (1.1)	1.5 (0.6)	1.6 (0.8)	1.4 (0.5)
Originality	Curious (+)	2.2 (1.6)	3.0 (1.9)	2.1 (1.5)	2.4 (1.7)	2.8 (1.6)	2.7 (1.7)
	Surprising (+)	2.6 (1.8)	2.5 (1.8)	3.3 (1.5)	3.9 (1.5)	2.9 (1.4)	4.3 (2.1)
	Special (+)	3.4 (2.0)	3.1 (1.9)	3.7 (2.2)	4.4 (1.5)	3.9 (1.5)	4.5 (1.5)
	Ordinary (–)	4.6 (1.3)	4.9 (1.7)	3.7 (1.6)	3.3 (1.3)	3.9 (1.4)	3.5 (1.7)

In the analysis of the factorial model, the result of the comparison between the Plaza, Pocket and Naturalistic characters could be different with or without the urban artefact, even if the interaction was not significant. Therefore, the comparison is divided into characters without urban artefact and characters with urban artefact in Table 5, The significant effects of the urban artefact for each character analysed separately are also given in Table 5.

Orange urban artefact's effect on park visitors' experiences of 'pleasantness' and 'originality' when comparing the physical characters

The results with the urban artefact present are shown in Table 5. The Plaza character had a significantly lower value than the Pocket and the Naturalistic character on the SMB dimension 'pleasantness', meaning that the incorporated urban artefact made the Naturalistic character more pleasant in relation to the Plaza character, and this was also true for the SMB dimension 'originality'. The Plaza character had a significantly lower value than the Pocket character and the Naturalistic character for the adjectives 'stimulating', 'idyllic', 'pleasant', and 'good', and a higher value for 'boring' (SMB dimension 'pleasantness'). This means that the incorporated orange urban artefact made the Pocket and Naturalistic character more stimulating, idyllic, pleasant and better in relation to the Plaza character, while the presence of the orange urban artefact made the Plaza character more boring in comparison with the Pocket and Naturalistic character. When the urban artefact was present, the value for the Naturalistic character was significantly higher than for the Plaza character for the adjective 'special' (SMB dimension 'originality'), meaning that the difference between these two characters in the adjective 'special' increased when the urban artefact was present (Table 5)

Comparing the effect of with and without orange urban artefact for each physical character in relation to the adjectives in the SMB dimensions 'pleasantness' and 'originality'

When the urban artefact was incorporated in the Naturalistic character the area was perceived as being significantly more idyllic and better, and generated the experience of being surprised. The Pocket character with the urban artefact had a significantly lower value than without the urban artefact for the adjective 'secure', so incorporated urban artefact in the Pocket character led to the area being perceived as less secure. The Plaza character with the urban artefact had a significantly lower value than without the urban artefact for the adjective 'pleasant', so an incorporated urban artefact in the Plaza character made visitors perceive the area as less pleasant. These results are shown in Table 5.

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Table 5. SMB dimensions and adjectives in the dimensions for which significant results were obtained in statistical analyses for Plaza character (A), Pocket character (B) and Naturalistic character (C) with incorporated orange urban artefact.

SMB dimension		**Significant results***	**Effect of orange urban artefact**
Pleasantness		The value for area A was lower than for area B and C with urban artefact ($p < 0.001$).	The incorporated orange urban artefact made the Pocket and Naturalistic character more pleasant in relation to the Plaza character.
Originality		The value for area A was lower than for area C with urban artefact ($p = 0.01$).	The incorporated orange urban artefact made the Naturalistic character more unusual and surprising in relation to the Plaza character.
SMB dimension	**Adjective in SMB dimension**	**Significant results**	**Effect of urban artefact**
Pleasantness	Stimulating	The value for A was lower than for area B and C with urban artefact ($p < 0.001$).	The incorporated orange urban artefact made the Pocket and Naturalistic character more stimulating in relation to the Plaza character.
	Secure	The urban artefact had a lower value than without artefact for area B ($p = 0.007$).	The incorporated orange urban artefact made the Pocket character less secure.
	Idyllic	The value for area A was lower than for area B and C with urban artefact($p < 0.001$). The urban artefact had a higher value than without artefact for area C ($p = 0.03$).	The incorporated orange urban artefact made the Pocket and Naturalistic character more idyllic in relation to the Plaza character. The incorporated orange urban artefact made the Naturalistic character more idyllic.
	Good	The value for A was lower than for area B and C with urban artefact ($p < 0.001$). The urban artefact had a higher value than without urban artefact for area C ($p = 0.02$).	The incorporated orange urban artefact made the Pocket and Naturalistic character better in relation to the Plaza character. The incorporated orange urban artefact made the Naturalistic character better.
	Pleasant	The value for A was lower than for area B and C with urban artefact ($p < 0.001$). The urban artefact had a lower value than without urban artefact for area A ($p = 0.005$).	The incorporated orange urban artefact made the Naturalistic and the Pocket character more pleasant in relation to the Plaza character. The incorporated orange urban artefact

			made the Plaza character less pleasant.
	Boring	The value for area A was higher than for area B and C with urban artefact (p = 0.004).	The incorporated orange urban artefact made the Plaza character more boring in relation to the Plaza and Naturalistic character.
Originality	Surprising	The value for area A was lower than for area B and C with urban artefact (p = 0.005). The urban artefact had a higher value than without urban artefact for area C (p = 0.02).	The incorporated orange urban artefact made the Naturalistic character more surprising in relation to the Plaza and Pocket character. The incorporated orange urban artefact made the Naturalistic character more surprising.
	Special	The value for area C was higher than for area A with urban artefact (p = 0.03).	The incorporated orange urban artefact made the Naturalistic character more special in relation to the Plaza character.
	Ordinary	The value for area A was higher than for area B and C with urban artefact (p = 0.004).	The incorporated orange urban artefact made the Plaza character more ordinary in relation to the Pocket and Naturalistic character.

*The p-values given for the comparison between the characters are for the overall difference between the three characters.

DISCUSSION

According to Wilms and Oberfeld (2018), Al-Ayash et al. (2015) and Berlyne (1971), bright and intense colours have the ability to affect levels of arousal and thereby experienced positive or negative aesthetic pleasure. High values on the SMB dimension 'pleasantness' and 'originality' indicate the assessed environmental quality to be pleasant, secure, beautiful, novel and surprising, with elevated levels of interest and attention, while a low value on the SMB dimension 'pleasantness' indicates a shift of the optimal stimulus situation (Küller, 1991; Janssens & Küller, 1989).

Our study shows that placing an orange urban artefact in a predominantly greenish environment (Naturalistic character) gave rise to a significantly higher value on the SMB dimensions 'pleasantness' and 'originality' and some of their related adjectives, but this was not the case when the same urban artefact was placed in a predominantly greyish environment (Plaza character). The results are in line with the study by Motoyama and Hanyu (2014), showing that a vertical orange urban artefact in a regular pattern incorporated in surroundings that contain low proportion of vegetation gave rise to high levels of arousal and reduced pleasantness as a consequence. The result may depend on the surrounding environmental

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colour combinations and lack of perceivable colour contrast in the Plaza character. The form and structure of the orange urban artefact (vertical sticks in a circular pattern) in this study, together with the surrounding build environment, may also have influenced the results. One interpretation is that the Plaza character with incorporated intensive urban artefact was probably perceived as being too complex and, in a way, too distressing to really understand. Following this line of thinking street furniture and colourful paved surfaces with intense colours, e.g. red, orange or yellow hues, arguably needs a high percentage of green vegetation to have the potential to be perceived as a pleasant and a positive aesthetic contribution to a park environment. When considering that the orange urban artefact applied in this study were less obvious than urban artefacts used in contemporary landscape architecture, it is likely that the also even more dominant additions of intense colours will affect perceived colour contrasts as well as human experiences.

The observed fluctuations in levels of arousal when intensive colours were added in the three different park characters is supported by Wilms and Oberfeld (2018), Al-Ayash et al. (2015) and Berlyne (1971). The placement of a bright and intensely coloured urban artefact in a predominantly green environment generates activation (surprising and unusual in the environment) as well as perceived surprise of moderate arousal between the intense urban artefact and the surrounding green environment. Another contributing factor behind the arousal effect might be that the orange urban artefact represents a cultural input and a sign of engagement in a rather static and monotonous environment.

Effect of orange urban artefact on perceived colour contrast in urban park

The effect of colour contrast in urban green spaces has proved to be essential in the assessment of visual beauty (e.g. Oleksiichenko et al., 2018; Polat & Akay, 2015; Arriaza et al., 2004) where perceived complementary contrast can be related to positive visual quality and positive experiences (Polat & Akay, 2015; Eroğlu et al., 2012). The results of the present study details this understanding by showing that the orange urban artefact had the capacity to change the overall perceived characteristics of colour in each studied character. This means that the surrounding proportions have an unneglectable impact on the perceived colours and thereby the possibility for a colour contrast to occur. This leads to the conclusion that bright and intensely coloured urban artefacts have the ability to transform the perceived colour situation and related human experiences. In this perspective, knowledge of potential changes in human colour perception seems to be a factor that should be considered in planning processes. According to Itten (2003), proportions between colours as well as surrounding colour fields change colour perception and perceived colour contrasts. This suggests that intense colours, such as red and orange hues on, for example, benches, planter boxes or playground equipment placed in an area comprising a high

percentage of greenery may offer experiences of variation, through intensity and a perceivable complementary and cold-warm colour contrast.

Methodological considerations

The main limitation of this study was that only a monochromatic coloured object with a specific structure and scale was used, and that supplementary colour combinations were not explored. However, other studies contribute to the discussion on placing colourful objects in the urban landscape (Abdulkarim & Nasar, 2014a; Abdulkarim & Nasar, 2014b; Motoyama & Hanyu, 2014).

In our study we applied a technique to connect perceived characteristics of colour effects to the assessed SMB results. The two methods complemented each other and broadened the discussion about the incorporation of a colourful urban artefact in a public park. Though the methods used could have been complemented with a phenomenological approach to provide other perspectives for comprehensive planning of urban green spaces.

The study focused on the visual aspects and omitted confounding variables, such as noise and smell. However, the sounds and smells were similar throughout the park, so we argue that these senses had limited impact on the results of the study. Hence in-depth studies of human reactions in relation to long-term studies, perceived active or passive colours, seasons changes and various distances might enable insights valuable to the understanding of human experiences in the outdoor environment.

Küller (1975) states that 15-20 respondents are enough for stability in the result, and we had 17 respondents per situation. This is about the same number as in other studies based on SMB (Karlsson, et al., 2003; Bengtsson et al., 2015).

In this study, the variation is large in relation to the differences between the mean values, but there are interesting significant results on the relationship between intensely coloured urban artefacts, urban green spaces and human experiences. However, in future studies, it would be interesting to see how much more respondents or another research design could reduce the standard errors in the model.

CONCLUSION

This study explored the interaction between an intensely coloured (orange) urban artefact and three park settings with differing proportions of grey and green. Our results are in line with earlier studies, showing that perceived colour contrasts can generate positive experiences and that urban artefacts with an intense colour in an urban landscape may bring about essential and important changes of perceived visual quality and experienced pleasantness. In contrast to other studies, our study shows that an intense coloured urban artefact influences levels of arousal and generate both negative and positive human experiences.

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From this point of view, awareness of landscape colours should be of high priority when installing intensely coloured benches, planter boxes, playground and fitness equipment.

It is proposed that municipalities and landscape architecture offices involved in the placement of coloured urban artefacts should pay just as much attention to the placement of urban artefacts in a public outdoor context as to the design of the urban artefacts themselves. From this perspective the modes of development is an important factor (designer's perspective) both in the design process and in placement of urban artefacts. However, a multiple perspective between the design of urban artefacts and the social use are to be preferred in order to satisfy unexpected scenarios and activities in direct or indirect connection to urban artefacts. It is central to discuss these issues at planning and management levels to increase awareness of the impact of intensely colourful urban artefacts on the quality of life and visitor´s attitudes. Further research and discussions in the academy (research and teaching situations) into the effect of intense colourful urban artefacts on humans in urban green spaces and other urban open space could help provide a more solid knowledge-base as a basis for development of evidence-based guidelines for practitioners.

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CONFLICT OF INTEREST

No conflict of interest was declared by the authors.

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Ethics committee approval was not required for this article.

LEGAL PUBLIC/PRIVATE PERMISSIONS

In this research, the necessary permissions were obtained from the relevant participants (individuals, institutions, and organizations) during the survey and in-depth interviews.

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Resume

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Research Article

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Exploring The Perceived Landscape with The Local People: The Experience of Community Mapping in Orduzu District (Malatya/Turkey)

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Abstract

Purpose

The main purpose of the paper is to define historical landscapes through locals' perspectives and employs community mapping as a tool for defining and transferring perceived landscape elements

Design/Methodology/Approach

The method used in this research consists of various stages, such as determining the boundaries of the study area, determining the goals and objectives of the community mapping, evaluation of the mapping process in the examined toolkits, and the community mapping process design specific to the study area according to the toolkits reviewed in the literature, and the outputs and observations obtained from the maps.

Findings

As a result of the community mapping study conducted with men and women separately, items under the themes of agriculture (past and present), hydrology, tangible cultural heritage, intangible cultural heritage, built environment, connectivity, flora and fauna were identified.

In this study, beyond the recognized physiographic features of the district, were discovered its "unseen" components due to the statements of locals and the analysis of the perceptual data they provided. Were acquired verbal information and point data about some archaeological sites that are not mentioned in any records or literature, as they remain undiscovered.

Research Limitations/Implications

This study bridged an establishing a new link with sustainable spatial planning by assessing perceptions of local people to the environment they live in. However, this study has limitations in the verbal and linear expressions of the groups participating in the mapping process.In the pre-mapping process needs to be supported by local government and non-governmental organizations for more participants.

Social/Practical Implications

it is suggested that the use of this methods such as spatial data production (on historical differences in landscape) within the mainframe of the participant planning approach and community mapping (to ensure collective wellbeing by creating healthy, sustainable spaces) and the inclusion of these methods in spatial planning stages will prove significantly useful.

Originality/Value

This study provides a framework for integrating different perspectives to better recognise and planning and manage the landscape character. This framework can be used as a foundation for a planning process in touch with "real life" and "users".

Keywords: *Perceived landscape, community mapping, participatory mapping, sketch maps, landscape characterization, Orduzu, Malatya*

INTRODUCTION

With its multiple elements, the term "landscape" has various definitions. Landscape refers not only to a complex phenomenon that can be described and analysed using objective scientific methods but also to a subjective observation and experience and thus has a perceptive, aesthetical, artistic and existential meaning as well (Macpherson, 2005; Cosgrove & Daniels, 1988; Lowenthal, 1975; Lowenthal, 1985). Antrop (2005) claimed that landscape has holistic, perceiving and dynamic characteristics. According to Johnson (2007) and Thomas (2012), landscape has meaning as the land itself (the land surface and its physical properties and features), as a matter of perception (cognition, meaning, and apprehension), and as a matter of relationships and experience (bodily engagement, practice, task, and movement) in other disciplines, especially archaeology (ScARF, 2012). According to Howard (2011), there are two predominant threads on landscape: the idea of the cultural landscape and landscape as a picture. Within the cross-section of all the definitions of the term "landscape", Johnson and Hunn (2010) highlighted the integrity of landscape by stating the following: "We emphasize landscape as perceived and imagined by the people who live in it, the land seen, used and occupied by the members of a local community, which encapsulates both land cover and land use" (Human Landscape Perception, 2013). The term "landscape" was given a common definition by the European Landscape Convention (ELC) undersigned by European countries. The ELC defines landscape as "an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors" (Council of Europe, 2000). In this definition of landscape, the factor of perception stands out. Hunziker *et al*. (2007) reported that there are two major modes of perceiving landscapes: the physical properties of a landscape linked to biological inheritance, where the landscape is considered in space, and the sociocultural understanding, in which the landscape is understood as a place. Moreover, it is important not only to understand the landscape itself but also to understand the factors that affect the perceived landscape. Research by Jacobs (2006) divided the landscape into three separate realities: matterscape, powerscape and mindscape. Matterscape is the physical reality, powerscape is the social reality, and mindscape is the inner reality. Examining the landscape classification by Jacobs, it can be conferred that landscape perception is affected by physical landscape and individual and cultural influences, given that realities shape perception.

In the research title "Demographic Correlates of Landscape Preference" by Lyons (1983), landscape perception was shown to differ significantly by age, gender and residential experience factors. She found that preference levels changed in different age groups, adolescent males and females had different preferences, urban and rural residents had different preferences, familiar vegetational biomes were most preferred, and there was no evidence that landscape preferences were shaped by innate or evolutionary factors. Within the scope of differing landscape

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perceptions in terms of gender aspects, the research by Perera and Chandrasekara (2017) was aimed at detecting perceptual changes in landscape architecture students and the local public in a study aimed at measuring the effect of a public landscape on different genders with different knowledge levels. According to the results, there is no clear difference in preference for landscapes between female and male public users. There is a significant difference in the order of perception according to gender among landscape undergraduate students. The other results of the paper indicate that landscape students have a comparatively better understanding of landscape than does the general public. The studies oriented at detecting the effects of different cultures (identities) on landscape perception show that cultures have a high correlation of preference (Herzog, *et al*., 2000; Kaplan & Herbert, 1987; Kaplan & Kaplan, 1989; Yang & Kaplan, 1990; Priego, *et al*., 2008; Schenberg, 2008; Matijošaitienė, *et al*., 2014). Yu (1995) also reported that people from different living environments (rural vs. urban) have different preferences; rural residents have a high preference for novelty and modernity. He also indicated that landscape preferences are strongly influenced by education levels.

Due to archaeological findings and previous approaches, we are aware that the relation between religion and landscape perception dates back to the distant past. According to Doyle (2014), influenced by archaeological approaches to the ideologies of prehistoric Britain, Anglo-Saxons are increasingly devoting themselves to exploring the wider religious use and interpretation of the landscape. The *Göbeklitepe* Archaeological Site, included in the UNESCO World Heritage List in 2019, can be provided as the most significant example of human beings shaping the environment due to their religious beliefs in prehistoric times. Schmidt (2007) reports that the *Göbeklitepe* region is different from the Neolithic settlements found in other archaeological excavations and that religious structures that have not been encountered before have been identified. One such megalithic structure, at least 5,000 years older than known ancient temples, clearly indicates how significant and influential religious beliefs can be in the development of civilizations. *Göbeklitepe* also indicates that humans constructed impressive and complex buildings before their basic needs, such as housing, agriculture and pottery, were met, showing that these were induced by the strong sense of belief amidst archaic human communities. In fact, Scmidt (2007) defines *Göbeklitepe* as follows: "…first, the temple was built, and then, the city." Today, we can see that religion and religious rituals (such as the use of landscape descriptions in connection with the belief that the mountains of Hinduism are the house of God, the belief that forests and rivers are sacred and make up the Garden of Eden in Islam, and the connection between life and life after death) have a significant effect on shaping landscape perception.

In brief, it can be said that landscape perception is shaped by religion and individual influence on perception; education, individual hobbies, area of

interest, age, gender, and cultural influence on perception; and nationality, class, social value/rules, economic, political conditions, and residential background of urbanization.

Landscape Typification and Characterization

The answer to one question—"How are perceived landscapes defined and integrated into the modern urbanization process?"—can be sought in the definition of landscape by the European Landscape Convention (ELC). It is reported that the definition of landscape also includes character, and the determination and classification of character types play a key role in the implementation of the ELC (Butler & Berglund, 2014). Tudor (2014) defines landscape character evaluation as the process of defining and explaining differences and changes in landscape character. In this process, the objective is to identify and explain the unique composition of the elements and features (characteristics) that render landscapes different. In such landscape character analysis, which is a method for identifying the perceived landscape, natural (topography, soil, vegetation, geology, etc.) and cultural (land use, settlement type, historical places, etc.) data are transferred to the GIS environment, together with the data obtained from the land survey. For each landscape character area and type, the key pressures of its important properties, qualities, spatial distributions and changes that can affect its character and biological diversity are determined. At the end of the process, the final decision or decisions are made based on landscape development strategies, landscape planning policy guide, landscape capacity and landscape development suggestions.

Historic Landscape Characterization

Historic Landscape Characterization (HLC) differs significantly from more traditional methods of describing historical sources, such as a list of areas of protected cultural heritage. As specified in the ELC, historical landscape assessment studies are closely related to the definition of the term “landscape”, involving areas shaped by natural and/or human activities and interactions. The outputs of this assessment, which focus on human-based factors, provide complementary contributions through presenting a relatively more historical dimension in the landscape character analysis and assessment process (Demir & Demirel 2016; Fairclough, 2014; Shropshire County Council, 2007; Turner; 2006). The HLC approach, which is based on an archaeological view of the landscape as a material culture and artefact, treats the landscape as a perception of the environment. This method is oriented towards the elements of time (time-depth), the role of human beings, and the dynamics of changes (Stular, 2011). Within the scope of this classification, landscape patterns, such as land size and form (closed, zoned, semi-closed, regular-irregular areas, etc.), current land use (forest, agricultural field, settlement area, etc.), the previous usages of landscapes, and the tangible cultural remains from the patterns (remains from the medieval age, classical age, post-

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classical age, etc.) or any single dominant pattern, structure and trace are clearly described. Character areas are defined using timewise changes by means of using historical photos, drawings, gravures, and old-dated air photos in GIS media. HLCs are beginning to be used in strategic planning policy, where they can contribute to national or regional objectives and the planning of major developments such as wind farms and can advise on land management issues, such as agri-environment schemes, woodland grant schemes and heathland regeneration schemes (Macinnes, 2003).

Participatory Mapping (Community Mapping)

Within the scope of defining perceived landscapes and the related decision-making process, the landscape types that are designated only by experts in technical departments and the practices exercised with the developed decisions are known to be the only areas where problems are experienced. One of the leading reasons may be the inability to ensure the participation of local citizens in the planning, management and decision-making processes of cultural landscapes, which are formed by experiences, gaining an identity through traditional use and constituting the collective memory with life practices.

Land use and development decisions are consistently among the most important decisions at the community level because they are perceived to have direct linkages to resident quality of life (Brown, 2006). To activate each and every dynamic within the structure of the landscape, the community mapping method aims to present the details of the current situations through community gatherings and to improve social accountability and environmental awareness through revealing feelings and opinions. The community mapping method presents the natural and cultural landscape resource assets of the local community and the tangible and intangible cultural heritage resources, as well as other potential solutions for the problems experienced through gathering individuals of different gender, age, ethnic group and socio-economic status living in the same area (Lydon, 2002; Armstrong, 2008; UNHCR, 2008). Community maps show how the local community sees their area through the use of maps and photos. Community mapping states the common basis that the community shares by means of establishing or exploring its connections (Lydon, 2003; Offen, 2003; Parker, 2006; Perkins, 2007). Used as a participative action research tool, the community mapping method has been recognized as the best practice in terms of sustainable development, with its contribution in revealing the secret potential of the landscape within the scope of its effects on local development in the United Nations Rio Environment Conference in 1992 (Panek & Sobotova, 2015; Cabeça et al., 2019).

Community mapping has been experienced for various purposes in various regions across the world and for various purposes. These experiences can be exemplified in terms of rural and urban planning scenarios. Within the scope of rural planning, community mapping

studies have been substantially used in the establishment of eco-museums projected for Italy. With the collaborative studies and works carried out with the local communities living in the region for the planning phases of the *Ecomuseum of Parabiago* Landscape, *Ecomuseo Della Castagna Raggiolo, Ecomuseo Della Pietraporzio*, and *Ecomuseo Regionale delle Miniere e della Val Germanasca*, planning and landscape studies have been carried out in line with such information as the potential of the local landscape, along with its problems, the changes experienced from past to date and biodiversity. The study of Wartman and Purves (2017) is an example of using the community mapping method to explore landscape categorization in rural areas. The mapping process that was carried out with *Takana* indigenous people in the Bolivian Amazon reflects local conceptualizations and land use, which can be considered, for instance, in resource management and spatial planning. The above study also shows considerable differences among the features represented on sketch maps with ethno-ecological landscape categories used in language. Examining the community mapping examples carried out in urban areas, the study by Panek and Sobotova (2015) in Nairobi (Kenya) stands out. They discussed the possible effects of community mapping on local development. Integrating the results with the participatory GIS, they aimed unlock the hidden potential in urban-slum areas in Nairobi, and further examined possible future development in the area of community mapping. The results of this experience show that the participation of the local community is crucial for the success of the mapping project. Panek and Sabotova (2015) drew attention to the link between technological demanding and participation levels in their research. As a result of the research, they determined that the more technology instruments in planning such as GIS, remote sensing or geodetic mapping dominate the mapping process, the less members of the community are actively involved, and thus the chances of sustainability decrease.

Study Area

With the use of a community mapping method, this paper aims to define the perceived landscape of *Orduzu* District, located within the district of *Battalgazi,* Malatya Province in the Eastern Anatolia Region of Turkey (Fig.1). The following criteria have been defined for choosing the *Orduzu* district: this district has hosted many civilizations in the historical development process, it possesses multiple cultural layers, the traditional landscape texture (settlement structure, production method, neighbouring relations, etc.) has been relatively preserved when we look at it in the present, and neighbourhood residents comprise a substantial proportion of the local public.

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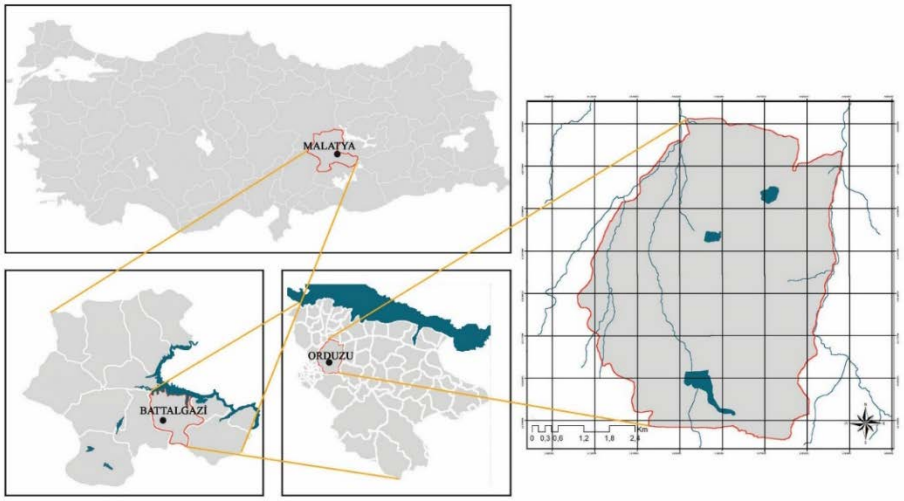

Figure 1. Location of *Orduzu* District in Malatya City

It is known that the settlement date of the *Orduzu* District dates back to the prehistoric period. This information comes from the *Arslantepe* Mound, which began to form in 1930 (the first systematic excavations were funded by the University of Rome La Sapienza in 1962), based on the data obtained from archaeological excavations. The cultural embankment of the *Arslantepe* Mound is 30 metres high. It was inhabited from 5000 BC until the 11th century BC. It was used as a Roman village between the fifth and sixth centuries AC and later was turned into a settlement—the Byzantine Necropolis (cemetery) (Frangipane, 2012). Following the excavations carried out since 1930, it has been accepted that this area has a multi-layered artificial form. It is known that it was named after the lion sculpture made of stone and found at the entrance of the palace at the beginning of the first millennium BC (Frangipane, 2012). It had a state structure and covered the Eastern Anatolian and Mesopotamian communities in 4000 BC, it supports developments such as monumental architecture and iconography with this multi-cultural structure, and in this sense, it is known to be the most well-preserved and oldest mud-brick palace with wall paintings. With its hosting characteristics, the *Arslantepe* Mound has been included in the UNESCO World Heritage Temporary List as of 2014 (UNESCO, 2014). With its characteristics along with its importance in explaining a crucial part of the history of humankind, its located structures, and its significant documenting stages over the world as a single unique area of human development, it was nominated as Turkey's candidate to permanently become a UNESCO World Heritage Site in 2019.

Many ceramic pieces from the Byzantine, Seljuk and Ottoman Periods have been found during the surveys carried out in the *Orduzu* District (Di Nocera, 2008). According to the findings, we can see that this area was used as a settlement area in later periods. Today, it is conferred that in *Orduzu*, which is established on a wide valley floor, its rich hydrological features, agricultural areas and orchards are densely spread (Figure 2).

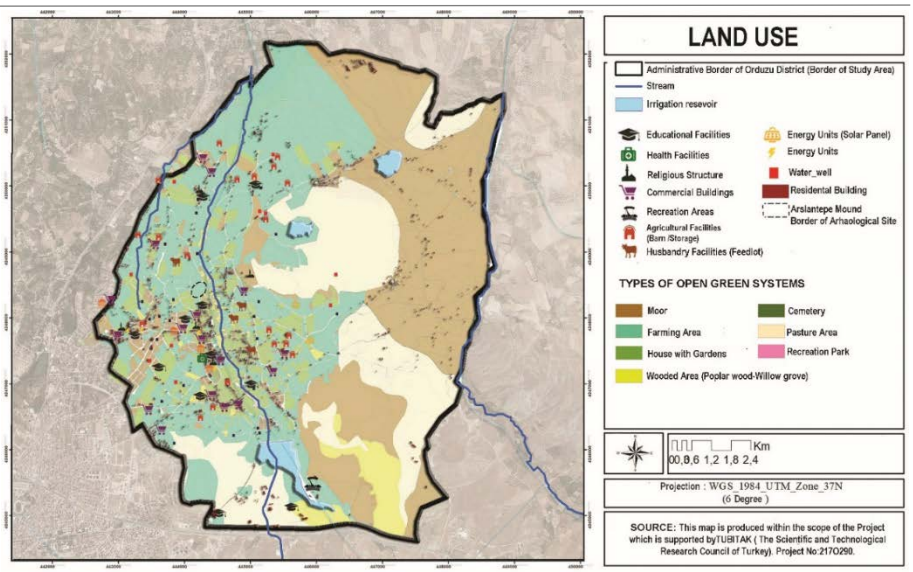

Figure 2. The Map of Land Use of *Orduzu* District in Malatya City

Methodology

The main purpose of the paper is to define the cultural landscapes of the study area by the local people using the community mapping method. With this method, it is aimed to understand the landscape potential of the study area with local people, identifying the problems and developing realistic and sustainable solutions to these problems.

In order to learn community mapping processes and techniques, studies in this field have been examined. In this research, is focused on toolkits that explain the mapping process and the implementation stages with the case studies. In the paper, it was used the booklets published by Penrith City Council and University of Western Sydney and Vale of Glamorgan as the materials, among the toolkits examined. The community mapping process in these toolkits is shown in Table 1 and Table 2.

The method used in this research consists of various stages, such as determining the boundaries of the study area, determining the goals and objectives of the community mapping, evaluation of the mapping process in the examined toolkits, and the community mapping process design specific to the study area according to the toolkits, and the outputs and observations obtained from the maps. The flow chart of the research method is shown in Figure 3.

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Table 1. The Creative Community Mapping Toolkits published by Penrith City Council and University of Western Sydney (Armstrong *et al.*, 2008)

Aim	Target groups	Mapping Process	The Materials Used	Outputs
To develop an understanding of the cultural values related to existing parks and outdoor recreational space in Penrith To use art processes to reveal uses and barriers to use of parks and open space To develop creative community mapping as an original design and planning tool for Penrith.	Children from Kindana After School Care Centre	**Pre-mapping** Initial Discussion, introduce the Project **information requested from children** write down stories about parks they enjoyed and their parent's stories games played in parks to collect small things such as leaves etc. from the parks. **Workshop One: Engaging with a Park** "What people do/find in parks" "Why we do this in parks" "What we don't do in parks **Making the Map (Collective)** **Building up Descriptive Words** **Workshop Two: Making Individual Maps** Mapping Favourite Parks. Mapping Not-Nice Parks **Discussion of Children's Workshops**	coloured folders with pens, drawing paper, notebooks and a personal letter. 3mx3m black mapping base, individual-coloured boards, each 600mmx800 mm	Children revealed that their use of parks and open space is changing from general play in neighbourhood open space to organised activities on playing fields at prescribed times. Their out of school activities seem to be increasingly structured, as a result many of them are not using local parks.
	Students of University of Western Sydney	**Pre-Mapping** individuals visited the places, wrote down emotions, both positive and negative **Workshop Design** Map One: Map of the Known Map Two: Map of Personal Landmarks Map Three: Mapping Layers of Memory and Experience Map Four: Map of Discomforting Places **Observations**	Using Google Maps For each participant, four A3 copies of the defined areas were printed out, digital images, coloured cotton, pins, tags	Youth groups indicated that a diversity of places is used for open space recreation. They are however restricted from using parks and open space at night because of the lack of lights. They are also prevented from gathering in the open space around Westfield by security guards.

				Participant'ssuggestion: "Parkouring' (a freestyle obstacle course). A new open space activity, is engaging the youth in Penrith.
	Local People (People with disabilities, Sudanese women, Sudanese youth, Indigenous Youth, The Elderly)	**Pre-Mapping** preliminary consultation **Workshop Design** stories of home, refugee camps, Penrith, using written stories **Making the Map (individual/ collective)** -using information technology to recall and map personal experiences as they relate to parks in other countries, -building on generic street maps, mapping using night-time digital photography (for Sudanese youth) -a map of connections (between points and spaces visited), a map of personal landmarks, and a map of layers of memory and experience (for Elderly) **Observations**	music, fabrics, beading, memorabilia Google Earth, digital images, word associations,	Sudanese women revealed how they felt conspicuous and possibly unwelcome in Penrith's parks. They are accustomed to using parks for large gatherings that include food and music. They do not feel free to do the same thing in Penrith parks

Table 2. The Community Mapping Toolkits published by Vale of Glamorgan (as part of the pilot project coordinated by the Creative Rural Communities Team) (Vale of Glamorgan Council, 2017)

Aim	Target groups	Mapping Process	Mapping Activities	Outputs
Building on and expanding existing community strengths	Local people from St.Athan in Vale of	**Pre-mapping** sets out the work involved before the mapping can take place.	**Ice breakers** a way of ensuring that all participants start to talk to one another and find out the names of people in their community. **Community Photo Quiz** an activity to give each group a page of photos of	**St. Athan:** The need to improve playgrounds and more activities for children

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Enabling the community to explore their assets within the physical and social environment Generating a shared awareness and understanding of community assets; Identifying new resources; Ensuring that the community has access to the resources it needs; Giving external agencies a greater understanding of the area and avoiding duplication of services and resources; Cultivating new	Glamorgan The Wenvoe Community Council, (85 attendees) Rhoose community (16 attendees) Ystradowen Community (over 220 attendees)	**Mapping** sets out some examples of exercise you could do to capture the community's views and guidance on developing a community survey **Taking things forward** enables the community to determine the most useful plan of action for effectively addressing the data findings and established goals as well as guidance on providing feedback to the community.	different sites in the community and ask them to identify on the map where they are. **Community bingo** Each person is given a list of questions about their local community to ask other participants. The first person who answers all the questions calls out BINGO and is the winner. **Dream Tree** An activity to gain feedback about the communities' aspirations. This exercise is offered to get informal feedback at a drop in sessions and start conversions as well as group exercises at a focus group **No map mapping** An individual activity with a focused group where participants are asked to map draw on a blank piece of paper a particular route they walk regularly and draw on the facilities / services they pass along the way for example a walk from their house to the local shop / community centre **Body maps** A group activity involving drawing a body and asking participants by sticking post what they love about the area (post-it notes on the heart), what services they use in the area (post-it notes on the legs and feet), what their hopes and aspirations (post-it notes on the head) to identify. **Citizen Mapping: My Favourite Places** A group activity involving participants putting post-it notes on a large map of the area identifying what they know about their local community.	**Wenvoe**: The need to provide a village café, a new library which could potentially be multi-functional including a café and, afterschool club and improve play areas and a new multi-use games area. **Rhoose:** a growing awareness of what other organizations exist in Rhoose, as well as a shared desire to increase collaboration between them, was identified. **Ystradowen:** At the end of the mapping, a 'sharing general assembly' was established and it was decided to prepare 2 new playgrounds with seating and barbecue facilities, 'Trim Track', Heritage Trail and an

partnerships and relationships; Providing information across agencies; and Encouraging collaboration.		**Maintaining momentum** Communicating and disseminating information is key throughout the implementation step. The final step involves maintaining, sustaining, and evaluating the efforts outlined in the community mapping process by continuously evaluating progress, making necessary changes to the plan, and learning from experiences	**Photo-visioning and mapping** A group activity bringing the community together to define the different types of physical / social assets in the area **Community asset mapping** A group activity bringing the community together to define the different types of / social assets in the area **Idea Prioritisation** An activity to initiate conversations, by asking participants to vote which issue / project is the highest priority in the community. **Creating a vision** An activity for participants to identify three things that are fundamental to the future of their community and, with flip chart papers, group words into themes and bring the words together in a vision	extension of the village hall, which were determined as needed.

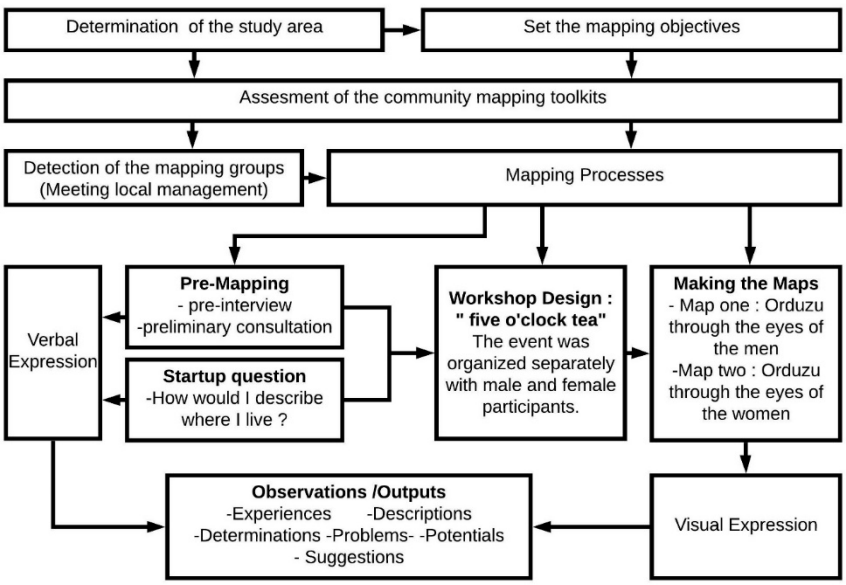

Figure 3. The flow chart of the research method

Pre-Mapping: Conservation with Local Management

The most critical point in this experience is the questions on ensuring participation in the mapping process and with whom the process is to be

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performed. Looking at the case studies conferred, the role of local governments is critical in the smooth execution of the process. Based on this, interviews were conducted with the upper- and lower-scale local government departments of *Orduzu* District. First, informative meetings were held for the purpose and importance of the community mapping method and especially its role in management. The first meeting was held on 23rd July 2019 within the *Battalgazi* Municipality, which is the district administrative management unit. On 30th July 2019, an informative meeting was held with the *mukhtar* (headman) of the district and the delegation under the coordination of the *Battalgazi* Municipality Culture Directorate. Following this meeting, discussions on the selection of participants were conducted during the mapping process. The mapping process aimed to achieve mixed participation, where all segments of society were together, without considering criteria such as gender, ethnicity, belief, age, and economic structure. However, in these meetings, there was a common discourse about the efficiency of the targeted expression in the mixed-participation stages by spokespersons and therefore the necessity of gender discrimination. Based on this, participation groups were formed by gender, and group studies were conducted at different times.

Pre-Mapping: Community Mapping with Local People

The following criteria were considered in the selection of individuals in the male and female groups: living in *Orduzu* for at least 10 years, having different professions, being in different ethnic groups, and being in different age groups. Regarding the perception of the living environment, it is of importance to bring together the subjective interpretation of the socio-cultural differences of individuals and therefore generate multiple meanings in the perception of the living environment and the shared space. In this framework, participant groups based on volunteerism were created. (Figs. 4-7). The groups were formed as follows: female participant group: 17 years (1 person), 25 years (1 person), 35 years (2 people), 45 years (6 people), and 46 years and above (5 people); male participant group: 17 years (1 person), 25 years (2 people), 35 years (4 people), 45 years (2 people), 46 years and above (13 people).

Figure 4: Meetings with *Orduzu* District Local Government Representatives (Photograph by author)

Figure 5: Meetings with *Orduzu* District Local People (Men) Participant Groups ((Photograph by author)

Figure 6: Meetings with *Orduzu* District Local People (Men) Participant Groups (Photograph by author)

Figure 7: Meetings with *Orduzu* District Local People (Women) Participant Groups (Photograph by author)

In the stages of the examined toolkits is seen that the activities have an important role for the efficient mapping process. During the mapping process, we determined that different workshop designs were carried out according to socio-cultural structure and age groups for the targeted groups. Based on this, we preferred the traditional activities of the neighbourhood as the workshop design for the community mapping process in the study area. It has been determined as the workshop event, called the "five o'clock tea", where the local people come together with each other. We were invited to two houses that hosted voluntarily for this event, which is usually held in the afternoon and where local dishes are served.

First, information was provided about the aim and purpose of the study. Afterwards, "How would I describe where I live?" was asked the starting question the participants. The process, which started with verbal dialogues without any direction, continued with visual expressions by giving A0 size white paper, coloured crayons, and coloured adhesive

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featured papers (note papers, etc.). The purpose of giving blank paper is to enable participants to express themselves freely. The stages of the drawing, the dialogues while drawing and the stories told were recorded (Fig. 8)

RESULTS

In the preparation process of community mapping, interviews and questionnaire techniques were used with participant groups. For verbal expressions, both groups first made a comparison with the present time by explaining the previous environment in which they lived. It was observed that these verbal expressions focused on the Arslantepe Mound. They evaluated the bond established with the Italian excavation team, along with the memories experienced, the contributions to the Orduzu neighbourhood and the people (making economic contributions to the local people during the excavation season, etc.). It was observed that the members of both groups actively participated in these verbal expressions. In the verbal expression stage, while the male group focused on describing the place in which they live, the female group mostly expressed their problems and expectations.

It was observed that the male group actively participated, and the majority of members of the female group remained hesitant when asked to proceed to the drawing stage after verbal expression. We voluntarily evaluated the community maps drawn by male and female participants both formally and contextually. In terms of stylistic features, the male group drew aerial views with a high vantage point, while the female group drew a mix of aerial and sideways perspectives. Both groups drew the neighbourhood in which they live in a circular form. While the male group divided the neighbourhood into four regions (old administrative boundaries that are not currently valid), the female group set the boundaries according to the present-day street names. Both groups drew the Arslantepe Mound as the centre of their maps.

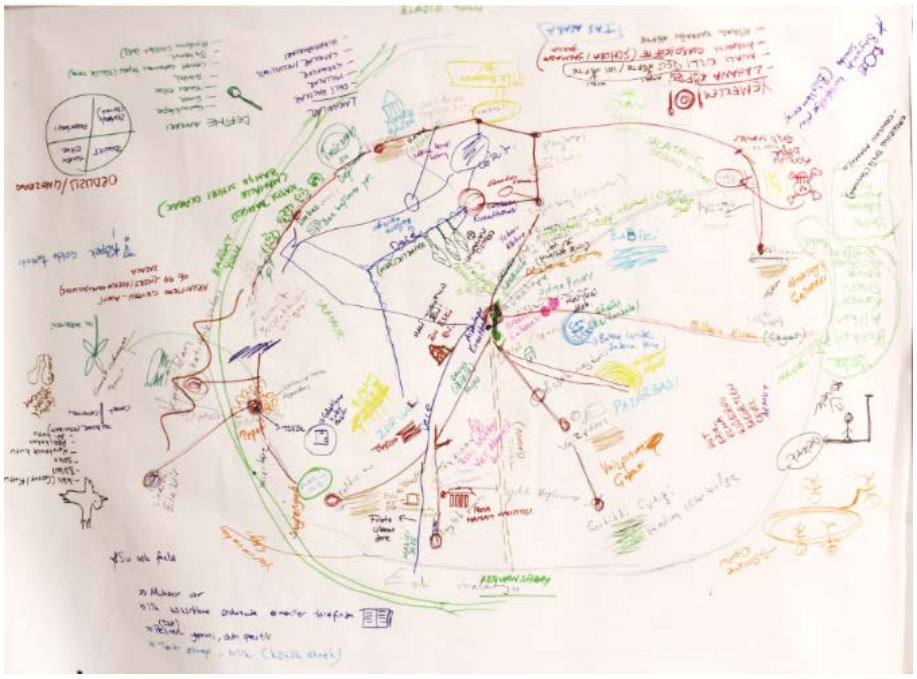

Figure 8: Example of community map with aerial view and high level of abstraction of men group

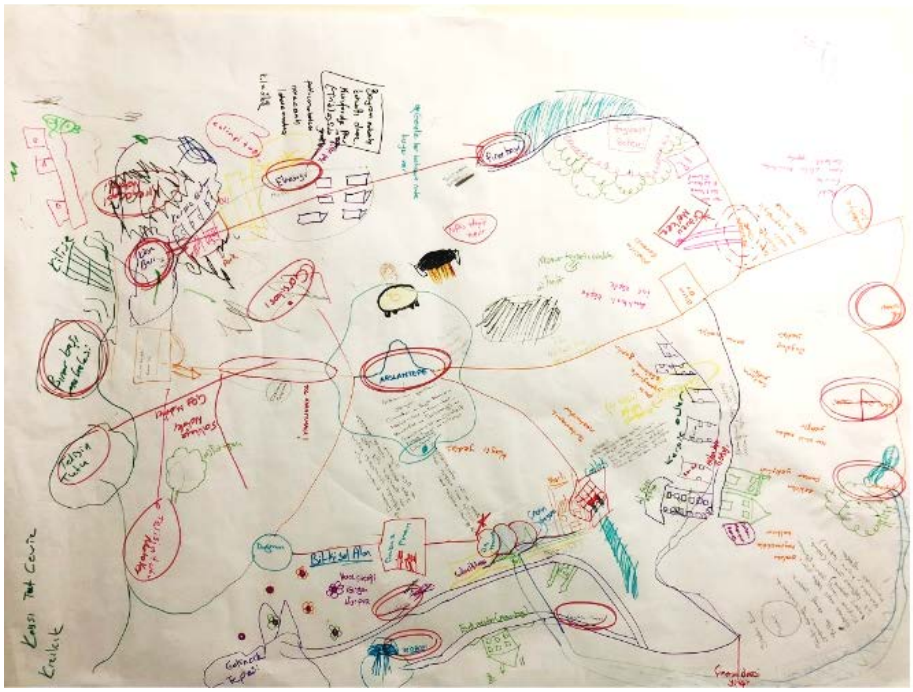

Figure 9: Example of community map with a blend of aerial and sideways perspective of women group

Analysing the formal language of the groups, it was determined that the locations drawn by the male group from the aerial viewpoint and their positions with each other reflect the existing land use, while there were errors in the geographical positioning of the women's drawings. It was observed that the female group drew the locations stated in the drawing according to the houses in which they lived (Fig. 8-9).

The items expressed in the community maps of both groups and the positioning stages (in the order of drawings) on the map are presented graphically in Table 3.

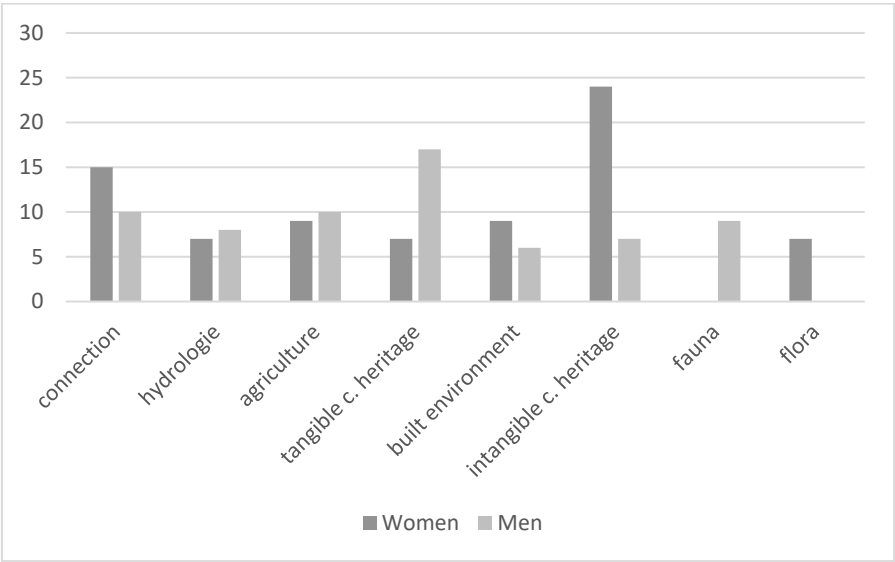

Figure 10: Comparison between historical landscape elements and features on community maps

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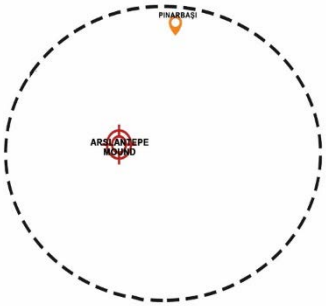
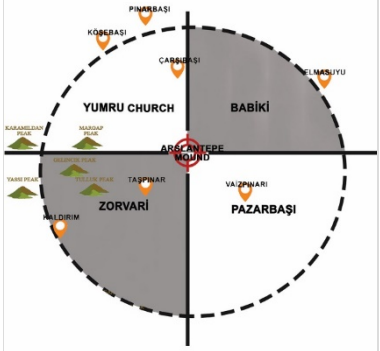
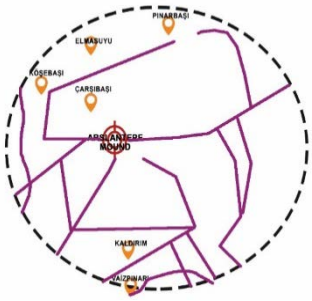
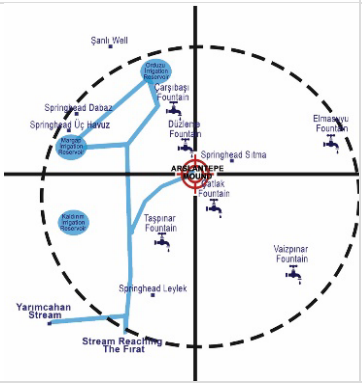
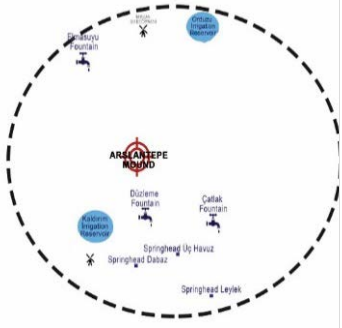
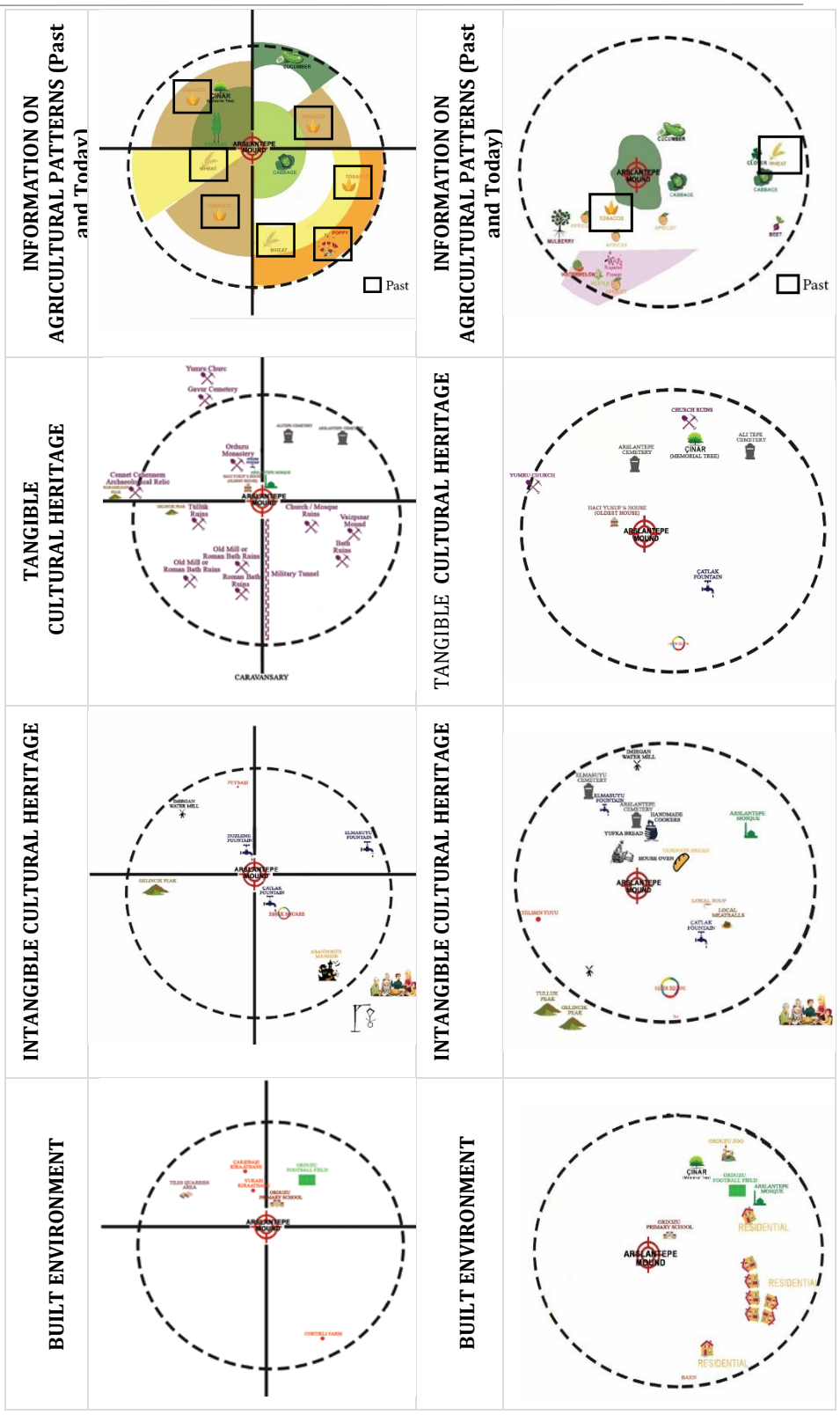
The community maps included in the table present the content. The topics of the groups are numbered in the order of drawing. In the mapping process, the local names are given in the table since they define the items drawn by the groups in the local language. Examining Table 4 both groups of community maps are generally composed of items under the themes of agriculture (past and today), hydrology, tangible cultural heritage, intangible cultural heritage, built environment, connection, flora and fauna. The distribution of the numbers of the items drawn under these titles according to the groups are presented in Figure 10.

Table 3. Formalistical Comparison of Community Maps of Man and Woman Groups: The Historical Landscape Elements on the Mapping (Drawing) Stages (Graphical Expression)

Stage	Men	Stage	Women
STARTING POINTS (Arslantepe Mound, Pınarbası Water Spring)		STARTING POINTS (Arslantepe Mound, Pınarbası Water Spring)	
CONNECTIONS (Neighbourhood, Hill, Old Town)		CONNECTIONS (Neighbourhood, Road)	
HYDROLOGICAL POINTS		HYDROLOGICAL POINTS	



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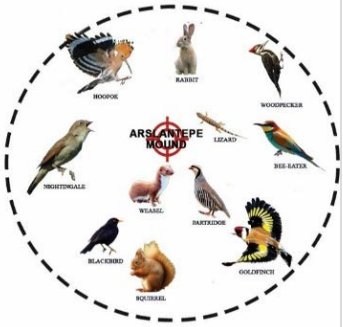
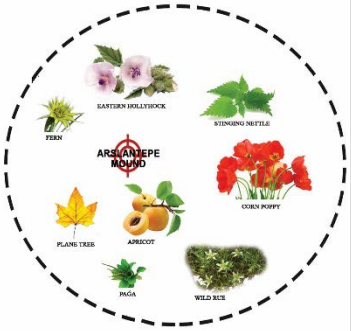
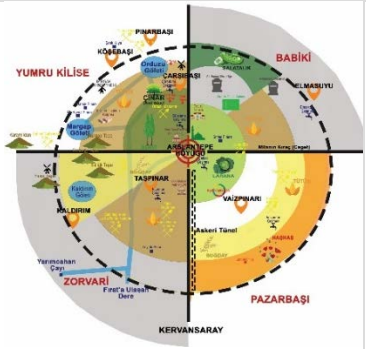
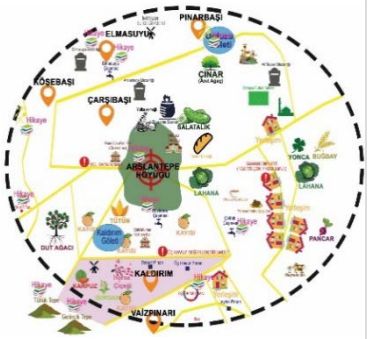
FAUNATIC INFORMATION		**FAUNATIC INFORMATION**	**There is no information on this theme on the community map.**
FLORISTIC INFORMATION	**There is no information on this theme on the community map.**	**FLORISTIC INFORMATION**	
FINAL MAP		**FINAL MAP**	

Table 4. Content-Wise Comparison of Community Maps of Man and Woman Groups

Men				**Women**			
Sketching Stage	Feature/ some of in Local Turkish Dialect	Features in Topics	Total Item	Sketching Stage	Feature/ some of in Local Turkish Dialect	Features in Topics	Total Item

Starting Point (First Drawing)	Arslantepe Höyüğü (Arslantepe Mound) Pınarbaşı	Prehistorical Archaeological Heritage Water Spring	2	Starting Point (First Drawing)	Arslantepe Höyüğü (Arslantepe Mound) Pınarbaşı	Arslantepe Höyüğü (Arslantepe Mound) Pınarbaşı	2
Connections (Today)	Vaizpınarı Köşebaşı Elmasuyu Şanlıkaya Pınarbaşı Çarşıbası	District, Streetname	6	Connections	Pınarbaşı, Elmasuyu Köşebaşı, Çarşıbaşı Kaldırım Vaizpınarı	District, Streetname	6
Connections (Past)	Yumru Church Babiki Zorvari Pazarbaşı	District, Streetname	4	Connections (Past)	X	**X**	0
Inter connections	**X**	**X**	0	Inter connections	Caget	Garden Paths	9
Hydrological Features	Margap Kaldırım Orduzu	Irrigation Reservoir	3	Hydrological Features	Margap Kaldırım Orduzu	Irrigation Reservoir	3
	Pınar Çatlak Üçhavuz	Sprinkhead/Fountain	3		Pınar Çatlak Üçhavuz	Sprinkhead/ Fountain	3
	Ordu Hacı	Stream	2		Harık	Water tunnel (passing through the courtyards)	1
Agricultural Patterns (Today)	Mış mış (Apricot) Elma (Apple) Hıyar (Cucumber) Lahana (Cabbage) Tut (Mulberry) Ceviz (Walnut)	Agriproduct	6	Agricultural Patterns (Today)	Mış Mış (Apricot), Elma (Apple), Hıyar (Cucumber), Lahana (Cabbage), Tut (Mulberry), Karpuz (Watermelon), pancar (beetroot)	Agriproduct	7
Agricultural Patterns (Past)	Tütün (Tobacco) (Çortik Farm) Gelincik (Poppy) Hıyar (Cucumber) Buğday (Wheat)	Agriproduct	4	Agricultural Patterns (Past)	Tütün (Tobacco) Buğday (Wheat)	Agriproduct	2

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Tangible Cultural Heritage (Today)	Kervansaray Arslantepe Cemetery Alitepe Cemetery Arslantepe Mosque Çınar, Hacı'nın Evi (House of "Hacı Ali"), Karamildan	Caravansary Cemetery, mosque, house, monumental tree, the oldest house, ruins of Roman period	6	Cultural Heritage (Today)	Çatlak Fountain Çınar	Fountain, Monumental tree,	2
Tangible Cultural Heritage (Past)	Yumru Church Orduzu Monastry Bathouse ruins (Roman period) Military tunnel Mosque ruins Gavur (unbeliever) cemetery Vaizpınar Mound Ruined mill Ruins in Tüllük Hill Ruins in Hill of Heaven Hell (Gelincik Hill) Düzleme Fountain	Church, Monastry, cemetery, mound, ruins (of mosque, bathhouse, mill) fountain,	11	Cultural Heritage (Past)	Yumru Church, Alitepe Cemetery Arslantepe Cemetery, Hacı'nın Evi (House of "Hacı Ali") Eşşek (Donkey)Square	Church, cemetery, the oldest house. square	5
Intangible Cultural Heritage	Damat Asma, Bayram sofraları	Bairam rituals	2	Intangible Cultural Heritage	Bayram sofraları	Bairam rituals,	1
	Gelincik Hill, Çatlak Spring, Düzleme Fountain Elmasuyu Fountain	Place of Mysterious and superstitious Beliefs	4		Arslantepe Mound, Arslantepe Mosque, Taşpınar Mosque, Elmasuyu Cemetery, Gâvur cemetery, Tüllük Hill, Gelincik	Place of Mysterious and superstitious Beliefs	8

					Hill, Çatlak Fountain		
	Terkedilmiş konak (abandoned inn)	Terrifying place	1		Eşşek Square, Elmasuyu Fountain, Imirgan watermill, Düzleme Fountain	Places used in the past (today not excited)	4
					Telisin Tutu	Story about, old garden path	1
					yufka ekmeği, Analıkızlı, Kirazyaprağı dolması, lahana dolması, Pirpirim çorbası, içli köfte, pazu dolması, fasulye yaprağı dolması	Traditional Dishes	8
					Tandır (house oven), değirmen (watermill, grinder, water well)	Traditional garden construction	2
Built environment	Tiles quarries area, Çarşıbaşı Kıraathane, Yukarı Kıraathane, Orduzu primary school, Orduzu football field, Cortikli farm	Education, recreational building, coffee house	6	Built environment	Own house, vernacular house (restored), some residence, Arslantepe Mosque, Orduzu Elementary School, Football field, Çınarpark, Barn, Zoo	Residental, regional, education, recreational building	9

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Faunatic Features	İbibik (Hoopoe), Baykuş (nighting ale) Saka (goldfinc h) Karatavu k (blackbir d) Ağaçkaka n (woodpec ker), Arıkuşu (bee-eater),Gelincik (weasel) Sincap (squirrel) , Kertenkel e (lizard)	Featured animal species (bird, weasel, squirrel, lizard)	9	Faunati c Feature s	**x**	**x**	0
Flora	x	**x**	0	Flora	Horoz çiçeği (eastern hollyhock) Isırgan (stinging nettle) Çınar (plane tree) Gelincik (corn poppy), Üzerlik otu (wild rue) Mış Mış (Apricot), Yemlik (fern)	Flowering plants in the home gardens, and fruit trees (especially apricot) surrounding	7
Problems and Suggestio ns	x	**x**	0	Proble ms and Suggest ions	More recreation areas for women Arslantepe road should be a pedestrian way Rehabilitati on and revitalisati on. Establishin g a connection to Gelincik Tepe	Problems (lack of playground, recreation areas and traffic noise) Suggestions (on the water surface and new connections)	3

According to the Figure 10, the most common intangible cultural heritage items are seen in the community maps drawn by both groups. Both groups provided verbal information about stories, superstitious beliefs, traditions and customs (festive rituals, etc.) under the title of intangible cultural heritage. While the male group did not express what they stated verbally in a linear fashion, they showed the locations where they told stories about the female group on their maps. Especially in the drawings about the stories, the illustrations about the religious places of the women and the illustrations about the water resources of the men come to the fore. Under this title, women drew more features than men. Both groups told and drew in detail the stories which they thought happened in the past at *Gelinciktepe-Tüllüktepe*, where the highest point of the neighbourhood.

Second highly drawn items are collected under the heading 'tangible cultural heritage'. Under this theme, the two groups accepted the *Arslantepe* Mound, the most important archaeological heritage site of the neighbourhoods, as the central point in their maps, and thus, they drew this point the first. While the male group expressed the *Arslantepe* Mound as an archaeological ruin, the female group used the concepts of hills and cemeteries. The male group also stated all the remains and registered structures found under the heading of tangible cultural heritage and the undetected remains and areas without any literature data on their maps. The male group correctly drew the cemetery, mosque, traditional house, monumental tree, which are registered under the title of tangible cultural heritage, and the caravanserai, which is located outside the borders of *Orduzu* district, according to the map location. In addition, the male group marked the archaeological remains without any information. The marked places are located around the *Arslantepe* Mound. (To the east of *Arslantepe* Mound, *Tüllük* remains, *Cennet Cehennem* Archaeological Relie, in the northeast Old mill, Roman baths ruins (drawn in 3 different regions), in the west, ruins thought to be a church or mosque, *Vaizpınarı* Mound, in the north the military tunnel that is connected to the historical city centre of *Battalgazi*, which is a Seljuk period city. In the southeast, *Orduzu* Monastery and outside the *neighborhood* border *Yumru* Church and *Gavur* cemetery). Elderly members of the male group said that they had visited these areas in the past or their family elders had told the stories about these areas. The female group drew only a few items under this theme.

Third highly drawn items are collected under the theme 'connections". Under this theme, it was determined that the female group drew road connections in detail (there were positioning errors). The male group drew the old town and neighbourhood boundaries and the interconnected roads in detail (the positions corresponded to the current situation. The women drew detailed garden paths as the interconnected roads, which they refer to as "*cagets*".

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Items found to be in the fourth density group were collected under the theme of agricultural product pattern and items. Information about the products grown in the previous years and present time is expressed both verbally and linearly.

Under the theme of built environment, the fifth densest group, the female group drew many elements, which were identified as residences, mosques, schools, recreational areas and traditional garden structures (garden ovens, etc.).

Under the theme of hydrological data, the two groups drew *Pınarbaşı*, the water source, together with the *Arslantepe* Mound. Water resources were drawn by the male group in detail.

In the mapping process, it was determined that the male group used bird species densely in *Orduzu* District, while the female group used plant species most. Apart from the themes created from the common elements in the mapping process, the female group expressed their problems and suggested solution about the area in which they live both verbally and linearly. The male group expressed such information verbally. Within the scope of the information obtained on the subject, it has been determined that there are significant differences in the satisfaction level of the male group and the female group concerning the area in which they live. While the female group focuses on the lack of children and sports areas in the neighbourhood, the security problem and the obsolescence of the residences, the male group states that they do not need additional children's playgrounds because the residences have a garden, and because they have strong social communication in the neighbourhood, they can immediately identify outsiders (there are coffeehouses at the node points of the district). They stated that they had no security problems for this reason. The most important problem for the male group was identified as the lack of infrastructure and unemployment. It was seen that both groups liked the area in which they live, and they do not think of living elsewhere. The main point on which the two groups related to *Orduzu* District agree was the *Arslantepe* Mound. The dominance of the male and female groups on the historical significance of the *Arslantepe* Mound is remarkable. They express that they owe this awareness to the excavation team. The emotional connection of the neighbourhood, which is observed to have a conservative and introverted structure in general, with the Italian excavation team is also remarkable. It has been stated that the establishment of this bond is based on years of a culture of coexistence, and at the same time, the group working in the excavation team made an economic contribution to the excavation work by choosing the residents of *Orduzu* District. Both groups agree that the potential of the *Arslantepe* Mound is not adequately described at the city and country scale and that it should be brought into tourism activities. In this sense, both groups stated that the *Arslantepe* Mound is the area that will provide the most economic contribution for *Orduzu* District and even Malatya City.

CONCLUSIONS

This study aims to define historical landscapes through locals' perspectives and employs community mapping as a tool for defining and transferring perceived landscape elements. The study reveals that the perception of the environment varies according to gender, age, and sociocultural profile, which leads us to the conclusion that healthy and multipurpose spaces can be designed by taking these perceptional differences into account in creating spaces and maintaining spatial continuity. It is thought that the spirit of the place (genius loci) (Tuan, 1977, Norberg-Schulz, 1980,), which is absorbed by collective memory in the context of nature landscape-constructed landscape-human, holds important clues concerning how it should be transferred to constructed environments in a way that creates landscape harmony (Thayer, 1994). In this study, beyond the recognized physiographic features of the settlement, we discovered its "unseen" components due to the statements of locals and the analysis of the perceptual data they provided. Most importantly, we acquired verbal information and point data about some archaeological sites that are not mentioned in any records or literature, as they remain undiscovered. The acquired data might be a useful source for archaeological research to be conducted in the area. Moreover, the comparisons drawn by focus groups between the past and today can be counted among the data, which may also be used to spot the differences in the landscape. In addition to tangible data, memory spaces are defined according to the information acquired from the locals via an interview on intangible cultural values' interaction with space. Experience has shown the criticality of local people's participation in the experience planning processes.

There is a consensus on the view that creating plans based on traditional research methods/approaches (which fail to capture real-life dynamics and locals' expectations and problems) and hence that is out of touch with "real life" or "users" will jeopardize the continuity of the planning process (Healey, 1997, UNDP, 1998, Taylor, 1998, Ersoy, 2008, Turgut and Seçilmişler, 2017). As a result, the planning policies and decisions to be made prove to be unfeasible in the long run. Therefore, it is suggested that the use of methods such as spatial data production (on historical differences in landscape) within the mainframe of the participant planning approach and community mapping (to ensure collective wellbeing (Warren, 2013) by creating healthy, sustainable spaces) and the inclusion of these methods in spatial planning stages will prove significantly useful.

In the participatory mapping with GIS experience of Panek and Sobotova (2015), where the community mapping method was used, the authors stated that there is no clear discourse revealing the hidden potential of the study area with this method. In our study, we were able to access data not found in the literature, especially concerning archaeological remains and agricultural product patterns. Comparing the two studies, we can say that the people express their landscapes more clearly with their own

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hand drawings, without using technology; therefore, we have concluded that hidden potential can be revealed in this manner.

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CONFLICT OF INTEREST

No conflict of interest was declared by the authors.

FINANCIAL DISCLOSURE

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ETHICS COMMITTEE APPROVAL

Ethics committee approval was not required for this article.

LEGAL PUBLIC/PRIVATE PERMISSIONS

In this research, the necessary permissions were obtained from the relevant participants during the site observations.

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Resume

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A Genealogy of "Phenomenology" in Architectural Research: An Epistemology Discussion through Dissertations

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Abstract

Purpose

Throughout the scientific process, architectural research has always been in tendency to highlight some research fields according to the spirit of the periods. This study is an inquiry on deciphering such "research trends" in architectural research within the framework of a specified area of study. This inquiry aims to draw a genealogy of "phenomenology" within the realm of architecture by making a specific discussion on whether this issue has been a privileged research subject or not.

Design/Methodology/Approach

In order to make an analysis on privileged subjects of particular periods, it is decided to use some dissertations, which are obtained from ProQuest database. The methodological approach of the study begins with dividing the periods of architectural research into six decades, which starts from 1960's up to the present. After the separation of the periods, 3 major keywords are chosen to be questioned. The dissertations are chosen among the results obtained by scanning the keywords at once, which are *phenomenology*, *architectural body* and *spatial experience*. The chosen dissertations are grouped according to their decades. All findings are gathered in a table, which includes lots of information such as the doctoral dissertations, annotations of their approaches, their numbers from decade to decade, epistemological frameworks, theoretical perspectives and methodologies.

Findings

As a result, *architectural phenomenology* appears as a privileged subject in architectural research. However, the findings show that there are some notable changes especially in the terms in certain decades. While *meaning* term had been used before 1980s, *phenomenology* appears as a favored term after 1980s. Especially with the late 2000s, architectural phenomenology begins to be a privileging research area. As a result of being a research trend, a sub-field emerges after 2000s that directly criticizes the theories of phenomenology itself, which is *post-phenomenology*.

Research Limitations/Implications

Because of not reaching much effective results, the other databases are not employed. ProQuest is the only database throughout the research process, which provides the most effective results in reaching proper dissertations. ProQuest already includes nearly all results other databases reached.

Originality/Value

To see a genealogy of the keyword itself from *meaning* to *phenomenology* provides to position this philosophical field in architectural research. In addition to identify popular research subjects according to the spirit of the decades in science, this study is a critical epistemology discussion within the field of architectural research. Such an epistemology discussion also provides to see the continuity and the changes of both the terms and the study fields over the years.

Keywords: *Architectural research, epistemology, genealogy, meaning, phenomenology*

INTRODUCTION

Architecture and its research field are based on an extensive ground, which embraces a comprehensive knowledge of different studies. A variety of theoretical understandings of particular subjects also structure the framework of this knowledge. Throughout its scientific process, architectural research is in tendency to highlight some research fields and its main subjects, which are open to change according to the spirit of the periods. At the point where some particular issues are privileged in scientific process, it is possible to mention about "research trends" in the theoretical ground of architecture, which define a general direction to study on.

This paper is an inquiry on deciphering if there are some certain established traditions in architectural research within the borders of a specific area of study. At that point, it is also important to aware of both the nature of architectural research and epistemological positions of its knowledge. As a result of that, the purpose of the study is not only to identify popular research subjects of particular periods in science but also to progress a critical epistemology discussion within the field of architectural research. In this paper, it is attempted to draw a genealogy of a specified area of research, which is the field of "phenomenology" within architecture.

The use of the term *"genealogy"* as a research method goes back to Friedrich Nietzsche's book of 1887, which is titled *"On the Genealogy of Morality: A Polemic" (Zur Genealogie der Moral: Eine Streitschrift)*. Through a genealogical method, Nietzsche (1887/2007) constructs a systematic research on the development of 'morals' throughout history. Inheriting from Nietzsche, Michel Foucault (1971/1977) evoked the concept of genealogy in the study of *"Nietzsche, Genealogy, History"*. While Foucault uses "archaeology" as both the term and method, which can be seen in *"The Archaeology of Knowledge" (L'archéologie du savoir)* in 1969, he evolves this method of "genealogy" especially in the book of *"Discipline and Punish: The Birth of the Prison" (Surveiller et Punish: Naissance de le prison)* in 1975. Similar approaches that trace the knowledge of a specific concept or research field also continues with other studies, for example as in the essay of *"A Genealogy of 'Globalization': The Career of a Concept"* (James and Steger, 2014). At that point, what this study attempts is to make an epistemological discussion by drawing a genealogy of a research field in architecture, which is phenomenology.

AN OVERVIEW TO THE PHILOSOPHIES OF SCIENCE

Before making a specific discussion on the scientific area of architectural research, it would be appropriate to take a look briefly to science, scientific knowledge and even the philosophy of science. At that point, to discover some significant models in the scientific research process emerges as an important issue in order to understand the philosophical

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perspective of science especially from some philosophers of science such as Karl Popper, Thomas Kuhn and Imre Lakatos.

Karl Popper (1959/2005), for example, sees scientific practice as an empirical and testable process. It means that, theory of science renders itself as being falsifiable. Popper's model of science, which is actually defined as *falsificationism*, is clearly based on conjectures and refutations. What a Popperian approach puts forward is that demarcation criterion between science and non-science is based on falsificationism. This is the model in which bold theories are proposed at first, and then a critical examination is applied to these theoretical propositions. In Popper's model, falsification acts as the unique criterion of science. As a result of the fact that the ground of science is always open to falsifiability, this model is not at the secure side of science. This position of science directly stems from the commensurability of theories. And thus, science is a progress that moves in a linear and continuous way by gathering new knowledge. The knowledge of science is produced not by an individual, but rather within a community. Popper's science is a criticism based model that continuously problematizes the fundamental theories in order to put forward new theories.

According to Thomas Kuhn (1962/1970), science is based on paradigm that corresponds to the fixed fundamentals of normal science such as shared theoretical beliefs, values and techniques. Kuhn's model of science basically consists of some steps, which progress in the evolution of science. The first step is normal science in which a paradigm is established as the basis for the scientific research. Science is advanced through some mind-set, tool-set and ground of this paradigm. Because it is prioritizes just to solve the problem, this process resembles a *puzzle-solving model*. Throughout the period of the science, the ground is kept stable in order to reach a solution. As a result, if some anomalous results emerged in science takes a risk for the whole initial process, they can be tolerated for both the protection of this paradigm-based ground and the continuity of scientific research. But, at the point of serious anomalies developed, this step is the crisis point that clearly requires a paradigm shift. Kuhn defines these extreme circumstances as the points of revolutionary science. The revolution is seen as an exceptional process in normal science and needs to establish a new paradigm for scientific research. So, Kuhn's science is a paradigm-based model that does not prioritize to question the central theory, but rather emphasize to solve the puzzle by protecting the ground.

Imre Lakatos (1970) mentions about a methodology of a scientific research program, which locates at the intersection of the models of Popper and Kuhn. According to Lakatos, the criteria of a scientific process is defined as *sophisticated falsificationism*. Contrary to being simply trial and error, it is focused on whether a research program can be falsifiable or not. This model basically consists of a hard core in which some fundamentals are protected from refutation through a

protective belt. While this hard core can be considered as the normal science of Kuhn's model, the protective belt generates a zone that is more flexible to change with auxiliary hypotheses such as Popper's model of science. Contrary to the hard core, this zone is open to the productions of novel facts. As a result of that, Lakatos' model suggests a progressive scientific progress unlike a degenerative process that is in a tendency to use always the same ground.

ARCHITECTURAL RESEARCH: GROUNDING ARCHITECTURE ON THE THEORY OF KNOWLEDGE

At the point where some significant models in scientific research process are discussed, to discover the ground of architectural research appears as a requirement. The framework of architectural research is a multi-layered ground that is open to many different research fields. So that, this situation always takes architecture beyond the borders of its discipline. For the reason that architecture and its research field are in tendency to adopt from other disciplines, the knowledge of architecture is directly ready to broaden the definition of its discipline. Jane Rendell (2004) argues the issue of architectural research concerning the importance of creating a multidisciplinary environment for research. According to Rendell (2004, p.143), "architecture encompasses several disciplines and uniquely brings together modes of research that are often kept apart... and so provides possibilities for multi- and interdisciplinary research". This is an attempt to see architectural research at the core of different paradigms of knowledge and research methodologies. At this point, architecture and especially its knowledge obviously need to redefine and position its ground in order to legitimate itself as a discipline.

To position architectural research in the field of discipline is directly related to discover the nature of knowledge. The scope of knowledge does not provide a limited structure which is closed within its own discipline. On the contrary, its nature has the potential to bring separate fields together and to reveal alternative viewpoints. Nigel Cross (2001) draws attention to the existence of many forms of knowledge, which builds up the histories and theories of each discipline. In this case, Cross (2001, p.53) defends that what is significant in design research is "...to draw upon those histories and theories where appropriate, whilst building our own intellectual culture, acceptable and defensible in the world on its own terms". In a similar way, the knowledge of architecture reaches to the fields of other studies in order to transfer the theories at first, and then to generate new ideas on its own discipline. Thus, it acts as a tendency that tries to seek beyond its own ground and generate a new form of action in discipline. That is to say, architecture as a discipline and architectural research are located at the intersection of a wide variety of both disciplines and theories.

When the existence ground of any discipline or its sub-disciplines are examined in research process, various types of theories emerge to guide

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the knowledge of architecture. At the point of dealing with the knowledge of a study field, this is the key issue to mention about "theory" issue, which defines the borders of the scope of knowledge. Zeynep Mennan (2006, p.65) focuses on what theory refers to and so presents it under three facets by generally saying that "...it invades all disciplines and research fields, ...asks for a redefinition that is not to stabilize itself in a painful period of paradigm change, and ...is a metaphorical representation that is currently subject to dislocation". Especially, the state of being in invasion to other disciplines directly corresponds with the knowledge of architecture. On the one hand, the understanding of going beyond the borders gains architecture discipline an unstable character, but on the other hand this situation supports architecture to stay always dynamic and changeable. In other words, alternative questions or new thought paradigms expand the limits of architectural research inevitably by transforming or evolving the present ground of discipline. Moreover, to act with an approach as the unity of disparate fields of knowledge develops interactions between study fields and thus interdisciplinary relationships in architecture. To say that in a clear way, at the point where collaborative processes generate new fields of knowledge, architectural research is significantly influenced by other disciplines. And, as long as the nature of architecture discipline opens its door to other fields of study, the knowledge of discipline continues to transform and evolve to new combinations, because of the possibility of new interpretations.

With an approach of legitimating disciplines, John Greco (1999) addresses to the main questions of the theory of knowledge in order to discover what epistemology is. According to this, "epistemology, or the theory of knowledge, is driven by two main questions: "What is knowledge?" and "What can we know?". If we think we can know something, as nearly everyone does, then a third main question arises: "How do we know what we do know?". Most of what has been written in epistemology over the ages addresses at least one of these three questions" (Greco, 1999, p.1). As a result of asking such questions, different epistemological positions become visible within the research field of discipline and its knowledge. These positions actually stem from major distinctions in changing theoretical perspectives such as context, techniques or methodology. And also in architectural research, to establish structures according to different approaches is the source of to ground the theories of knowledge in alternative positions.

As a result of the fact that to observe various lines of inquiry is directly related with all of the discipline's main questions, Greco (1999, p.24) mentions about a number of different directions that has been developed in epistemological positions. These new directions in theory of knowledge can emerge such as feminist epistemology and social epistemology or other epistemic theories related with artificial intelligence or postmodernism. But, beyond these new sub-theoretical perspectives, it is inevitable to address to the main epistemological

positions in research field. At that point, Luke Feast and Gavin Melles (2010) refer to three of them, which are the subjectivist position, the constructionist position and the objectivist position. As a consequence of analyzing the differences between the aspects of these epistemologies, Feast and Melles (2010) clearly mention about that "being epistemologically aware requires that at each point in the research process we recognize that we make a variety of assumptions about human knowledge, the realities encountered in the human world and interpretability of our findings". Put it in other ways, asking major questions to research field of a discipline varies the issues concerning to its theory of knowledge. And also, changing theoretical perspectives generates different epistemological positions, which significantly gain discipline to act with a comprehensive viewpoint.

METHODS: AN EPISTEMOLOGY DISCUSSION IN ARCHITECTURAL RESEARCH

This study is an inquiry on making an analysis on privileged subjects of particular periods in architectural research. In addition to detecting whether there are any popular research subjects according to the spirit of the decades in science, this is actually to decipher "research trends" within the framework of a specified area of study. Such an epistemology discussion also provides to see the continuity and the changes of both the terms and the study fields over the years. In the scope of this inquiry, the discussions are structured within the framework of *"phenomenology"* subject in architectural research. This is a process of the constitution of a database that will support to develop a comprehensive analysis on terminologies, epistemological frameworks, theoretical perspectives and methodologies of this specified research field.

To Reveal the Evolution of Phenomenology through Literature Review

As the result of elaborating a research field, which is determined as *phenomenology*, it is expected to find both some continuities in research trends and breaking points in terms. Because, although it is actually a term belonging to philosophy, it has passed into the research field of architecture and has started to belong to the knowledge of this discipline by evolving over time in various aspects.

Although the traces of phenomenology can actually be seen in the field of philosophy much earlier, 1900s and later is especially important to follow. In 1900-1901, Edmund Husserl wrote a foundational book in this field as *"Logical Investigations" (Logische Untersuchungen)*, which was published as in two volumes. By prioritizing "the theory of the *essences*", Husserlian viewpoint (1900-1901/2001) associates phenomenology with "to go back to *the things themselves*". In 1927, Martin Heidegger makes a major contribution to phenomenological ground through an existential viewpoint with the book of *"Being and Time" (Sein und Zeit)*.

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Similar approaches continue with many of his subsequent works, especially as in *"The Origin of the Work of Art" (Der Ursprung des Kunstwerkes)* in 1950 and in *"Building, Dwelling, Thinking" (Bauen Wohnen Denken)* in 1951. Through an existence-based perspective, Heidegger discusses lots of terminologies such as *Dasein*, *Being*, *being-in-the-world*, *dwelling* and *poetry*. While philosophical phenomenology expands its ground, Maurice Merleau-Ponty occupies a very fundamental place on this ground. While Heideggerian approach mostly deals with the metaphysical aspects of the subject, Merleau-Ponty mentions about the embodied experience of human body with the world, especially with the work of *"Phenomenology of Perception" (Phénoménologie de la perception)*, which is published in 1945. Moreover, other works such as *"Sense and Non-Sense" (Sens et non-sens)* in 1948 and *"The Visible and the Invisible" (Le visible et l'invisible)* in 1964 support to strengthen the theoretical grounding of phenomenology by conceptualizing some terms like *body*, *embodiment*, *flesh*, *chiasm* and *perception*.

Although being a philosopher, Gaston Bachelard associates phenomenology with architecture in his 1958 book, *"The Poetics of Space" (La Poétique de l'Escape)*. By focusing especially on house, Bachelard (1958/1964) intends to discover the relationship between a physical space and the feelings it generates. In time, some architectural phenomenologist develops this research field by constituting their particular theoretical interpretations. Christian-Norberg Schulz has become a pioneer in the field of architectural phenomenology with his seminal works such as *"Intentions in Architecture"* in 1963, *"Existence, Space and Architecture"* in 1971 and *"Genius Loci: Towards a Phenomenology of Architecture"* in 1979. The knowledge of phenomenology broadens its borders through the discourses on *existential space*, *dwelling*, *poetry*, *genius loci (spirit of place)*, *character* and *meaning* issues. To translate phenomenology from philosophy to architecture continues with Steven Holl. Especially by adopting from Merleau-Pontian perspective, Holl contributes the theory of architectural phenomenology with the works of *"Anchoring"* in 1989 and *"Intertwining"* in 1996. Additionally, Holl wrote an essay about authentic physical and *sensory experience* as *"Questions of Perception: Phenomenology of Architecture"* for a journal in 1994, the other writers of which are also Alberto Perez-Gomez and Juhani Pallasmaa. In that study, while Perez-Gomez (1994) aims to discover the genuine *meaning* of architecture through a series of terms like *poiesis*, *being*, *inhabit*, *nature* and *chora* in the essay of *"The Space of Architecture: Meaning as Presence and Representation"*, Pallasmaa (1994) discusses the physical, sensual and embodied essence of architecture in the essay of *"An Architecture of Seven Senses"*. Among many theoretical works of Pallasmaa, *"The Eyes of the Skin: Architecture of the Senses"* written in 1996 appears as a foundational book for architectural phenomenology. In that study, Pallasmaa (1996) problematizes what the *essence* of

architecture is by making a discussion on the role of body and the *senses* in architectural *experience*. And, Peter Zumthor (2006a, 2006b) also adds a new theoretical interpretation with the books of *"Thinking Architecture"* in 1998 and *"Atmospheres: Architectural Environments, Surrounding Objects"* in 2006. Especially by elaborating atmosphere issue, it is questioned how *the body of architecture* gains a *poetic character* to space. Similar approaches associating architecture with phenomenology also continue with different theorists. As a result, all these transformations on the knowledge of phenomenology shows that it is inevitable to observe an increase in interest in some periods and even some evolutions in terminology through decades according to the changes in the literature.

To Construct an Organized System through Dissertations

First of all, architectural research and its periods are divided into six decades, which start from 1960's up to the present. In order to reach an organized system according to the changing periods, each decade acts as a base for dissertations, which are distinguished studies in the specified area of research. After the separation of the periods as decades, 3 keywords are chosen for each decade in order to launch the search for dissertations, which will be neither too specific nor too general. For the field of phenomenology, the keywords are determined as "phenomenology", "architectural body" and "spatial experience". *Phenomenology*, as a keyword, is the main concept of the selected research field. The other major concepts of this field, which are *body* and *experience*, are transformed to *architectural body* and *spatial experience* in order to describe the position of this study area in architectural research. After that, these three search terms are researched in academic databases all three at once. As a result of scanning other academic databases, ProQuest is employed as the only database throughout the research process, which provides the most effective results in reaching proper dissertations.[1] As a result, all findings derived from this database such as the doctoral dissertations, annotations of their approaches, their numbers from decade to decade, theoretical perspectives, methodologies and epistemologies used are gathered in a form of a table as in *Table 1*, which will comprise lots of information of the research genealogy at the final step to be discussed critically.

Table 1. The form of table in which all databases will be gathered

DECADE	KEYWORDS	NUMBER OF DISSERTATIONS	SOURCE	EPISTEMOLOGY	THEORETICAL PERSPECTIVE	METHODOLOGY/ METHODS	ANNOTATIONS
1960s							
1970s							
1980s							
1990s							
2000s							
2010s							

[1] The other databases scanned are METU Library Search, Bilkent Library Search, Publication and Documentation Department of YÖK (Council of Higher Education) Thesis Center and Networked Digital Library of Theses and Dissertation (NDLTD). However, none of them is preferred to employ in this study because of not reaching much effective results. In addition, ProQuest already includes nearly all results these databases reached.

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In the process of reaching the dissertations from ProQuest database, some procedures are followed. Firstly, the selected keywords are especially researched all three at once by using *Advanced Search* tab. These keywords are scanned only in *doctoral dissertations* by excluding master theses because of the efficiency of their contribution to science. In order to obtain more effective results, it is prioritized to take part all the search terms not only in abstract but also in full text. And also, it is not applied any limitation on the language of dissertations. At that point, the findings include all of the dissertations completed in every discipline and their departments, which are based on the selected concepts. In order to reach only the dissertations that had been made in the field of architecture, *Architecture* option is selected among other study fields from the *Subject* tab. After reaching the filtered dissertations, which are made in the department of architecture, 3 dissertations are selected randomly for each decade to study on. Throughout the study, a discussion is progressed through these dissertations in order to analyze epistemological frameworks, theoretical perspectives and methodologies of the knowledge belonging to these periods and also to identify in which decades the field of phenomenology appears as a privileged area of study as a research trend in architectural research. Additionally, for the preceding decades in which the determined keyword does not bring any results, this study attempts to search for the genealogy of this term itself and to decipher the equivalent of this term for the corresponding decade.

This way of scanning a database also gives the results on how many dissertations are completed in each decade within the borders of the privileged keywords. To see a rate of the numbers of dissertations among not only the decades but also the disciplines provides the study to prepare additional graphics and pie charts. Because there are a variety of fields of study related to the selected search terms, a decision is taken to make the evaluation among only the first 9 academic departments, which are seen in the highest position of the list, and the sum of other studies, which represent the 10th pie, as can be seen in *Chart 1*. With both the main periodic tables and the additional charts, a critical epistemology discussion is attempted to progress on the genealogy of the field of phenomenology in architectural research throughout the study.

RESULTS AND DISCUSSION: TO DECIPHER THE GENEALOGY OF PHENOMENOLOGY

Architectural research and its theory of knowledge is in a position that opens its door to different various fields of study. Because of the existence of many forms of knowledge, which are ready to be imported, the borders of architectural research continuously expand with new combinations. At that point, *architectural phenomenology* appears as such a field that broadens the borders of both its discipline and

knowledge. Although phenomenology primarily belongs to the realm of philosophy, architecture adopts from its field of study. Because of the interaction between the fields of philosophy and architecture, an alternative knowledge and its terms becomes to appear in architectural research.

Before 1980s: To Search for *Meaning* in Architecture

As the result of scanning the keywords in ProQuest, database brings results in architecture only for the decades between 1980s and 2010s. However, it is a known fact that phenomenology, which is actually an aspect of philosophy, was studied in architectural research in the preceding years. At that point, the keyword *phenomenology* is in the need of giving its place to its equivalent term, which is "meaning". That is to say, in order to obtain the dissertations related to the field of phenomenology for the decades before 1980s, the study employs the keywords in database as "meaning", "architectural body" and "spatial experience".

Between the decades 1960s and 1980s, *phenomenology* does not exist as a term in architectural researches limited to doctoral dissertations. Whereas dissertations become to appear after 1980s as in *Graph 1*, database does not bring any results for the preceding years. According to the results ProQuest brings with the keywords of "phenomenology", "architectural body" and "spatial experience, there are 26 dissertations in 1980s, 115 dissertations in 1990s, 264 dissertations in 2000s and 252 dissertations in 2010s. On the other hand, at the point where *meaning* takes the place of phenomenology as a search term, the results come to visible for the decades before as in *Graph 2*. This is a considerable result because of showing that the studies based on the subject on *meaning* become to benefit from the knowledge of a different discipline after 1980s. As a result of this finding, a significant change appears on the main term of the research field with the new term adopted from philosophy, which is *phenomenology*. Although the database finds no dissertations for 1960s, ProQuest brings 4 dissertations for 1950s and 35 dissertations for 1970s with the equivalent term of *phenomenology*. It means that, the field of phenomenology appears in architectural research as a philosophical study after the 1950s with the term of *meaning*.

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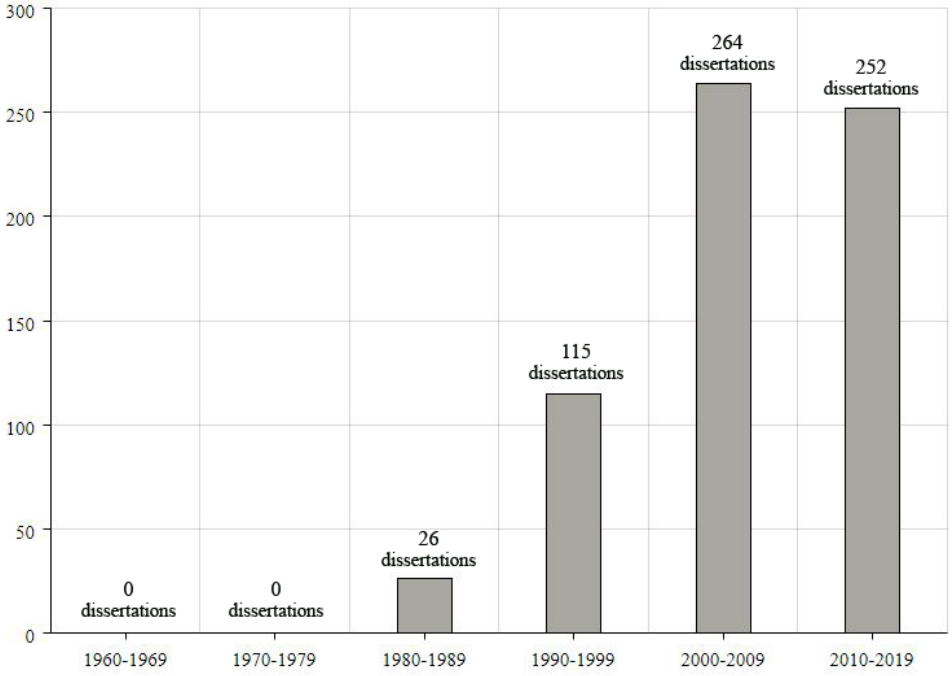
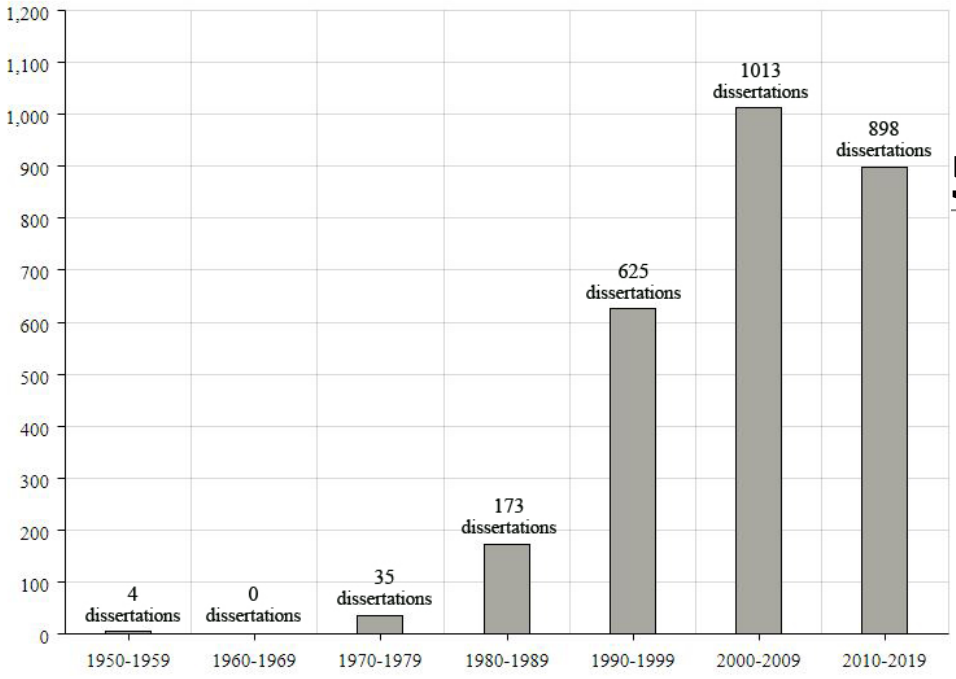


Graph 1. The numbers of dissertations in architecture according to the decades, with the keywords of *phenomenology*, *architectural body* and *spatial experience*



Graph 2. The numbers of dissertations in architecture according to the decades, with the keywords of *meaning*, *architectural body* and *spatial experience*

For the 1950s, the study reaches 4 dissertations, one of which is also the first dissertation studying directly the phenomenology issue in architecture. Although there is actually another dissertation completed in 1952, this study does not directly establish a satisfying connection as the dissertation in 1957. To put in other words, in *"Water and Architecture"*, which is the doctoral dissertation of Charles Willard Moore (1957), architectural research especially adopts from the philosophy of Gaston Bachelard. Bachelards' book *"L'Eau et les Rêves" (Water and Dreams)*, which was written in 1942, was used as a main

source in Moore's dissertation. In order to reveal the effects of water on Man, the physical nature of water is approached as both a form and an expression. Within a philosophical point of view, this dissertation clearly constructs a special structure on architectural phenomenology by following the traces of *meaning* on space through water as an element of architectural composition and the emotional experience it provides. That is to say, because of grounding on a philosophical framework in the process of generating a knowledge belonging to architecture, architectural research has not a limited structure any longer that is closed within the borders of its pure discipline. It means that, the knowledge of architecture is in tendency to reach to the fields of other studies that supports the development of new directions in discipline, such as *architectural phenomenology*. Moreover, such an approach in scientific research especially requires to look from an epistemological perspective in order to understand the nature of knowledge.

To discover the epistemological positions, for example of the dissertations in 1950s, to decipher the nature of the knowledge in research field appears primarily as a requirement. It means that, through the main questions which structure the theory of knowledge, a research field basically consists of various directions in a number of ways. Through these questions that structure the theory of knowledge, objective, subjective and constructive aspects of epistemology exist within the epistemological continuity. As seen in the book of *"The Social Construction of Reality: A Treatise in the Sociology of Knowledge"*, Peter L. Berger and Thomas Luckmann (1966/1991) introduces the term "social *construction*" in addition to "*objective* reality" and "*subjective* reality" when discussing the knowledge of social sciences. Even though there are different kinds of perspectives acknowledged, the other approaches in research process generally fall under these three main epistemological positions. In addition, these different kinds of positions also stem from major distinctions in both theoretical perspectives and methodologies. As can be seen in *Table 2*, the dissertation completed in Columbia University, which is titled *"Mediaeval Monastic Planning: Its Origins in the Christian East and Later Development in Western Europe* (Sowers, 1952), bases on a constructivist epistemological ground. Because, this dissertation intends to make a discussion on the relationship between the monastic life and the medieval architecture especially by connecting the elements of spiritual life with physical structures of architecture. The other dissertation, which is titled *"Water and Architecture"* (Moore, 1957), discusses meaning issue in architecture by using a case study as the methodology. Because this is an interpretive approach of water and its meaning for architecture through the philosophy of Gaston Bachelard, it is possible to say that architectural research constructs an alternative knowledge at the intersection of the philosophical and the architectural field. In a similar way, a constructive perspective is also seen on the dissertation

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completed in 1958, which is *"Rodrigo Gil De Hontanon: His Work and Writings, Late Medieval and Renaissance Architecture in Sixteenth Century Spain"* (Hoag, 1958). Using a heuristic inquiry, this dissertation clearly tries to develop an interpretation between the geometric forms of exterior masses and the characteristics of their interior spaces especially within the context of the late Medieval methods. Through mystic spaces and the spiritual experiences they produce, such an approach is on revealing the character issue of architecture. As a result of all these dissertations, 1950s is defined as the beginning of the constructivist epistemology for the phenomenological field in architectural research through generally an interpretivist theoretical perspective.

Table 2. The analysis of the architectural dissertations database brings for 1950s

DECADE	KEYWORDS	NUMBER OF DISSERTATIONS	SOURCE	EPISTEMOLOGY	THEORETICAL PERSPECTIVE	METHODOLOGY / METHODS	ANNOTATIONS
1950s	~~Phenomenology~~ / **Meaning** **Architectural Body** **Spatial Experience**	**4**	Ossa Raymond Sowers. (1952). *Mediaeval Monastic Planning: Its Origins in the Christian East and Later Development in Western Europe,* Doctoral Dissertation, Columbia University.	**Constructivism**	**Interpretivism**	**Heuristic Inquiry**	- relationship between ... monastic life and mediaeval architecture - monastic planning ... according to the monastic experience - physical structures for ... spiritual life
			Charles Willard Moore. (1957). *Water and Architecture,* Doctoral Dissertation, Princeton University.	**Constructivism**	**Interpretivism**	**Case Study Heuristic Inquiry**	- **water** as an element of architectural composition (for an **infinite space**) (for richness and depth) that will give **meaning** - as a form ... and ... as an expression the physical nature of water the effects of water on Man - an **emotional experience** - two proposals for two sites
			John Douglas Hoag. (1958). *Rodrigo Gil De Hontanon: His Work and Writings, Late Medieval and Renaissance Architecture in Sixteenth Century Spain,* Doctoral Dissertation, Yale University.	**Constructivism**	**Interpretivism**	**Case Study Heuristic Inquiry**	- **the character** of architecture especially in ... late medieval methods - **the characteristic** of interior space through ... **exterior masses** **... geometric forms** for ... emotional, mystic spaces ... spiritual experiences

As mentioned before, ProQuest database finds no dissertations for 1960s. Instead of that decade, this study prefers to analyze also the 1950s. As in *Table 3*, throughout the years between 1970 and 1979, there is a continuity in epistemological positions as constructivist epistemology as in previous periods. In the dissertation titled *"Social and Political Theory in Modern Architecture: A Study of Frank Lloyd Wright and Le Corbusier"* (Milne, 1975), the research is based on an interpretivist approach. Using both a heuristic inquiry and a discourse analysis, this dissertation develops a critical inquiry on human experience and its sensory meaning in architecture. On the other hand, the dissertation, which is *"Way-Finding in the Built Environment: A Study in Architectural Legibility"* (Weisman, 1979), uses hermeneutics as the methodology of interpretation. In addition to progress with a case study, which is based on the impact of physical design and its psychological reactions through specifically chosen ten university buildings, the research is actually an empirical study especially on human sciences. The other dissertation, which is completed in the late 1970s in Rice University by Ahmet Vefik Alp (1979), also follows a similar philosophical outlook to other studies. Within a physical environment, the study titled *"Aesthetic Response to Geometry in Architecture"* (Alp, 1979) searches for the emotional and aesthetic potentials of the geometrics of architecture especially on the human perception. By tracing psychological considerations of architecture within the man-environment system, this study also maintains constructivism as the epistemology. Like the previous dissertations, there is an attempt to reach beyond the established knowledge of discipline by not only interpreting the existing ground but also constructing new approaches through a philosophical perspective on the body of knowledge of architecture.

Although none of them directly uses the term of phenomenology itself, all dissertations completed in 1970s are in tendency to adopt its point of view from the field of philosophy. However, it is not very possible to claim an evident phenomenological perspective or actually a direct adoption of the theories of any philosophical phenomenology in architectural research for the years before 1980s contrary to the dissertations completed in later periods. It means that, the scientific studies of these decades come together around a more hidden understanding through *meaning* that actually forms the foundations of *phenomenology* in architecture, which is emerging after the periods of 1980s.

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Table 3. The analysis of the architectural dissertations database brings for 1970s

DECADE	KEYWORDS	NUMBER OF DISSERTATIONS	SOURCE	EPISTEMOLOGY	THEORETICAL PERSPECTIVE	METHODOLOGY / METHODS	ANNOTATIONS
1970s	~~Phenomenology~~ **/ Meaning** **Architectural Body** **Spatial Experience**	**35**	David Alvin Milne. (1975). *Social and Political Theory in Modern Architecture: A Study of Frank Lloyd Wright and Le Corbusier*, Doctoral Dissertation, University of Toronto.	**Constructivism**	**Interpretivism**	**Heuristic Inquiry** **Discourse Analysis**	- on **social and political theory** (with philosophical principles) - the city planning ideas of... Frank Lloyd Wright and Le Corbusier - a critique of naturalism - **human experience & sensory experience**
			Gerald David Weisman. (1979). *Way-Finding in the Built Environment: A Study in Architectural Legibility*, Doctoral Dissertation, University of Michigan.	**Constructivism**	**Interpretivism** **Hermeneutics**	**Case Study** **Heuristic Inquiry**	- orientation and way-finding within buildings the impact of physical design psychological reactions "physical design characteristics" - **an empirical study** on environmental legibility within ten university buildings - **a theoretical discussion** the impact of psychological variables to objective physical features
			Ahmet Vefik Alp. (1979). *Aesthetic Response to Geometry in Architecture*, Doctoral Dissertation, Rice University.	**Constructivism**	**Interpretivism** **Hermeneutics**	**Case Study** **Heuristic Inquiry**	- **psychological** considerations of architecture "man-environment" system - physical environment - visual (human) perception - experiential aspects of architectural surroundings - emotional and aesthetic potentials of... the geometrics of architecture (and their effects) - **an experimental research** (through a literature analysis) **a comparative analysis**

After 1980s: *Phenomenology* as an Emerging Term in Architecture

The evolution of the term *meaning* to the term *phenomenology* is the result of directly associating architecture with the knowledge of philosophy. The dissemination of the phenomenology field in architecture starts with the studies of Christian Norberg-Schulz, who adopts Martin Heidegger's philosophy to architecture. However, while

the studies of Norberg-Schulz after 1980s prioritizes the term of "meaning" as in *"Intentions in Architecture"* in 1963 and *"Existence, Space and Architecture"* in 1971, the term "phenomenology" began to appear in the studies at the end of 1970s as in *"Genius Loci: Toward a Phenomenology of Architecture"* in 1979. So, it is expected that the effect of such a transformation reflects to other studies completed only after 1980s. Similar approaches continue by combining the other philosophies, for example of Edmund Husserl and Maurice Merleau-Ponty, with architecture discipline by some architectural phenomenologist such as Steven Holl, Juhani Pallasmaa and Alberto Perez-Gomez. This is an invasion of the knowledge to the research fields of other disciplines. As in *Chart 1* (in which "Other Studies" actually represents the sum of all other disciplines' dissertations except the first nine study fields), although phenomenology issue is primarily the subject of philosophy in 1980s and 1990s, this knowledge begins to enter to the fields of other disciplines after 1990s by leaving the philosophy behind.

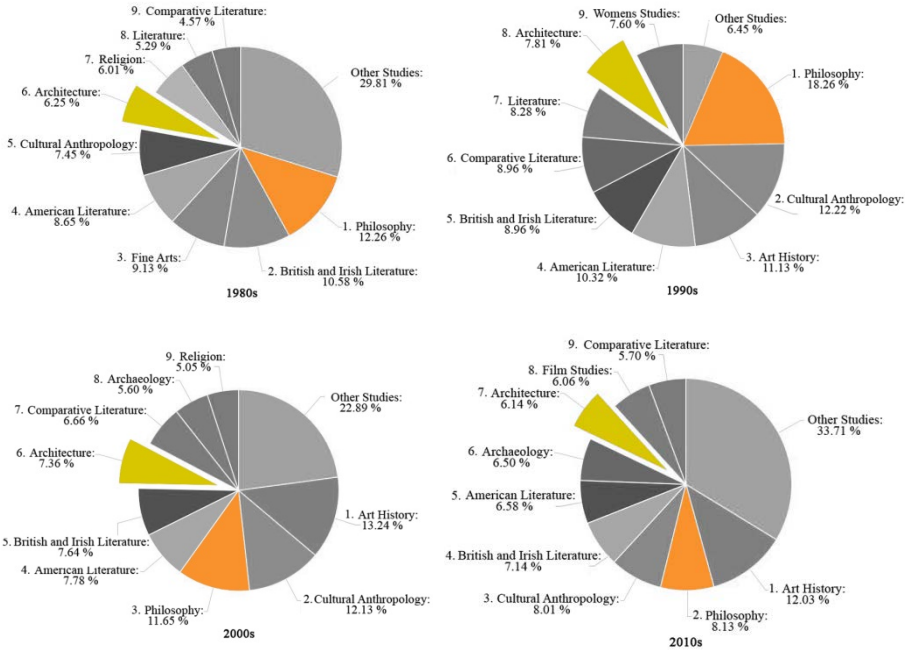

Chart 1. The distribution of research on phenomenology in architecture among other fields from 1980s to 2010s

Table 4. The distribution of research on phenomenology in architecture among other fields from 1980s to 2010s

DECADE	ALLSTUDIES	ARCHITECTURE FIELD	FIRST 9 STUDY FIELDS	OTHER STUDY FIELDS	% (ARCHITECTURE)
1980s	416	26	292	124	6.25
1990s	1473	115	1378	95	7.81
2000s	3587	264	2766	821	7.36
2010s	4106	252	2722	1384	6.16

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Being influenced by philosophical phenomenology, the research of *architectural phenomenology* begins to appear, especially with this specific term in architectural research field, with the 1980s and 1990s that actually constitutes a study base for later periods, which is illustrated in *Graph 1* before. Mennan (2006, p.67) points out this transfer of knowledge between different disciplines by stating that "the late '80s and early '90s witnessed an increasing interest in interdisciplinary studies, this manifestation of a new intellectual and discursive spirit, blurring disciplinary frontiers". A significant part of this new discursive spirit is also phenomenological researches in these decades in architecture. As in *Table 5*, for example, the dissertation titled *"Interpreting the Dialogue between Man and Architectural Form, as a Means for Constructing a Third and a Unifying Element between Them"* (Albayaty, 1983) clearly constructs its structure with a phenomenological view by attempting to decipher the dialogue between material form and the spiritual order of man. Although *phenomenology* arises as a term, researches on *meaning* reach a very high level in these two decades. Additionally, another dissertation, which is *"Semiotics and the Discourse of Architecture"* (Walker, 1987), searches for meaning within a semantic view through phenomenological research method. In a similar way, the other dissertation titled *"Inside Children's Place: A Phenomenological Study of the Social-Spatial Worlds of Thai Daycare Centers"* (Patumanon, 1989), which is completed in University of Michigan, uses the same methodology as phenomenological research. Through a sensitive observation on a philosophical ground, this study bases on searching a meaningful place to dwell for children. Moreover, to focus on *meaning* issue continues during the 1990s as a research trend in architecture. A study, which is completed at the beginning of the 1990s (Mansour, 1990), for instance, discusses this issue within the framework of an exploratory case study. Heuristic inquiry is mostly preferred as methodology that mostly attempts to decipher meaning through theoretical texts, such as in another study (Buechi, 1991) in early 1990s. Using phenomenological hermeneutics, this dissertation discusses the meaning and the role of buildings in the life of people. Similarly, the dissertation titled *"A Phenomenological Inquiry into the Problem of Meaning in Architecture"* (Jongkeun, 1994) also keeps this privileged research subject in its approach within a constructivist epistemology such as the previous dissertations. As a result, all these determinations proves the existence of a continuity for these two decades in their contents, methodologies, theoretical perspectives and epistemologies.

Table 5. The analysis of the architectural dissertations database brings for 1980s

DECADE	KEYWORDS	NUMBER OF DISSERTATIONS	SOURCE	EPISTEMOLOGY	THEORETICAL PERSPECTIVE	METHODOLOGY / METHODS	ANNOTATIONS
1980s	**Phenomenology** **Architectural Body** **Spatial Experience**	**26**	Muthana Jamal Albayaty. (1983). *Interpreting the Dialogue between Man and Architectural Form, as a Means for Constructing a Third or a Unifying Element between Them*, Doctoral Dissertation, University of Pennsylvania.	**Constructivism**	**Interpretivism** **Hermeneutics**	**Phenomenological Research** **Case Study**	- **a unifying element** ... as a balance between man and form man ... as an individual a part of society form ... as an individual spaces between buildings - architecture is both... a material form and the spiritual order of man **(with a phenomenological view)** - **a case study** to interpret two urban fabrics (shared spiritual values in culture)
			Paul Joseph Walker. (1987). *Semiotics and the Discourse of Architecture*, Doctoral Dissertation, The University of Auckland.	**Constructivism**	**Interpretivism** **Hermeneutics**	**Phenomenological Research** **Heuristic Inquiry**	- **"meaning"** of architecture **a semantic view** - **"semiotics"** in architecture semiotic concepts / paradigms ... in architectural discourse - **to construct a semiotic model** through "language" in architecture (with theoretical texts)
			Tipsuda Patumanon. (1989). *Inside Children's Place: A Phenomenological Study of the Social-Spatial Worlds of Thai Daycare Centers*, Doctoral Dissertation, University of Michigan.	**Constructivism**	**Interpretivism** **Phenomenology**	**Phenomenological Research** **Case Study**	- **"meaning"** of architecture **a place to dwell** (experience, soul, spirit, genius loci) - meaningful architecture for children a place like a home ... - a **philosophical ground** for study - **a case study** - on three local spaces ... through **a sensitive observation**

To focus on *meaning* issue continues during the 1990s as a research trend in architecture. In *Table 6*, the dissertation titled *"The Language of Design: Conceptual Interpretations"*, which is completed at the beginning of the 1990s (Mansour, 1990), for instance, discusses this issue within the framework of an exploratory case study. Heuristic inquiry is mostly preferred as methodology that mostly attempts to decipher meaning through theoretical texts, such as in another study (Buechi, 1991) in early 1990s. Using phenomenological hermeneutics especially from Heidegger, this dissertation, which is on *"Interpreting Buildings as Interpretations: Towards a Hermeneutics of Building"*, discusses the

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meaning and the role of buildings in the life of people. Similarly, the dissertation titled *"A Phenomenological Inquiry into the Problem of Meaning in Architecture"* (Jongkeun, 1994) also keeps this privileged research subject in its approach within a constructivist epistemology such as the previous dissertations. As a result, all these determinations especially prove the existence of a continuity for these two decades in their contents, methodologies, theoretical perspectives and epistemologies.

Table 6. The analysis of the architectural dissertations database brings for 1990s

DECADE	KEYWORDS	NUMBER OF DISSERTATIONS	SOURCE	EPISTEMOLOGY	THEORETICAL PERSPECTIVE	METHODOLOGY METHODS	ANNOTATIONS
1990s	**Phenomenology** **Architectural Body** **Spatial Experience**	**115**	Yasser Mohamed Mansour. (1990). *The Language of Design: Conceptual Interpretations*, Doctoral Dissertation, University of Michigan.	**Constructivism**	**Interpretivism** **Hermeneutics**	**Heuristic Inquiry** **Case Study** (exploratory) Participant Observation & Interview	- **"meaning"** ... as the center of the "language" **a descriptive language** - **a participant observation** among a group of designers in a design activity - **interviews** with participants - **a conceptual interpretation** of the language of design language of images language of sketches
			Georg Buechi. (1991). *Interpreting Buildings as Interpretations: Towards a Hermeneutics of Building*, Doctoral Dissertation, University of California.	**Constructivism**	**Interpretivism** **Hermeneutics**	**Phenomenological Research** **Heuristic Inquiry**	- the role of buildings ... in the life of people **hermeneutics** of building - **to use phenomenological hermeneutics** (as the main foundation of study) (especially from Heidegger) - readings on... Foucault, Benjamin, Gadamer - **to analyze as interpretation**
			Lee Jongkeun. (1994). *A Phenomenological Inquiry into the Problem of Meaning in Architecture*, Doctoral Dissertation, Georgia Institute of Technology.	**Constructivism**	**Interpretivism** **Phenomenology**	**Phenomenological Research** **Heuristic Inquiry**	- **"meaning"** in architecture (a phenomenological account) being ... phenomenal body the essence of architecture "lived experience" - **a critical discussion** on architectural meaning - **a reinterpretation** of the meaning of space

With the late 2000s, interests on phenomenology grows in architecture by emerging a new approach. While the knowledge of philosophical phenomenology is employed to search for meaning in architecture in 1980s and 1990s, a new trend is developed after 2000s, which directly criticizes the theories of phenomenology itself. This is obviously the

science model of Karl Popper that falsifies the fundamentals to construct an alternative knowledge. Because, as Lakatos (1970, p.93) states, the Popperian approach is based on "criticism of the dominant theory and proposals of new theories". In *Table 7*, for example, a dissertation completed in 2007, which is *"The Deposition of the Body: Architecture and Corporal Limits"* (Fitzsimons, 2007), appears as a discourse analysis on the theories of Alberto Perez-Gomez, Michel Foucault, Beatriz Colomina and Michel de Certeau. By analyzing architectural texts of these theorists, this study clearly attempts to explore the situated meaning of body in order to construct a new discourse afterwards. In a similar way, another study, *"The Architecture of the Poetic Image: The Visible and the Invisible in the Sacred Architecture of Sigurd Lewerentz"* (Patterson, 2009), makes a phenomenological reading by making use of the text of Merleau-Ponty (1964/1968), *"The Visible and the Invisible"*. Through such a reference, this study deals with meaningful experience and poetic images in architecture. In another dissertation titled *"Architectural Theory and Practice, and the Questions of Phenomenology"* (Shirazi, 2009), there is a similar critical examination on theoretical texts. In order to develop a phenomenological interpretation of architectural buildings, Shirazi attempts to make an analyze of phenomenology issue from the philosophical ground through Husserl, Heidegger and Merleau-Ponty to the architectural ground through Christian Norberg-Schulz, Juhani Pallasmaa, Kenneth Frampton and Steven Holl.

In addition to 2000s, a similar methodology on phenomenological researches continues during the 2010s. As can be seen in *Table 8*, the dissertation completed in 2001 (El-Antably, 2011), which is titled *"Experiencing the Past: The Virtual (Re)Construction of Places"*, aims to discover the meaning of place through formal and sensory qualities of historic places. In order to put forward a critical inquiry, an analysis on architectural literature is progressed in another study, which is *"Architectural Space: In Search of Sensory Balance for Contemporary Spaces*" (Watford, 2013). This dissertation generally makes a discussion on why vision is the sole sensory element in architecture. Similarly, the dissertation titled *"Body, Soul and Architecture: A Study of the Premodern Islamic and Western Traditions"* (Hajamaideen, 2014) constructs an interpretive reading on history of body and architecture. This study uses discourse analysis as methodology from the philosophical texts of Husserl, Heidegger and Merleau-Ponty to architectural theories of Norberg-Schulz, Pallasmaa, Frampton and Holl. Unlike the science model of Thomas Kuhn (1962/1970, p.23) that is based on "an accepted model or pattern", all these understandings are far from protecting the central theories. Constructivist epistemology provides an evolutionary model that generates lots of post phenomenologies from Husserl to Deleuze with a hermeneutics.

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Table 7. The analysis of the architectural dissertations database brings for 2000s

DECADE	KEYWORDS	NUMBER OF DISSERTATIONS	SOURCE	EPISTEMOLOGY	THEORETICAL PERSPECTIVE	METHODOLOGY / METHODS	ANNOTATIONS
2000s	**Phenomenology** **Architectural Body** **Spatial Experience**	**264**	Juan Kent Fitzsimons. (2007). *The Deposition of the Body: Architecture and Corporal Limits*, Doctoral Dissertation, Rice University.	**Constructivism**	**Interpretivism** **Critical Inquiry**	**Heuristic Inquiry** **Discourse Analysis**	-"body" ... as **a living flesh** (contrary to ... numb ... immobile ... dead) - in order to understand... "body's motion and sensation" - **to explore the situated meaning of "body"** - **to analyze architectural texts** (Perez-Gomez, Foucault, Bolomina, de Certeau)
			Paula Anne Patterson. (2009). *The Architecture of the Poetic Image: The Visible and the Invisible in the Sacred Architecture of Sigurd Lewerentz*, Doctoral Dissertation, University of Washington.	**Constructivism**	**Interpretivism** **Hermeneutics**	**Phenomenological Research** **Heuristic Inquiry** **Case Study**	-**"the issue of meaning"** ... in architecture meaningful experience **poetic images** - **a phenomenological reading** using the text as a guide the visible and the invisible... by Merleau-Ponty examining sacred architecture cemeteries, chapels, churches... by Lewerentz
			Muhammedreza Shirazi. (2009). *Architectural Theory and Practice, and the Questions of Phenomenology* , Doctoral Dissertation, Brandenburg University of Technology.	**Constructivism**	**Interpretivism** **Hermeneutics**	**Discourse Analysis** **Phenomenological Research** **Case Study**	-**"phenomenology"** issue... in the field of... architectural theory and practice (to capture the essence of things) - **to analyze the term/discourse** from philosophy Husserl, Heidegger, Merleau-Ponty to architecture Norberg-Schulz, Pallasmaa, Frampton, Holl - **to interpret architectural buildings** (a phenomenological interpretation) -(from Tadao Ando)

Table 8. The analysis of the architectural dissertations database brings for 2010s

DECADE	KEYWORDS	NUMBER OF DISSERTATIONS	SOURCE	EPISTEMOLOGY	THEORETICAL PERSPECTIVE	METHODOLOGY / METHODS	ANNOTATIONS
2010s	**Phenomenology** **Architectural Body** **Spatial Experience**	**252**	Ahmed Hamed El Antably. (2011). *Experiencing the Past: The Virtual (Re)Constructio n of Places*, Doctoral Dissertation, University of California.	**Constructivism**	**Interpretivism** **Phenomenology**	**Heuristic Inquiry** **Case Study** (exploratory) Participant Observation & Interviews	- to discover... "the meaning of **place**" (according to different context) **Phenomenology** in architecture - **"a semantic analysis"** to generate virtual spaces **"reconstruction"** of historic places (by using computational technology) - a case study is perceived to **a group of users** [formal and sensory qualities of space **... "body"...**] - **to analyze "qualitative data"**
			Rebecca Ruth Watford. (2013). *Architectural Space: In Search of Sensory Balance for Contemporary Spaces*, Doctoral Dissertation, California Institute of Integral Studies.	**Constructivism**	**Interpretivism** **Critical Inquiry**	**Heuristic Inquiry** **Discourse Analysis**	- **"vision"**... the sole sensory element in architecture (depreciation of the sense) the role of sensory experience (human & nature) - **analysis of...** architectural examples architectural literature from modern architecture - **a critique on...** industrial modern world technological progress
			Faris Hajamaideen. (2014). *Body, Soul and Architecture: A Study of the Premodern Islamic and Western Traditions*, Doctoral Dissertation, The University of Adelaide.	**Constructivism**	**Interpretivism** **Hermeneutics**	**Phenomenological Research** **Discourse Analysis**	- a reading on ... "history of body and architecture" **"body"** as ... of the human / the building / settlement / city **"soul"** as ... intangible ruler of the body - **interpretations on** theoretical & mystical texts (Vitruvius, Alberti... Farabi, Ibn Arabi) **through Philosophy** - (Perez-Gomez, Pallasmaa, Heidegger, MerleauPonty)

CONCLUSION

Research field of a discipline acts as an extensive ground, which embraces a comprehensive knowledge of its discipline. This knowledge includes nearly all theoretical and practical approaches of the subject. In a similar way, architecture discipline also has the same nature in its research process. And so, to analyze its nature of knowledge through major questions and then to decipher the structure of the knowledge of its study field epistemologically appears as a requirement in architectural research.

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In this study, it is attempted to draw a genealogy of a specified area of study in architecture, which is *phenomenology*. Analyzing some doctoral dissertations within particular periods, this study is actually an inquiry on whether *architectural phenomenology* is a "research trend" or not. As a result, architectural phenomenology appears as a privileged subject in architectural research according to the spirit of the periods in science. Adopting from other discipline, which is the field of philosophy, this research area generates new forms of knowledge within the discipline of architecture. It means that, this research is "a closer examination of the relationship between epistemology and the research process" (Feast and Melles, 2010).

The results show that there are some significant changes especially in the keywords of architectural phenomenology in certain decades. While *meaning* term had been used in phenomenological approach based studies before 1980s, *phenomenology* appears as the favored term after 1980s. Especially with the late 2000s, architectural phenomenology begins to be a privileging research area. As a result of being a research trend, a sub-field emerges after 2000s that directly criticizes the theories of phenomenology itself, which is *post-phenomenology*. Additionally, from 1950s up to the present, there is continuity in epistemological positions of dissertations for each decade as constructivism. However, different methodologies emerge in different periods especially as before 1980s, between 1980s and late 2000s and after 2000s. But, all approaches exist on a common theoretical ground, which is interpretivism. To see a genealogy of the keyword itself from meaning to phenomenology provides to position this philosophical field in architectural research.

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CONFLICT OF INTEREST

No conflict of interest was declared by the author.

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The author declared that this study has received no financial support.

ETHICS COMMITTEE APPROVAL

Ethics committee approval was not required for this article.

LEGAL PUBLIC/PRIVATE PERMISSIONS

In this research, the necessary permissions were obtained from the relevant participants (individuals, institutions and organizations) during the survey, in-depth interview, focus group interview, observation or experiment.

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Resume

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A Performative Research with The Eco-Parametric Architectural Design

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Abstract

Purpose

This study aims to see the eco-parametric design as performance research and try to reveal the relationship between nature and space and try to develop a new architectural design strategy.

Design/Methodology/Approach

The new strategy consists of three phases: Phase 1: Simulations, Phase 2: Eco-discourses, Phase 3: Modulations. The new strategy includes analytic, geometric, descriptive, qualitative research.

Findings

In the context of "performance", the grid becomes an evolutionary device and the array of a matrix placed in vertical and horizontal arrays with a mathematical set of probabilities. The grid creates an effect of operative interconnectivity on the interlinked logic of episodes and events themselves. The operative matrix works both by making the dynamic parameters in nature visible by simulation and by running this visibility as the codes of the design process. The operative matrix controls the movement in this dynamic system, allowing new design decisions to be made. Therefore, the design process turns from an analytical and logical structure to an evolutionary and intuitive structure with layers. This enables flexible adaptive variability in the space design. The name of this strategy is ECOFOLD 5.0.

Research Limitations/Implications

The dynamic model offered by performance-based research provides new production strategies for the built environment design, as well as new spaces and strategies for the construction and use of the artificial environment. It tries to design the artificial environment as a stable whole that exists with ecosystems in nature.

Social/Practical Implications

ECOFOLD (EF) becomes adaptable for different geographies. The concept of layout depending on multiple parameters can be operated. EF creates its activity with the continuity of internal and external relations crystallizing the formation of space. Crystallization can be considered here both in terms of a metaphor and geometry itself. The layers of internal and external simulations accumulate and crystallize as in a chemical reaction. These layers include the coding of the movement. The movement is encoded according to time and creates the evolutionary texture. This process results in the mapping of the texture.

Originality/Value

As a map, EF is the crystallization of the accumulated function of the environment. In EF, digital tools have possibilities to create performative commons. The common element to all these reshapings is the reconfiguring model of life itself.

Keywords: Architectural design, performance, parametricism, ecology, environment

INTRODUCTION: Organism and Environment

Performance investigates the feedback loops between architecture and the systems it is embedded in. Isolated questions of form, process, fabrication, etc. cease to be a priori condition of architecture. Performance does not ask how a form looks like, but what it enables. Thus performance shifts the focus of interest from essence to effect (Ruby, 2003, p.476). This effect is dynamic. Understanding the environment as dynamic cycles of active ecology can offer a new perspective to develop control strategies in architectural design. Each ecosystem is self-sustainable and the nature of ecosystems, which lasts for 3.8 million years, is very high compared to the artificial ecological systems produced by people. This information, which is used for the benefit of humanity as in prosthetic (artificial) leg and organ design in biotechnology, has not been used enough in the built environment yet (Yeang, 2012). The dynamic model offered by performance-based research provides new production strategies for the built environment design, as well as new spaces and strategies for the construction and use of the artificial environment. It tries to design the artificial environment as a stable whole that exists with ecosystems in nature. Integrity like the order in the ecosystem provides a link between the visibility of cycles and science and design (Ryn & Cowan, 2007). According to Mario Cucinella, the 1970s could not conduct experiments and analysis, so the link between science and design was limited. Today, with its analysis capacity, the invisible parts of the design like the airflow, shadow, etc. can be seen (Guzowski, 2017). This link includes the fundamental principles of performance-based design based on evolutionary strategies, along with developments in production models and computer technologies today. The performance gives mathematical properties for the production of interactive patterns with complex geometries (Arıdağ & Cimşit Koş, 2016). The evolution process depending on these mathematical features can be explained by a four-feature structuring process the environment and organism (Lewontin, 2007).

It cannot be an organism without an environment, nor can it be an environment without an organism. First of all, organisms determine which elements of the outside world will be brought together to form their environment, and what kinds of relationships between the elements will relate to them. The environment is understood by the activities of the organism. The building can be thought a body of as an organism. An organism as a body suggests density and mass, with the attendant connotations of the body that Grange (1985, p.72) seeks to overcome. He adopts the word “flesh”, whose sensuousness shocks us into remembering the fundamental activity of the human body: to feel the world and to house the environment in our being. If the body is seen as flesh, how place arises as the active, emergent soil of value begin to reveal themselves. First and foremost, flesh and place merge to form a matrix of value. This axiological function shifts with the domination of the environment. According to him, there would seem to be four elemental

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structures that our bodies deploy to found place: posture, orientation, feel, and comprehension. These structures are like gestures connoting the active, fleshly role of our bodily being. They are described separately but are to be understood together. Here, the body can interpret as the transformation of the body of the building with the movements of the environment, and the effects of the environment such as wind and sun.

The second interface of the relationship between the organism and the environment is the organisms not only determine which conditions of the outside world will relate to them but with the typical features of their form and metabolism, they effectively build a world around them. All terrestrial organisms, both plants, and animals, form shells that can be observed around them with simple devices. These shells contain the body's metabolic heat and warm and humid air created by water. These shell systems in organisms are similar to prosthetic (wearing) systems that must effectively integrate with the organism to which they will be attached. The organism that contains the prosthesis device is the human body to which the device is attached, and the success of the device depends on the effectiveness of the integration in the symbiotic relationship between the system and the natural organism to which it is attached. In the built environment, the carrier organism is the ecosystem. The success of the design depends on the performance of the designed system as well as the effectiveness of the integration in the symbiotic relationship between the built environment and the ecosystem in the biosphere. One of the success parameters of this effect depends on the use of renewable energy sources with passive methods. This design strategy mimics the atmosphere of the world by creating a building shell as a greenhouse with a prosthetic approach. This mimesis also includes obtaining a surface articulation that will increase the performance of the greenhouse by keeping the heat against the wind.

Third, organisms not only determine what is related to them and create a set of physical relationships between the appropriate situations of the outside world but also constantly change their environment. The carbon dioxide produced by animals is the raw material of plant photosynthesis. Thus, organisms change their environment of other species in ways that can be vital for other organisms. The symbiotic cooperation strategy in the ecosystem is a result of the interaction between different species and ecological functions. Under this strategy, organisms spread around the environment to take advantage of all kinds of functions. Thanks to the cooperation between producers, consumers, and differentiating species, each playing different roles in the ecological system, the system shows dynamic stability (Yeang, 2012). Therefore, in the building, symbiosis in the ecosystem can produce a variety of architectural programs by producing a performance.

The fourth feature of the structuring of the environment is that when organisms become part of their environment, organisms modulate the statistical properties of external conditions. Living systems can both average time and perceive proportional change. Ecosystems have many

interaction channels. These channels provide feedback to every community, ensuring high environmental control and system-wide stability. This can view as a knowledge-based operating system. Ecosystems survive, adapt, and evolve in their natural habitat. This may also be the target of eco-parametric architectural design.

Just like in organisms, when the relationship of the building with the internal and external environment is viewed as an operating system based on information, it is ensured that the appearance of nature is obtained through wind simulation, and a new relationship model where the existing building system can be transformed by combining this information obtained from nature with the knowledge of eco-discourses is investigated methodically. In this method, on the one hand, information vectors that visualize the pressure levels obtained from wind simulation are used, on the other hand, the information of eco-discourses is thoughtfully diagrammed. As a result of these, an understanding of surface and space with advanced performance has been achieved. Because of this study aims to see the eco-parametric design as performance research and try to reveal the relationship between nature and space and ask the following questions:

What is the potential for applying digital simulation for research in eco-parametric design?

What layout concepts parameterize geometry?

How can self-sufficiency as a symbiotic system be possible in high-rise buildings?

Can the eco-parametric approach in architectural design offer a strategy for spatial transformation? What are the eco-parameters of this strategy?

THEORY: Simbiotic Simulation as a Performance

Evolutionary design is a creative process in terms of form production, architectural concepts can be determined as a series of productive rules and encrypted like codes that participate in the evolution process (Frazer, 1995). Evolutionary architecture describes processes that can develop and evolve, responding to the user and the environment, by describing architecture as an artificial way of life. Evolutionary architecture aims to create a common behavior and metabolic balance in the natural environment. For this, it directly participates in the design process of nature and behaves similarly as an organism. According to Ho (2001) seeing the building as an organism indicates that organic philosophy has been replaced by mechanical philosophy. While mechanical systems take place in space and time, organisms are mainly composed of space-time. The organism creates its spacetime by its actions. It, therefore, retains control of its space-time, and at this time it does not progress in the same way as the time in the outside world. Secondly, the organism has its entropy and mechanical systems have stability coming from a closed balance. According to him, the system functions like a non-democratic institution, it is controlled by the hierarchy. On the other hand, an organism has dynamic stability. Dynamic stability, on the other hand, is

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achieved in open systems that do not have a balance, so their entropy is high. Although the system structure develops internally, it always works with external forces and influences. In these radically democratic systems, everyone is involved in the decision making process and working environment in communication and sensitivity. Finally, a mechanical system consists of abstracted parts. Each of these parts is independent of the others. In contrast, the organism is irreducible integrity. The introduction of such basic knowledge is an important step for the biotechnology industry, which allows the development of design software used in architecture. Therefore, the development of biology-based simulation technology and coding of the invisible causes new possibilities in interdisciplinary study, and computers become an experimental environment. Thus, the parameters that provide the formation of the space and increase its performance become observable thanks to the simulations based on time. These simulations in "Performance via representation" architecture functions via its semantic associations as much as it does so via physical separation and connection. In this connection, the core competency of architecture is thus the task of articulation, which aims at an information-rich, communicative spatial morphology (Schumacher, 2016, p.110). This task of articulation can increase the performance of the space depending on the better understanding of the dynamic structure in nature. Wind motion is taken as a reference to make the invisibility visible within the scope of the performance-based research of architectural design. Therefore, with the observation of the wind movement, it is aimed to bring a new perspective in terms of spatial morphologies of tall buildings.

According to Ryn & Cowan (2007, p.14), the heart of the ecological design is not efficiency or sustainability. It is the embodiment of animating spirit, the soul of the living world embedded in each of us waiting to be reborn and expressed in what we create and design. This soul becomes to the fore with their metaphor of the "Form follows flows". This metaphor heralds the opening of a new era like "Form follows function". A new mindset is based on a familiar concept, but the aim is to radically change the understanding of the environment and architectural form. In this context, the metaphor goes beyond criticism and develops an architecture, planning, and design strategy. This strategy rejects the approaches that glorify the form, as opposed to the conception of conventional planning and architecture. The morphological approach of the new age will be eco-morphic. With the help of computer technology, examples of this metaphoric approach in the field of planning, architecture, and design have been growing rapidly for the past twenty or thirty years. Although theorists describe these examples as new baroque architecture, revitalization of organic architecture, which characterizes form, the subject is about design strategy. The basics of this strategy should be sought in a new relationship with nature (Aymelek & Özgencil-Yıldırım, 2015). This new eco-strategy refers to an abstract system as diagrams capable of directing operations. The operations in the

strategy have a vertical ground. According to Zaera-Polo (2003, p.390), this type of new ground as a land strategy has specific performance:

- They are artificially constructed.
- They are neither figures nor backgrounds, but the operating system.
- They have an uncertain frame, as the field in which they exist a differentiated domain affiliated to external processes.
- They are neither a datum nor a reference.
- They are neither solid nor structured by gravity.
- They are hollow and "diagonally" structured.

This new eco-strategy is phenomena from piece to whole and from whole to piece; they are defined not as overlapping geometric forms, but as intricate connections-relationships. These relational forms are distributions of "relationships and configurations of points" and / or "sequentiality of events". This relational network is in a period between necessity and coincidence. The new strategy is not a discursive practice, but a material condition. Paying attention to the detailed conditions that determine the connection of one piece to another, it is possible to think of an architecture that can respond to differences fluently and precisely by understanding the space design as a "sequence of events" (Arıdağ, 2018). The relationships between biological concepts and eco-parametric models of the new strategy are as follows (Table 1).

Table 1. The Relationships Between Biological Concepts and Eco-parametric Models

Concepts	***Models***
Body of Organism	Wind: A Body of the Nature/ Aerodynamic Surface Ecomimesis/ Promenade: Bodies of Humans
Shell	Sun: A Body of the Nature/ Greenhouse Social Reconnection/ Different Architectural Programs
Symbiosis	Green Network/ Vertical Garden Social Reconnection/ Different Architectural Programs
Adaptation	Modulation/ Topology of Surface/ Texture

PRAXIS: Towards Operational Eco-Parametric Design

In the light of this theoretical knowledge, the strategy is developed in the Gebze Technical University Institute of Science as part of the graduate course series "Performance-based Architectural Design". The design groups are 2 or 3 students. The samples are selected from a total of 6 groups according to the differences in the designs. As part of the course, three tall buildings were selected to improve surface and space performance in Istanbul (Figure 1, 2, 3).

In the context of "performance", the grid becomes an evolutionary device and the array of a matrix placed in vertical and horizontal arrays with a mathematical set of probabilities. The grid creates an effect of operative interconnectivity on the interlinked logic of episodes and events

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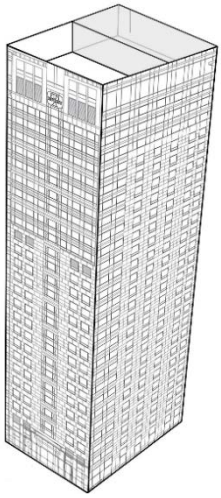
themselves. An operative is a system or device capable of fostering combinatorial evolutionary developments based upon open logic. Environments generate operating actions (Gausa, 2003, p.464).



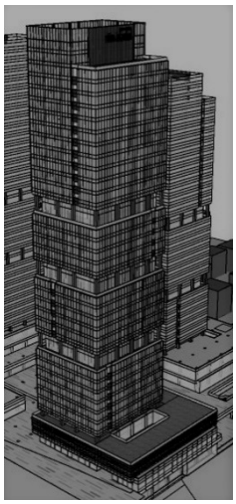


Figure 1. Design: Tekfen Tower
Figure 2. Design 2: Vadi Kule
Figure 3. Design 3: Ritm İstanbul

This operative matrix is necessary for digital tectonic thinking. The definitions of the digital factors for digital tectonic thinking are as follows (Mitchell, 2009, p.28):

1. Motion is the serial process of dynamic operation in the manipulation of design concepts and form evolution.
2. Information is the utilization of digital signals in any form on the skin or surface of a building as a newly appearing material.
3. Generation is the automatic generating process of form or concept by the application of software generative systems/algorithms.
4. Fabrication is the process of fabricating de design components and the method of construction with the aid of CAD/CAM technology.

Similarly, the new strategy includes these four digital factors at different levels for an operative matrix and digital tectonic thinking. As operative actions, the strategy has an operative topology. This operative topology is conceived of as and through strategic movements of folding in the environment. As the subject of performance research, it is designed as a vertical topology. Therefore, the information is encoded by simulating it with the operative matrix in the vertical. The operative matrix has different layers and they create an evolutionary system. The layers are handled until the order of chaos that students can control or the limit at which the order evolves. In the context of this system the strategy for investigating the new topology consists of three phases:

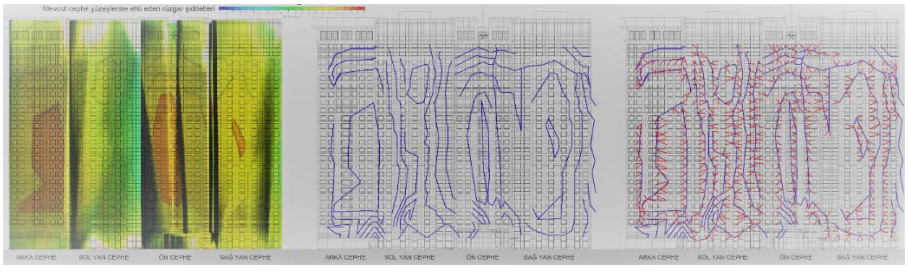
Phase 1: Simulations
Phase 2: Eco-discourses
Phase 3: Modulations

Phase 1: Simulations

Working with simulations requires the development of a logical-mathematical description of the performance of a system or process,

which corresponds to certain specific parameters of its physical behavior. In the sciences, 'model' means more than the geometrical description of an object that we commonly use this term for. A model is an abstraction of a process and can be defined as an understanding of a process that develops, so those complex problems can be accurately modeled. Where the design ambition is to develop "responsive" architectures, buildings or artifacts that can make controlled changes to themselves to adapt to dynamic loading conditions and environmental changes, advanced simulations are essential (Weinstock & Stathopoulos, 2006, p.59). In the context of advanced simulations, the augmentation of design projects using agent-based crowd modeling enables us to test and ascertain the enhancement of the design's social functionality; gains in operational efficiency delivered by the semiologically augmented design should become manifest via the crowd simulation. This ambitious agenda will in turn leave its innovative imprint on the very premises and tools of crowd simulation. Three key innovations are on the horizon: the generalization of crowd modeling from circulation flow simulations to a generalized life process modeling; the shift from physically conceived to communicatively conceived agents with the crucial augmentation of sign- or frame-dependent behaviors; and the differentiation of agents according to different social roles (Schumacher, 2016, p.112).

In the context of the crowd simulation, the current model of the selected building is created as a mass. The model is tested digitally using the "flow design" program of wind tunnel testing software of Autodesk, which creates wind simulation. While testing, the maximum blowing speeds of the wind blowing from the southwest and northeast directions in Istanbul are taken as reference. The building analyzes according to the pressure points formed with red, it is aimed to distribute these points gradually to yellow, green, blue colors that create less pressure. In the first stage, it is tried to understand what kind of geometry the topology depending on the whole building form turns into. Design 1 searches for a crystal topology to reduce the pressure effect by investigating the changes in the surface itself (Figure 4). Design 2 tries to achieve a streamlined soft topology according to the wind directions (Figure 5). Design 3 explores a new surface angle to disperse the pressure, which increases the intensity of the wind formed on the surface of the building (Figure 6).



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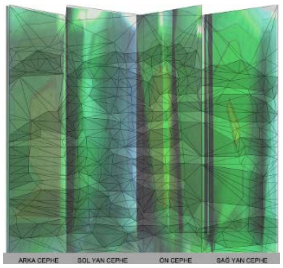

Figure 4. Design 1: Surface expansion of the current building and the proposal according to the wind effect (designed by Büşra Cantürk and Dilara Yiğit, *Bioretention*)

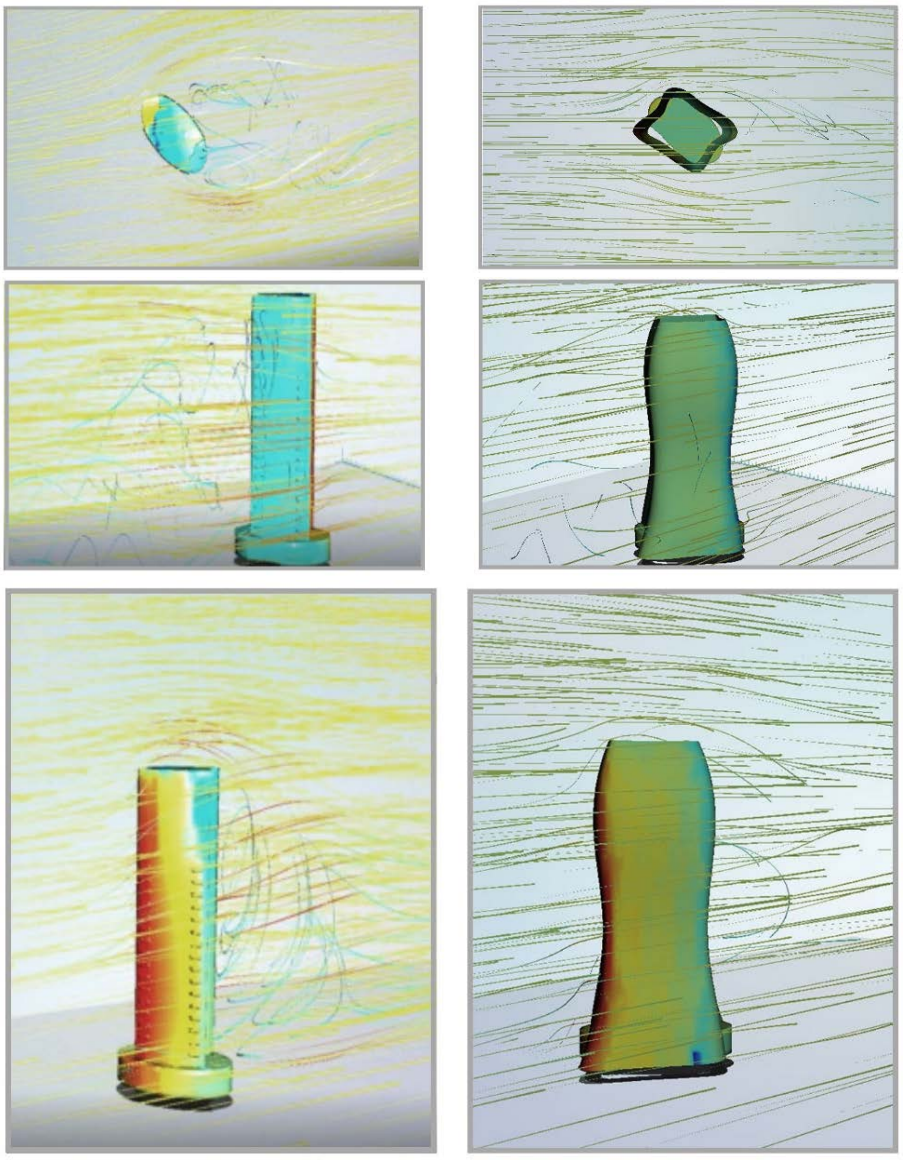

Figure 5. Design 2: Wind effects of the current building and the proposal in plan and perspective (designed by Hümeyra Damacıer and Faruk Faydalı, *Climesh*)

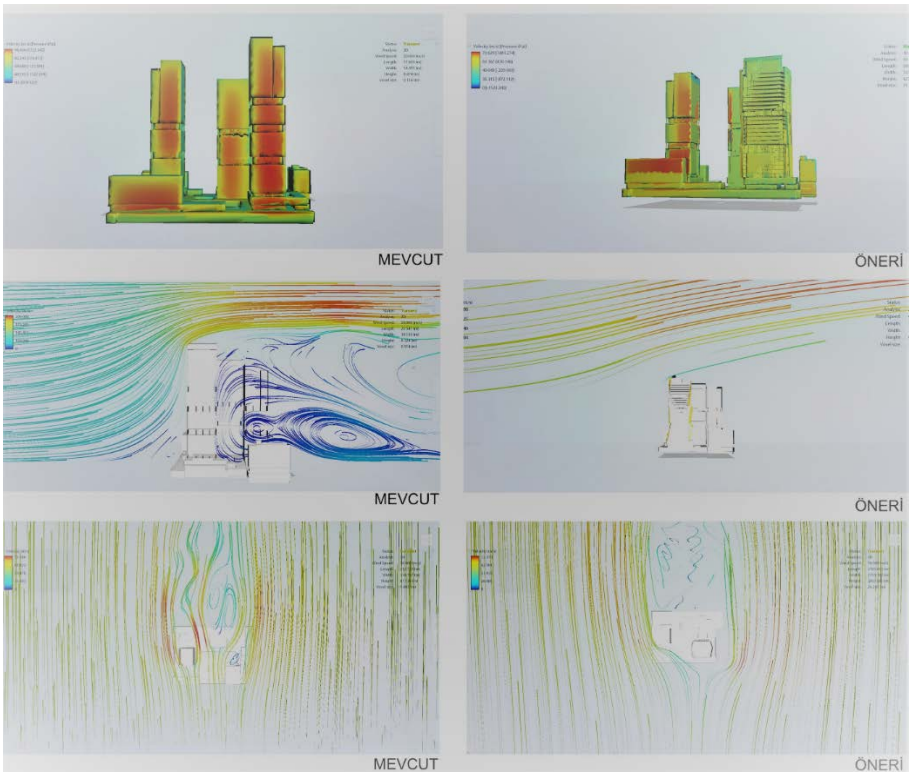

Figure 6. Design 3: Wind effect of the current building and the proposal in plan and perspective (designed by Sema Kala and Beyza Partal, *Fluid Empathy*)

Phase 2: Eco-discourses

In the context of transformation, eco-design needs a friendly and symbiotic scenario with the eco-system in which the design field is located. In this scenario, it is important to produce discourses that establish a relationship with nature. Within the scope of this research, Ecomimesis, Green Network, Social Reconnection discourses are included.

Ecomimesis; it can be understood as a strategy that exemplifies evolution. Nature's geometry is an important organizing principle for ecological design. Geological processes operate in a self-similar way over a vast range of scales, producing a variety of fractal systems: coastlines, archipelagos, mountains, watershed drainages, fault lines, mineral deposits, and so on. Vegetation responds to these fractal landscape features, with each plant favoring a particular microclimate and set of soil conditions. Vegetation, in turn, is a major determinant of ecosystem structure and animal habitats. Fractal geological forms are ultimately reflected in fractal habitats (Ryn & Cowan, 2007, p.59). There are many lessons to be learned from nature for designers who can observe and understand nature. Particularly, researchers who try to understand the form-structure-material relationship of structures in nature can work on optimizing their systems by using their mathematics, computer technologies, and simulation methods as tools, and increasing their communication with other disciplines (Selçuk & Sorguç, 2007).

However, when these methods go beyond copying for designers, they find the true meaning of learning from nature by establishing relationships. The organization formed in the million-year processes inherent in eco-

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systems is at a high level compared to artificial ecological systems produced by people. Today, there is an opportunity to mimic nature like never before. This opportunity, which is used for the benefit of humanity in biotechnology, is not yet adequately exhibited in the built environment. Nature models offered by bio and eco-mimicry, besides new production strategies for built environmental design, are the source of various methods for production and use of the built environment. When the eco-system targets are examined, it is seen that Yeang (2012) is the target of producing an additional part of the functioning mechanism of the eco-system. Energy flows use renewable energy efficiently in eco-systems' photosynthesis, carbon-nitrogen cycles, water, and wind energy. Eco-mimicry is aimed at reducing fossil fuel consumption, using renewable energy sources.

Eco-mimesis can be considered in conjunction with bio-mimesis as the carbon cycle in the absence of the ecosystem or nature, the nitrogen cycle, and the mimicry of all the dynamics of nature. In terms of increasing spatial performance, the prosthesis is also based on the creation of the atmosphere of the world (Figure 7, 8, 9). In Design 1, greenhouses emerge on the promenade. In design 2-3, they are constructed in the south direction connected to the floor gardens.

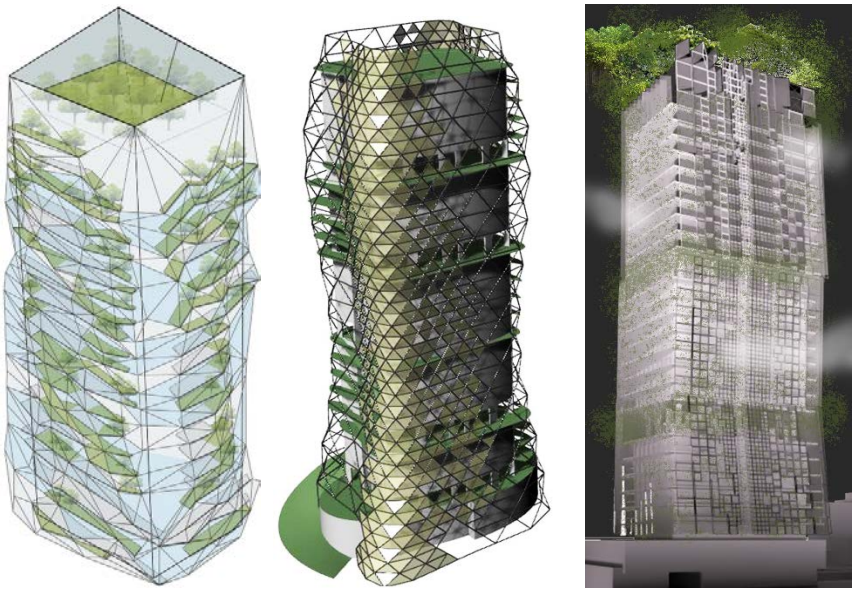

Figure 7. Deign 1: Eco-mimesis
Figure 8. Design 2: Eco-mimesis
Figure 9. Design 3: Eco-mimesis

Green Network; it is aimed that green is an element of the architectural program without any rural-urban distinction. Green is associated with the body movement and architectural program. It is aimed to create a vertical promenade with a green and combine it with green textures in the city. Space is a part of this green and its continuity (Figure 10, 11, 12). In residential or office life, green also creates a relaxation and relaxation area. In this way, it is possible to contact green without long distances by public transportation or on foot. It also positively affects the atmosphere of space and human psychology. It continues to activate the potential of extraterrestrial natural areas through transition areas such as sports,

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culture, and relaxation as a landscape by transforming it into a new strategy. The building can be connected to the green network in the city by maintaining these green roads within its system. In all three designs, green surrounds the building in all vertical directions and on the roof. Thus, a new microclimate is created in the building. It supports this building in terms of both heating and ventilation.

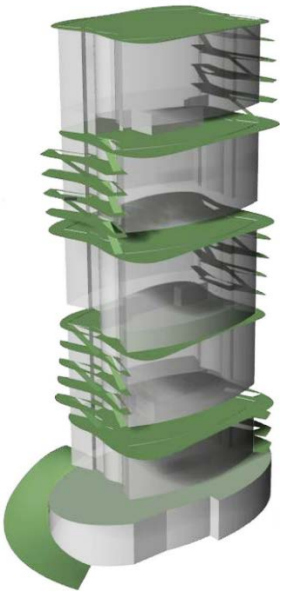

Figure 10. Deign 1: Green Network
Figure 11. Design 2: Green Network
Figure 12. Design 3: Green Network

Social Reconnection; Different action definitions that affect the system gradually as dynamic modifiers are handled together with natural forces such as wind. In the performance, also a human body can be defined as flesh as a vector whose trajectory is relative to other objects, forces, fields, flows form within an active space of force and motion (Lynn, 1999). Form as a digital tectonic can represent the transformational generation of configurative patterns. Performative interfaces as event spaces create a new interaction with public space, that they have fluidity, hybridization, complexity, and morphogenesis. If in the social context, it is desirable to plan, design or understand pluralist and ecological circles, it is important to try to balance between man and the world, feeling and thinking, experience and theory, space and environment (Arıdağ & Cimşit Koş, 2015). This balance overall, the argument and instrumental toolset that begins to emerge operates largely on gradient threshold conditions and effects and their experiential value. In the next stage of development, it would be interesting and necessary to reengage a discourse of spatial arrangement and social formation that operates on the combination of the hard material thresholds and the environmental gradient threshold. Topological alterations of each evolved design instance may thus yield alternative and novel spatial arrangements together with the social formation pattern that these spaces can provide for (Hensel & Menges, 2006, p.95).

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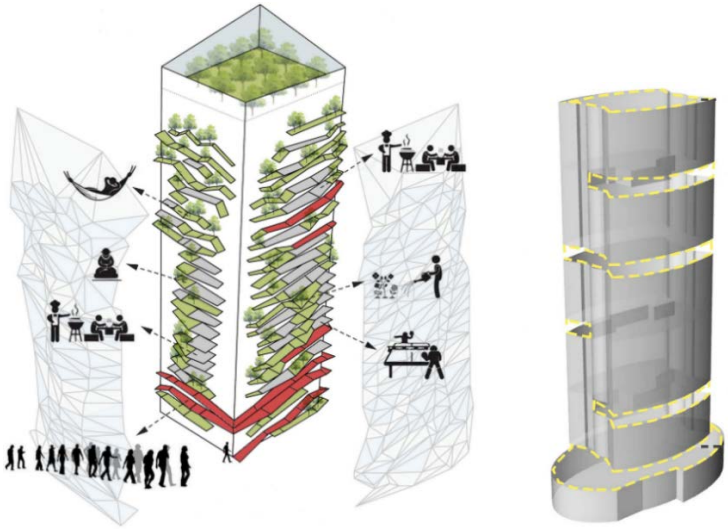
Public space can be viewed as an extension of the house. It provides an opportunity to transform the lives of these neighborhoods and to change their social relations with them. Social groups, age groups, changes of time throughout the day, and the use of promenade serve as integration of great diversity. The relationship between the people living in high-rise buildings, the places where they can socialize and the diversification of the architectural program can be designed. These places are connected with green and promenade. It supports programs that provide socialization in Design 1 by connecting promenades. In Design 1, programs such as table tennis, sitting, eating, meditation, and library expand on the promenade, while in Design 2, programs such as a cafeteria and open-air cinema create by unloading floors and with promenade connections. In Design 3, floor spaces are mostly supported by using existing circulation as relaxation activities (Figure 13, 14, 15).



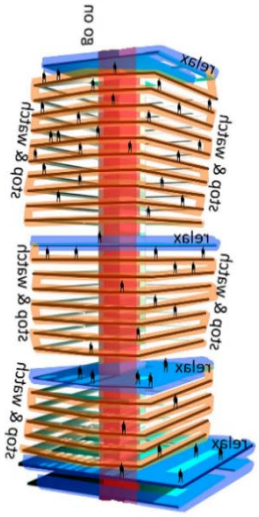


Figure 13. Deign 1: Social Reconnection
Figure 14. Design 2: Social Reconnection
Figure 15. Design 3: Social Reconnection

Phase 3: Modulations

Architecture as an ecology needs analytical and generative methods. That is based on strategically nested capacities within intelligence. These nested capacities as intelligence always involve selection–perception, connection–relatedness and assessment–effect and then, again, selection–perception, connection–relatedness and assessment–effect, and so on. Intelligence is a loopy process that is somewhat like a very deep algorithmic sequencing. An algorithm is a procedure for computing a defined set of relations, usually involving the repetition of an operation. Each algorithm has its behavioral refrain; it assesses the 'ifs' and 'else', and then acts, over and over. While the process of intelligence does not share the mechanical, sequential linearity of the simple algorithmic sequence, this perceived likeness underwrites the field of artificial life4 and what we call "artificial intelligence" (Ednie-Brown, 2006, p.25). The design mind that can create artificial intelligence is created by observing in the digital environment. The resulting modulation is made according to both wind simulation and ecological discourses, according to the capacity of the triangular form to form each form (Figures 16, 17, 18). Patterns with different modulation in Design 1 create a design topology, while design 2 produces a module of different sizes that are multiples of each other that make up the curvilinear topology. In Design 3, the rectangular module creates various obliques by creating different angles with the building surface.

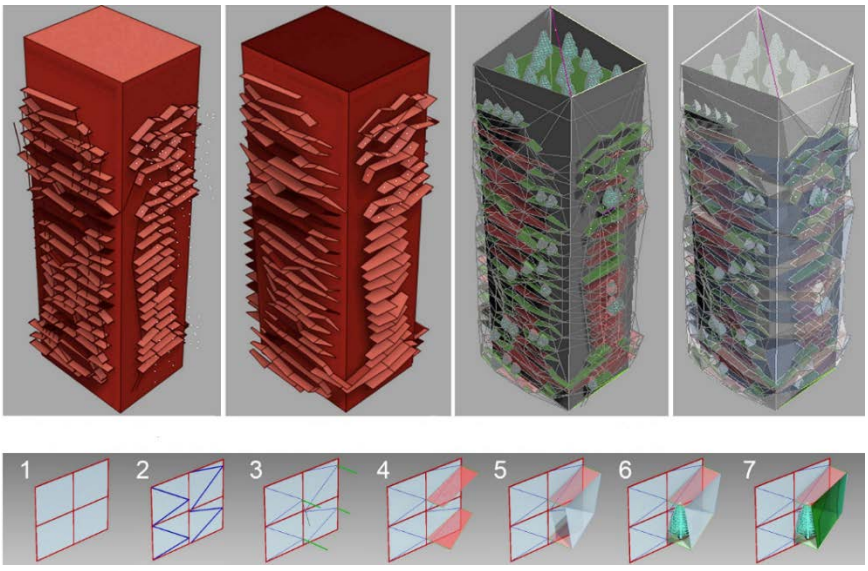


Figure 16. Design 1: Modulation

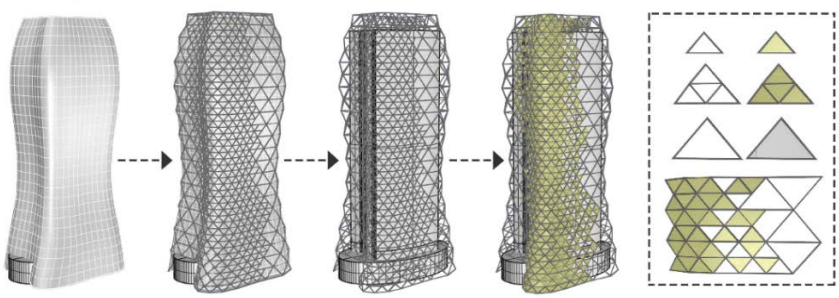


Figure 17. Design 2: Modulation

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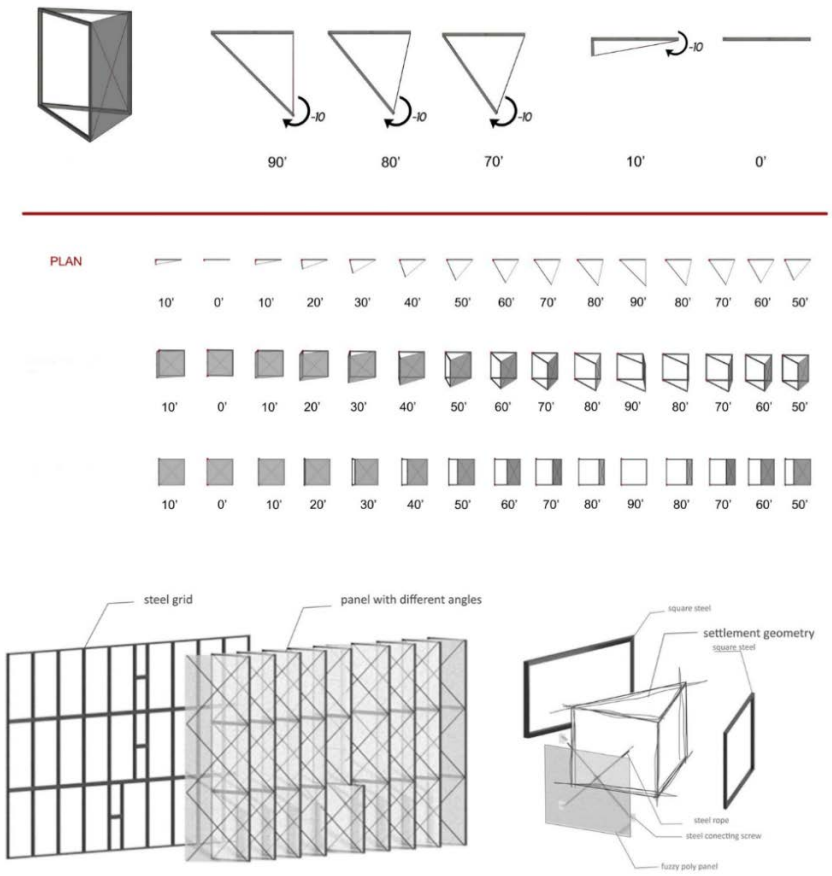


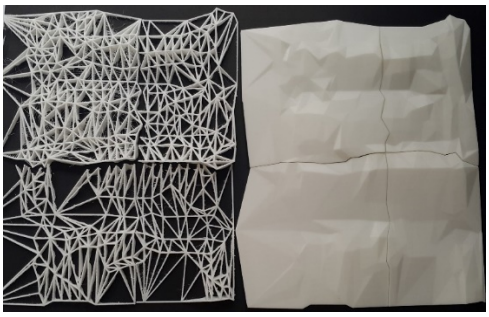
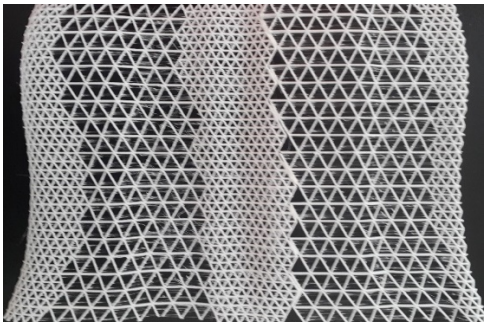
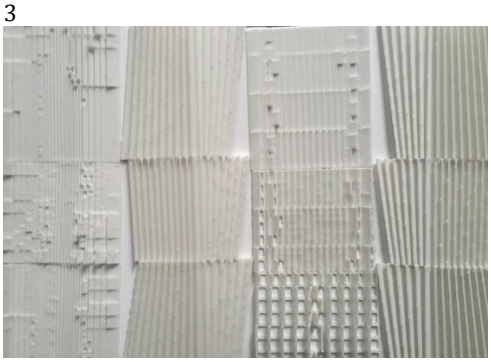
Figure 18. Design 3: Modulation

CONCLUSION: ECOFOLD 5.0

In general, the theory of evolution has taught us to recognize, measure, and simulate the complex order model that emerges from self-organization and evolutionary processes. According to Schumacher (2018), freedom was obtained by giving up the order in the 20th century. But the parametric approach helps develop the idea of order, without giving up freedom in the 21st century. The balance between freedom and order obtains with the operative matrix. This operative matrix works both by making the dynamic parameters in nature visible by simulation and by running this visibility as the codes of the design process. The operative matrix controls the movement in this dynamic system, allowing new design decisions. Therefore, the design process turns from an analytical and logical structure to an evolutionary and intuitive structure with layers. This enables flexible adaptive variability in the space design. The name of this strategy is ECOFOLD 5.0. Thus, ECOFOLD (EF) becomes adaptable for different geographies. The concept of layout depending on multiple parameters can be operated. The number "5.0" describes the version of ECOFOLD that it repeats in time and its evolution. EF creates its activity with the continuity of internal and external relations crystallizing the formation of space. Crystallization can be considered here both in terms of a metaphor and geometry itself. The layers of internal and external simulations accumulate and crystallize as in a chemical reaction. These layers include the coding of the movement. The

movement is encoded according to time and creates the evolutionary texture. This process results in the mapping of the texture. As a map, EF is the crystallization of the accumulated function of the environment. In EF, digital tools have possibilities to create performative commons. At the end of the process, the topological texture that was created to develop performance-based architectural design research and to better control and understand it was digitally fabricated as building surface opening on a scale of 1/500 (Table 2). The common element to all these reshapings is the reconfiguring model of life itself.

Table 2. Digital Fabrication: Design 1, 2, 3

Digital Fabrication	**Topology**	**Space**	**Module**
1 	Crystal	With the promenade	Fractal triangle
2 	Soft	With the promenade and reducing the current architectural program	Triangle
3 	Cartesian	With reducing the current architectural program	Square

We need an understanding of environmentalism that sees humanity as a biological species closely tied to the natural world. The world is genetically our home, which has been home to millions of years of evolution of humanity and its ancestors. The wise use of the resources offered by the world is to protect the existing ecosystems and to manage

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them at a micro-level enough to save the biological diversity they contain until they can be understood and used for human benefit. In the context of this benefit and management, the topology of EF which begins to form according to the movement of the wind is associated with space, it is not only a surface. It is a folding ground that surrounds the space. This folding starts under the influence of an external force such as wind and continues to occur under the influence of internal forces such as the promenade, action, and architectural program. This formation can be continued at different scales. Today, when life changes and transforms, it can be an alternative for self-sufficient, symbiotic, and communal life. This life prioritizes both obtaining energies with greenhouses from nature, growing plants and animals, and interacting socially in this diversity. Low complexity will emerge with a strict determination, as in the case of existing buildings. Therefore, understanding the world, life, people, knowledge, and action as open systems can offer a new creative opportunity. The dialectic of interference and interaction between science-consciousness and design is not closed. Because it is at the heart of the dialectic of disorganization/reorganization that exists in this dialectic nature. This creative game can create new textures, unprecedented spaces. In this relationship, humanity can have an opportunity for a new model of life. The process of EF manifests as follows;

- Vertical topology becomes a landscape that humans can walk inside.
- The greenhouses in the landscape turn into a social space, allowing for public encounters.
- A culture that references nature as in the past is remembered and preserved.
- Space becomes an ecosystem, culture, and thought.
- Three-dimensional simulation of information increases the capacity to comment, making it possible for different disciplines to work together.
- The flexibility of the information increases thanks to the nested capacities, and the thought of the system based on the new strategy creates more sensitivity.
- Sensitivity potentially contains new technologies.
- The intelligence produced by layers with the knowledge of nature is created by computers.
- Computers work like a second mind, enhancing building performance by providing an environment of experimentation and experience for all disciplines.
- The building, which is living and adequate for the flexibility of the living function, is created with new living possibilities and eco-parametric requirements that will reconstruct society through them.

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No conflict of interest was declared by the author.

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LEGAL PUBLIC/PRIVATE PERMISSIONS
In this research, the necessary permissions were obtained from the relevant participants (individuals, institutions and organizations) during the observation.

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Resume

Levent Arıdağ is designer and educator, who is dedicated to develop an innovative approach towards architecture, urbanism, design and ecologie. His work aims to develop the relational thinking capacities of the architecture in its relation with design technologies. He investigates the possibilities of physical environment through the potential relations between space and time.
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Changes in Apartment and Site Type Houses During Covid-19 Pandemic

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Abstract

Purpose

The purpose of this study is to reveal the deficiencies and the space features that people who have to spend more time in their homes during the Covid-19 epidemic process.

Design/Methodology/Approach

This research was conducted during the coronavirus pandemic, when individuals had to stay in their homes, spend more time at their homes and get to know their homes better. In this context, a questionnaire was applied to 400 residents living in the apartment and site (multi-block apartment). The obtained data were evaluated in the SPSS (Statistical Package for the Social Sciences) and the results were expressed in figures and tables.

Findings

The changes made by the users living in these residences in all spaces of the house (living areas, wet areas, night units, semi-open, open, etc.) and their evaluations for these spaces are presented in detail.

Research Limitations/Implications

The main limitations of this study are that residential users are directly included in the study process through questionnaires.

Originality/Value

As a result of the COVID-19 epidemic in the world, architecture was affected by this situation, as in many disciplines, and people started to rearrange their lives by taking measures against the risk of epidemics. Measures have been taken all over the world to reduce the risk of transmission of the epidemic, and curfews have been implemented. In the discipline of architecture, the spatial fictions that have continued until this time have been questioned, and people have been drawn to their residences against the risk of infection by the virus. Streets, avenues and squares in the cities remained empty and public spaces (shopping mall, cultural centre, sports centre, etc.) became unusable. This process enabled individuals to analyse their homes better and people realized the features they needed regarding the spaces they lived in during this process. In this study, the effects of this newly encountered process on residential spaces are revealed.

Keywords: *Change in housing, Covid-19, housing, housing in pandemic, pandemic*

INTRODUCTION

People have the instinct to survive and continue their generation like other creatures. Since existence, people have built housings to meet their basic needs such as shelter, protection and security. The housings have different meanings for people rather than being the structure where only the accommodation requirement is met. People have internalized the housing. They also saw it as part of themselves, their families, and their lives. Le Corbusier has defined housing as the crowning of life. Again, Le Courbusier "When it comes time to build the house, then it is neither a bricklayer nor a technician; that moment is the moment of poetry created by every human being at least once in their lives." With this expression, likened the house to a poem that can be created once in a person's life (Courbusier, 2015). He also emphasized that the house user should be a determining factor in the design of the housing. Houses are affected by many factors such as economic, social, cultural and social factors of the age. Houses are the most common buildings as building stock, and their construction and demand from the past to the present is higher than other buildings. It is important that this type of building, which is numerous in cities and shapes the structural environment, is designed to meet the needs of the users. Houses contain many basic actions that people perform. People perform their basic actions such as sitting, sleeping, resting, preparing food, eating and cleaning in their homes. However, in the epidemic processes rarely encountered in human history, people had to spend more time in their homes. During the epidemic, people carried out different actions in their homes. These were included in the actions in the houses in activities such as hobby, work, learning, doing sports, watching movies, growing plants. Especially in the COVID-19 pandemic process, which has emerged recently and its effect is expected to last for many years, people carry out all the activities they do throughout the day in their homes. In this process, people have to do their jobs, education and social activities in their homes. As a result, the houses were unable to respond to some of the actions, or in order to perform these actions, people have to change their homes, change the functions of the spaces in the home or redecorate. It has been determined that especially living spaces have transformed into educational spaces even during the lesson (Erturan et al., 2020).

Pandemics are one of the most serious threats faced by human beings. During the coronavirus pandemic, quarantine was declared in many countries and societies had to spend a long time at home. During the coronavirus pandemic, where socialization is risky and people need to stay in their homes, people spent more time in their homes and had the opportunity to get to know their homes. Before the pandemic, they spent most of their time at workplaces, parks, gardens, cafes, restaurants, cinemas, and theaters. However, people have not left their homes all over the world, as there is a risk of people infecting each other with the Covid-19 virus by touching the air or surfaces. People in the house tried to find different activities, especially thanks to the advanced technology, the rate

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of spending time on social platforms has increased many times. Organizing concerts, events, and symposiums remotely at home, giving education over the internet gave the users who spend very little time at home the opportunity to make changes to their individual spaces or the whole house. Epidemics are the kind of diseases that mirror us who we really are (Chotiner, 2020). It has been observed that in the fight against the epidemic, national combat programs are implemented and solutions are sought within the borders of the state (Özkoçak et al., 2020).

In line with the new crisis caused by the covid-19 pandemic that has emerged all over the world, it has become necessary to conduct new research and studies in the field of architecture, as in many disciplines. In this direction, when we look at the studies in the field of architecture, we see different disciplines and research topics. In his study, (Barbarossa, 2020) addressed the issue of new urban design studies in order to ensure continuity in transportation in line with the pandemic needs. carried out a study emphasizing the necessity of producing urgent solutions in the field of architecture, taking into account the pandemic process. Hercules and his friends emphasized that it is important for health to produce architectural solutions for the pandemic process (Hercules et al., 2020). In the study of (Ensarioğlu & Ensarioğlu, 2020), the definition, scope and application principles of the concept of "universal design" were examined. It has been determined how these can change during and after the epidemic process, and what new initiatives can be developed. Studies show that this situation is important in terms of architecture and that it is necessary to produce solutions.

With this study, it was aimed to investigate how the preferences of individuals living in apartment-type houses were affected and changed in line with the situations that occurred during the covid-19 pandemic process. In order to create the conceptual framework of the study, first of all, apartment type houses and the development process of these houses are mentioned. Then, the types of spaces in the houses were mentioned. In the continuation of the study, epidemic diseases, the history of the pandemic process, the emergence of covid-19 and its effects are mentioned. In the field research part of the study, a questionnaire was applied to 400 users living in flats and multi-block sites in order to reveal the space features that people need in the places they live during the covid-19 pandemic process. With the survey study, it was requested to investigate the features of the spaces that the users living in apartment-type houses or multi-block sites need in the spaces they live in due to the pandemic process and the changes they make in the spaces. And in this direction, it is aimed to reveal how the new situations in housing design will guide the space design. Within the scope of the survey, firstly, questions were asked to the users, questioning personal information and it was aimed to determine the effects of factors such as age, gender and education on housing preferences. Afterwards, they were asked about the characteristics of the places they lived in. In the continuation of the survey, it was questioned what kind of changes were made in the places

they lived in during the pandemic process, the points they saw missing in the places and whether there were any changes in their venue preferences. The answers to the questionnaire questions applied in the continuation of the study were analysed in the SPSS program and the results were presented. With these data, it was questioned how the personal information of the users and the characteristics of the place they live affect the housing preferences of the individuals and the function changes they make in the places they live. In addition, it is aimed to investigate what kind of need arises by comparing the functional features they need in the house. In the conclusion part of the study, a methodology that can guide the designers is presented by revealing how the perspective of individuals who experience such a process has changed.

THE CONCEPT OF HOUSING

Houses have changed and developed continuously in parallel with the development of people from the early ages until today. Houses were first built to protect humans from wild animals and bad weather. In the early ages, houses were built for basic human needs. However, in the later times, the houses changed according to the age they were in and the needs of the housing user. In the past, people have discovered the needs of the housing by experiencing it and made different spatial analysis in the housings according to it. The fact that people are different from each other and have different demands requires different space analysis in the houses. In addition, people experience many changes in their lifetimes. Socio-economic, cultural, technological and family structure (growth, contraction, etc.) change the way of living in houses. Therefore, houses need to be designed flexibly for these changes. People feel happy, satisfied, and successful in their lives if they own the housings that suit their needs and lifestyles.

Historical Development of Apartment Housing

The construction of housing is the most justified occupation of every society, every civilization. In the past, houses had built horizontally and individually. Different housing typologies have developed with the effect of social, cultural and technological developments. Kostof stated that first multi-storey housing buildings was built before BC 500 in Mesopotamia (Kostof, 1995). With the effect of the Industrial Revolution that emerged at the end of the 18th century, today's apartment housing typologies have developed. The Industrial Revolution, which started in England, spread quickly to Europe. Large enterprises were established and mass production started with the start of mechanization and the use of steam power. Thus, workforce was needed in enterprises and it was attractive for people to work in these enterprises during these periods of unemployment. Immigration to the cities were increased rapidly. In the cities, there was not enough housing stock for the incoming migration density. There was a need for houses that would meet everyone's needs and that could be produced quickly.

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As a result of the changes in social life with the Industrial Revolution, people's lifestyles have changed. As a result of industrialization, economic, social and cultural changes have changed the architecture, the structure and usage of the houses. There have been changes in the way of use of the houses and the interior layout with the changing world order. (Balamir, 1994) stated that not only the industrialization revolution was effective in the development of the apartment house, but also it had economic, political, architectural and socio-cultural effects. In addition, Balamir stated that apartment buildings are a new model in terms of form and meanings, although they have many features of the houses produced in previous periods.

Bozboğan stated that the construction of apartment housing types in Europe began in the 17th century but began to appear in the Ottoman Empire at the end of the 19th century (Bozboğan, 2015). In addition, apartments were first seen in Galata and Beyoğlu districts in Istanbul, where non-Muslims are mostly located. Bozboğan stated that apartment buildings, which were first seen in big cities such as Ankara and Istanbul, started to be built in other Anatolian cities in the middle of the 20th century (Bozboğan, 2015). Görgülü stated that the first of apartment house of Turkey's was Decugis Apartment located in Istanbul's Beyoğlu, Turkey (Görgülü, 2016). Decugis Apartment was built in 1895. The apartment is used as Galata Hotel today.

In 1918, Tayyare Apartment is both multiple housing and is designed by Turkish architect for the first time. In many sources Tayyare Apartments is accepted as Turkey's first apartment house. The apartments designed by Architect Kemalettin Bey for people whose houses were burned down in the fire were called Harikzedegan (people suffering from fire) Apartments. Later, it was given to the Turkish Aeronautical Association and thus it was named as Tayyare Apartments by the public.

Figure 1. Decugis Apartment (Görgülü, 2015).

Figure 2. Tayyare Apartment (URL-9)

Migration from rural areas to cities, which started with the Industrial Revolution and continued until today, has increased. Thus, in cities with the increase in demand for housing and the increase in land prices, mass-produced houses were produced. In general, apartment type houses have produced as mass production due to the land prices. As a result, the influence of houses users have decreased in housing design. Thus, people with different family, characteristics and cultural structure have to live in

houses arranged one on top of the other with the same plan scheme. Uniform housing concept, which is a product of industrialized construction systems, cannot meet the different spatial needs of all people in the house. Realizing the problem in housing demand and production, Le Corbusier described the housing problem as the problem of the age. Moreover, Le Corbusier stated that the balance of societies depends on the solution of the housing problem. He also said that the construction of mass production houses is inevitable to meet the demands. He said that this new mode of production should be viewed from an impartial and critical perspective. Thus, he stated that he would eventually reach the healthy mass produced housing.

Places in the House

Shelter is one of the needs of people (Dinçer, 2005). The sheltering process, which started with tree burrows and caves, continues to the present day (Gündoğdu, 2019). Today, Houses are places where people's accommodation needs are met. Houses are used not only as shelters, but also as places where users meet their daily needs, spend their lives, and expand their families. In fact, residences are places where users spend a significant part of their time with their families (Parvaresh, 2013). Many actions have emerged over time in the houses. Food should be prepared in the kitchen, eaten in the dining room, laid in the bedroom, and daily actions should be carried out in the living space (Hacıbaloğlu, 1989). These actions are analysed and reveal the necessity of shaping the places in the house. The spaces that emerge from the need of the user in the dwelling are again shaped according to the needs. These needs are taken into account while determining the location in the building. Considering user needs and actions, we can define 3 different functions in housing space. The first one is living spaces, the second one is the sleeping places and the third one is the service places. In this section, brief information about the places in the residence will be given.

Living Spaces (Daytime Living Spaces)

The living space is often the largest multi-purpose space of houses, where users perform their activities in their active lives. Arcan and Evci defined the living space as the places where family residents sit together, communicate with the outside world indirectly through communication tools such as radio and TV, and are organized for the social needs of the houses (Arcan & Evci, 1999). Places that spend time with family members or guests coming to the house during the day such as living room, guest room, living room and veranda can be evaluated in this group. In many areas in Turkey, there is a place where families and given the importance of having a larger size than the other rooms. This area is called a lounge or guest room. The guest rooms, which consist of sections such as sitting, hosting guests and eating, are flashy, large, bright and spacious (Alga, 2005). With changing user requirements, guest room culture has been gradually decreasing in recent years. It is seen that living room spaces

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have transformed into a space that combines both the living room and the guest room functions.

There are some principles to be followed when planning living spaces. Usually it is planned living spaces of the house to the landscape orientation. Living spaces should be suitable for flexible arrangements according to time within the possibilities. The living space should be directly related to the entrance of the house. In this way, it will be ensured that the guests coming to the dwelling reach the living space without moving to the private areas. It is very important to determine the action areas in the living space. Areas of use emerge from action analysis. The figures below give the sitting action and the distances needed with this action.

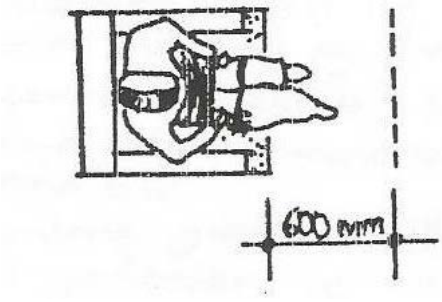


Figure 3. Distance needed with sitting action

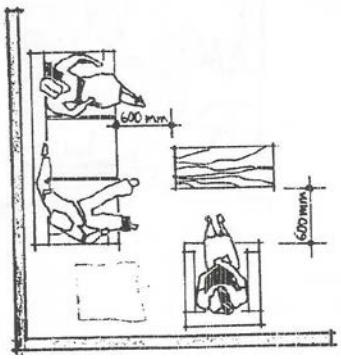


Figure 4. The living room distances in living spaces

Users need a space of at least 60 cm in front of the seating element while performing the sitting action. Ministry of Education determined that the distance between the furniture and the required distance in front of the sitting element should be at least 60 cm.

Bed Places (Night Living Spaces)

They are places where people sleep and rest. They are mostly used at night. Places such as parent bedroom, children's bedroom, guest bedroom can be evaluated in this group. Throughout history, the sign of status and wealth has been intimate spaces. The places where sleeping and resting activities are performed vary according to political and socio-cultural events, periods, art movements, customs and traditions, lifestyle, materials and production technology. Sleeping is an action that allows the human body to rest mentally and physically. Physical environments needed for the act of sleeping should be created.

Therefore, sleeping areas in buildings are considered separately from other places today (Demirarslan, 2020). Figure 3 shows an example of a bedroom solution. It can be evaluated between the guest bedrooms or sleeping places. They are places created for the guests coming home to relax.

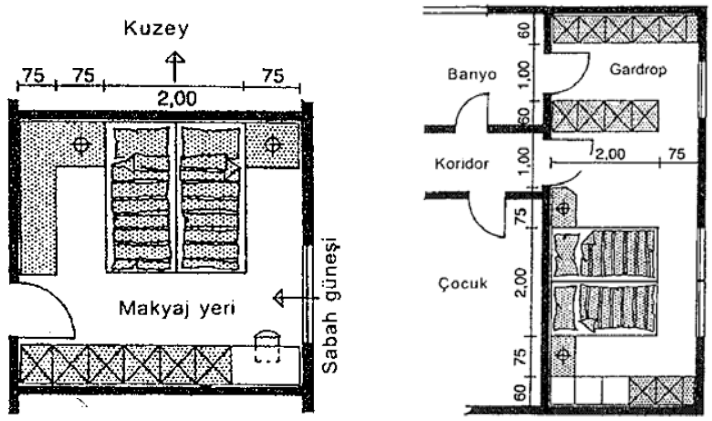


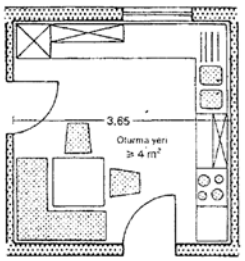
Figure 5. Bedroom example (Neufert, 1983).

Another place in the sleeping areas is the children's room. The children's room is a place that allows the child to work, sleep and play with his siblings or alone (Bayazıt & Yüksel, 1996). The spatial needs of the child change as the child gets older. The children's room should be a place planned considering the needs and activities of the child (Alga, 2005).

Service Locations

They are places used for activities that will help people's needs such as kitchen, toilet, bathroom, and warehouse. Research has shown that the living and service spaces of the residence are the most frequently used spaces and it has been revealed that the kitchen has an important place in these spaces (Yıldırım, 1999). Actions such as storing, washing, cooking, preparing, serving and disposing of garbage are carried out in the kitchen space. In addition to these, some side actions such as watching TV, ironing, sitting can take place in the kitchen. In addition to these, some side actions such as watching TV, ironing, sitting can take place in the kitchen. These actions depend on the socio-economic status, habits and cultural characteristics of the family, as well as the characteristics and size of the house (Gönen, 1990).

Bathrooms are another part of the service areas. Bathrooms are places that serve for the purpose of care and health and are also used to perform the washing action (Oruç, 2009). In some houses, small toilet spaces are also common along with the bathroom space. In some houses, there are also applications where dressing and shower rooms are considered in the parents' bedrooms. The bathroom solution is given in Figure 7 below.



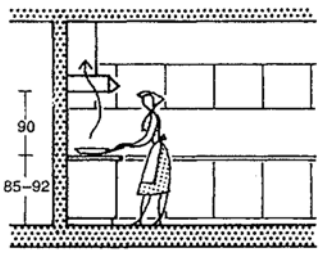


Figure 6. Kitchen space (Neufert, 1983).

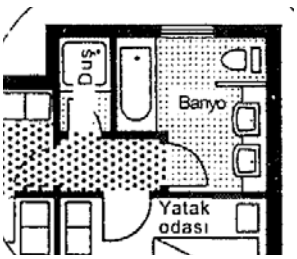


Figure 7. Bathroom space (Neufert, 1983).

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PANDEMIC PROCESS AND ITS EFFECTS ON PLACES

Diseases caused by pathogenic microorganisms such as bacteria, viruses, parasites or fungi that can pass directly or indirectly from one individual to another are called infectious diseases.

Epidemics have been cited throughout history as the main cause of mass deaths. In human history, it can be said that deaths from infectious diseases are more likely than deaths from wars (Esen, 2017) it is highly likely that a quarantine will be declared during the treatment of epidemics affecting the social, cultural and economic structures of societies. It is one of the most effective measures that can be taken to prevent the disease from taking effect without contacting people who may be infected.

What is the Pandemic?

In the historical period, the settled life of human beings began to make agriculture, agricultural products were sold in the markets began to trade more people came together with each other has increased epidemics. People who come in contact from various geographies have also become carriers of diseases.

Pandemic refers to a concept in the sense of “affecting all people” formed by the combination of the words “pan” meaning “all” and “demos” meaning “people” in ancient Greek (Aslan, 2020). The Word Healthy Organization (WHO) decides whether an outbreak is a pandemic.

According to the World Health Organization, the pandemic is considered to have started when three conditions are met; emergence of a disease that the population has not previously been exposed to disease-causing transmission to people and leading to danger the fact that the disease can spread easily and continuously among people (Yıldız, 2017). The most effective way to prevent epidemics is to protect provinces, counties and endangered areas. Due to the quarantine, most of the individuals are protected in a way that they do not leave their homes. The Italian word “quaranta (forty)” for the duration of keeping the passengers under control against the spread of the plague, the quarantine (quarantena in Italian) was first implemented in Raguza in 1465 and in Venice in 1485. In the Ottoman Empire, the quarantine was named” usul-i tahaffuz “and the place was named” tehaffuzhane" (URL-3) the epidemic is an epidemic that spreads across a wide geography, but the pandemic refers to an epidemic that spreads globally.

The Spanish Flu (1918-1920), which is considered to be the largest outbreak and most affecting people's lives in history, has infected 1/5 of the entire population (URL-2). Spanish flu is known to have resulted in the deaths of 100 million people worldwide (Kırık et al., 2020).

19. at the beginning of the century, cholera, one of the major epidemics, spread all over the world and deeply affected the Ottoman Empire. Trade relations, Wars, migrations and pilgrimage to the Ottoman lands caused great economic losses (Ak, 2011).

On March 11, 2020, the announcement of the Covid-19 outbreak as a pandemic occurred, and on March 13, 2020, the epicenter of the outbreak was changed to Europe (URL-1). Covid-19 poses concern to scientists as it contains uncertainties yet.

Places formed due to pandemic (epidemic) in history

Technological development, the easing of transportation, industrial foods, radiation and air pollution can also be cited as the causes that trigger outbreaks. In particular, people's social lives are heavily affected in pandemics, which can be passed from person to person and increase in cases where the social distance is not maintained. Outbreaks that can cause more casualties if health precautions are not taken also change users ' expectations of the venue.

In epidemic processes, people face many consequences psychologically as well. One of the most common behaviors is avoidance behavior. A survey of people quarantined due to SARS found that 54% of people avoid people who cough or sneeze, while 26% do not want to be in crowded areas (Reynolds. et al., 2008).

Depression, acute stress disorder, post-traumatic stress disorder, generalized anxiety disorder, panic disorder, somatic symptom disorders, other mood disorders, even psychosis can be seen as the danger increases, the disease spreads around them and the negativity increases in its course.

The outbreaks ended with a negative impact on the lives of many people, and states have erected many monuments on the occasion, thank God. It is possible to see praying, thankful and pleading motifs on the monuments found in the countries. (URL-4) It is common in European culture to think that outbreaks can be circumvented by erecting a monument (URL-5).

In Europe, church construction was also done with the wish to ask God for forgiveness and to remove the plague from them. The mosque was built by the Ottoman Empire, hoping for forgiveness from Allah. Hidayet mosque (URL-6) is one of these examples. The mosque is located on the site of the previous misbehaviour and therefore the epidemic spread in this area, thinking that the name of the destroyed Hidayet (the path of Allah, the right path) was determined as (URL-8).

Figure 8. Plague Column Vienna and Holy Trinity Column Bratislava (URL-4 ve URL-5).

Figure 9. Hidayet Mosque.

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Tahaffuzhane is the name given to places built against epidemics during the Ottoman Empire and allocated for patients to spend a certain period of time. Tahaffuz means to avoid, to protect in Arabic (Pakalın, 1983). people were disinfected in Tahaffuzhane while their belongings were disinfected in Tebhirhane in the same complex. Tebhir means steam (URL-7). Each municipal office opened temporary cholera hospitals in its districts and undertook the treatment of patients in a short period of time. Three tebhirhane/disinfection stations were built and put into operation in Galata, Üsküdar and Tophane. The places where cholera is seen and the items brought here have been disinfected (Yıldırım, 2015). There are 3 registered quarantine Islands in the world: Elisa Island in the USA, Dubrovnik island in Croatia and quarantine island in our country. Urla Tahaffuzhanesi, located in our country, was designed for trade ships, cruise ships and pilgrims coming all over the country for the pilgrimage route, and continued to operate actively until 1950 (URL-7).

Figure 10. Urla Tahaffuzhane (URL-7).

Figure 11. Gedikpaşa Tebhirhane, (Yıldız, 2015)

As a result of the Covid-19 pandemic, the places most needed have been Hospitals. Considering that construction technologies like today did not exist in the past, it can be predicted that the mortality rates of patients who did not receive treatment due to the fact that hospital construction processes did not take place quickly. However, today, prefabricated hospitals around the world have been completed and started to provide services within weeks, thus increasing the number of inpatient patients. Another place needed as a result of the pandemic is undoubtedly the parks and recreation areas where social distance can be provided. People needed breathing and non-crowded environments, especially due to the destruction of green spaces as a result of distorted urbanization. Due to the lack of such spaces, people had to spend more time in their housing, and because they spent most of their time in the housing, they needed some changes.

FIELD RESEARCH

Within the scope of the study, a survey was conducted to investigate the effect of the Covid-19 pandemic. The survey was applied to 400 residential users living in apartments or estates over the internet. With the questionnaire, the personal information of the users was first questioned and then questions about the type of residence lived in were included. In addition, the questionnaire included questions about the

residence and its surroundings that were experienced during the covid-19 pandemic process, and the space features needed by the users. The answers given to the questionnaire were evaluated in the SPSS program. In this section, the statistical results of the survey application will be included.

Survey Results

In the questionnaire, the questions containing the personal information of the residential users were primarily included. The results of the answers given to the questions about age, gender and education status of the residential users who were surveyed are given in the table below.

Table 1. Personal information of the respondents

Age					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	14-19	40	10,0	10,0	10,0
	20-30	163	40,8	40,8	50,8
	31-45	129	32,3	32,3	83,1
	46-60	64	16,0	16,0	99,1
	61 and over	4	1,0	1,0	100,0
Total		400	100,0	100,0	
Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	278	69,5	69,5	69,5
	Male	122	30,5	30,5	100,0
	Total	400	100,0	100,0	
Education Status					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Primary school	11	2,8	2,8	2,8
	Secondary School	36	9,0	9,0	11,8
	High school	59	14,8	14,8	26,5
	University	236	59,0	59,0	85,5
	Master or PhD	58	14,5	14,5	100,0
	Total	400	100,0	100,0	
What is the number of people you live together?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Single	27	6,8	6,8	6,8
	2	78	19,5	19,5	26,3
	3	84	21,0	21,0	47,3
	4	112	28,0	28,0	75,3
	5 and over	99	24,8	24,8	100,0
	Total	400	100,0	100,0	

When we look at the answers given about the age of the respondents in the table, 10% are between the ages of 14-19, 40.8% 20-30, 32.3% 31-45, 16% 46-60 and 1% is over 61 years old. The majority of respondents are in the 20-30 age range. 69.5% of the respondents are women and 30.5% are men. 2.8% of the respondents have primary school, 9% secondary

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school, 14.8% high school, 59% undergraduate, 14.5% graduate education level. Participants mostly have undergraduate education level. The statistics of the answers given by the respondents to the questions about the houses they live in are given in the table below.

Table 2. The answers given to the questions about the house where the participants live

What is the type of the house you live in?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Apartment	262	65,5	65,5	65,5
	Site (multi-block apartment) or Gated communities	138	34,5	34,5	100,0
	Total	400	100,0	100,0	
How many rooms do you live in?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1+1	7	1,8	1,8	1,8
	2+1	60	15,0	15,0	16,8
	3+1	263	65,8	65,8	82,5
	4+1	60	15,0	15,0	97,5
	5+1	10	2,5	2,5	100,0
	Total	400	100,0	100,0	
Is there an elevator in your house?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	290	72,5	72,5	72,5
	No	110	27,5	27,5	100,0
	Total	400	100,0	100,0	

When the respondents were asked about the type of house they live in, according to the answers; 65.5% of them live in a single block apartment, and 34.5% live in the site (multi-block or secure site). When asked about the number of rooms, 1.8% of the respondents live in 1 + 1 residences, 15% 2 + 1, 65.8% 3 + 1, 15% 4 + 1, 2.5% lives in residences with 5 + 1 rooms. When asked whether there is an elevator in the residence, 72.5% of the respondents have an elevator, 27.5% do not have an elevator.
When the users were asked about their housing preferences during the pandemic process and whether they made any changes in their houses, the results in the following table were obtained.

When the respondents are asked whether their housing preferences have changed; 36.5% of them stated that their housing preference changed during the pandemic process, while 63.5% of them stated that the housing preference did not change. When the respondents are asked whether the function of any space has changed during the pandemic process; 9.5% of them made changes in their home during the pandemic process, 90.5% did not change their home. 9.2% of the respondents stated that they bought sports equipment at home during the pandemic

process, and 90.8% did not. 58 people participating in the survey have adopted pets during the pandemic process.

In the table below, the statistics of the answers given to the questions about whether there is a change in the general activities of residential users during the pandemic process are given.

Table 3. Responses to questions about users' housing preferences and whether they have made any changes in their homes during the pandemic process

Have your housing preferences changed during the pandemic process?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	146	36,5	36,5	36,5
	No	254	63,5	63,5	100,0
	Total	400	100,0	100,0	
Have you changed the function of any place in the pandemic process?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	38	9,5	9,5	9,5
	No	362	90,5	90,5	100,0
	Total	400	100,0	100,0	
Did you buy home sports equipment during the pandemic process?					
Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	Yes	37	9,2	9,2	9,2
	No	363	90,8	90,8	100,0
	Total	400	100,0	100,0	
Have you had a pet in the pandemic process?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	58	14,5	14,5	14,5
	No	342	85,5	85,5	100,0
	Total	400	100,0	100,0	

Table 4. Responses to the questions of whether there has been a change in the daily activities of residential users during the pandemic process

If there is an elevator, do you use the common elevator in the pandemic process?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	185	46,3	46,3	46,3
	No	105	26,2	26,2	72,5
	No elevator	110	27,5	27,5	100,0
	Total	400	100,0	100,0	
If you live in a residential sites are using the common use in the process of a pandemic?					
Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	Yes	30	17,5	17,5	17,5
	No	138	46,5	46,5	64,0
	I don't live on the site	262	36,0	36,0	100,0
	Total	400	100,0	100,0	
Do you do sports at home during the pandemic process?					
Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	Yes	185	46,2	46,2	45,0
	No	215	53,8	53,8	100,0
	Total	400	100,0	100,0	

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If you are doing sports at home during the pandemic, in which unit of the house do you do your sports?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Living Areas (Living Room etc.)	107	26,8	26,8	26,8
	Kitchen	3	,8	,8	27,5
	Night Units (Bedrooms, Kids Rooms)	43	10,8	10,8	38,3
	Entrance Hall	10	2,5	2,5	40,8
	Half Open and / or Open Spaces (balcony, terrace, patio etc.)	22	5,5	5,5	46,3
	I don't do sport	215	53,8	53,8	100,0
	Total	400	100,0	100,0	

If you bought sports equipment during the pandemic process, in which unit of the house did you put the sports equipment (s)?					
Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	Living Areas (Living Room etc.)	15	3,8	3,8	3,8
	Night Units (Bedrooms, Kids Rooms)	13	3,3	3,3	7,0
	Entrance Hall	3	,8	,8	7,8
	Half Open and / or Open Spaces (balcony, terrace, patio etc.)	6	1,5	1,5	9,3
	I did not buy a sports equipment	363	90,8	90,8	100,0
	Total	400	100,0	100,0	

If you have a pet, have you created a space (cage, cat house, dog house, aquarium, etc.) for it?					
Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	Yes	36	9,0	9,0	9,0
	No	22	5,5	5,5	14,5
	I did not have	342	85,5	85,5	100,0
	Total	400	100,0	100,0	

If you owned a pet, which unit of the dwelling did you put his place in?					
Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	Living Areas (Living Room etc.)	32	8	8	8
	Kitchen	4	1	1	9
	Night Units (Bedrooms, Kids Rooms)	2	,5	,5	9,5
	Entrance Hall	4	1	1	10,5
	Half Open and / or Open Spaces (balcony, terrace, patio etc.)	16	4	4	14,5
	I don't own pets	342	85,5	85,5	100,0
	Total	400	100,0	100,0	

64% of 290 participants who have elevators stated that they did not use elevators during the pandemic process, and 36% stated that they used elevators during this period. 17% of 168 people living on the site used

common areas during the pandemic process, 83% did not use common areas within the site during this process. 46.2% of the respondents stated that they do sports during the pandemic process, while 53.8% do not do sports. Of the participants, 57.8% of the participants who do sports are living areas, 1.8% in the kitchen, 23.2% in the sleeping areas, 5.4% in the entrance of the house, 11.8% in the balcony and terrace does sports in places. During the pandemic period, 40.5% of those who bought sports equipment at home put their sports equipment in their living space, 35% in night units, 8.3% in the entrance area, and 16.2% in the semi-open space. In this process, 62% of the 58 people who adopted pets created a special area for their pets in their residences. 38% did not create an area. 55% of those who adopt pets have created living spaces for their animals in living spaces, 7% in kitchen, 3% in night units, 7% in entrance areas and 28% in semi-open spaces.

Table 5. Answers to questions about cleaning spaces during the pandemic process

I think that a clean and dirty area should be created for the entrance hall of the house.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	I agree	243	60,8	60,8	60,8
	I partially agree	108	27,0	27,0	87,8
	Disagree	49	12,3	12,3	100,0
	Total	400	100,0	100,0	
I think that there should be a sterilization area in the entrance and elevators of the apartments.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	I agree	338	84,5	84,5	84,5
	I partially agree	48	12,0	12,0	96,5
	Disagree	14	3,5	3,5	100,0
	Total	400	100,0	100,0	
I think that the common areas should be sterilized continuously after the pandemic process.					
Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	I agree	349	87,3	87,3	87,3
	I partially agree	36	9,0	9,0	96,3
	Disagree	15	3,8	3,8	100,0
	Total	400	100,0	100,0	
I think that frequent ventilation of the house will have a positive effect on the places in the house.					
Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	I agree	367	91,8	91,8	91,8
	I partially agree	23	5,8	5,8	97,5

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	Disagree	10	2,5	2,5	100,0
	Total	400	100,0	100,0	

60.8% of those participating in the survey stated that they agreed that sterilization areas should be created in the entrance areas of the houses, 27% partially participated, and 12.3% stated that they did not. 84.5% of the respondents stated that they agreed that sterilization areas should be created in the entrance areas of the apartments and elevators, 12% partially participated, and 3.5% disagreed. 87.3% of those participating in the survey stated that they agree that common areas should be sterilized after the pandemic, 9% partially agree and 3.8% do not. 91.8% of the respondents said I agree, 5.8% partially agree, and 2.5% do not agree to the question that I think that frequent ventilation of the house will have a positive effect on the spaces in the residence.

Table 6. Answers to questions about the number of people living together and the type of house you live in

What is the number of people you live together? * What is the type of the house you live in? Crosstabulation

		What is the type of the house you live in?		Total
		Apartment	Site (multi-block apartment) or Gated communities	
What is the number of people you live together?	Single	20	7	27
	2	48	30	78
	3	56	28	84
	4	73	39	112
	5 and over	65	34	99
Total		262	138	400

Comparing the number of people living together with the type of house, 74% of the people living alone live in apartment-type house, while 26% live on the site. While 62% of the families with 2 people live in apartment-type house, 38% of them live on the site. While 67% of the families with 3 people live in apartment-type house, 33% of them live on the site. 65% of the families with 4 people live in apartment-type house although 35% of them live on the site. Also 65% of the families with 5 people live in apartment-type house although 35% of them live on the site.

Table 7. Answers to the questions on the number of people living together and the number of rooms

How many rooms do you live in? * What is the number of people you live together? Crosstabulation

		What is the number of people you live together?					Total
		Single	2	3	4	5 and over	
How many rooms do	1+1	6	1	0	0	0	7
	2+1	12	18	13	11	6	60
	3+1	8	53	56	77	69	263
	4+1	1	6	15	21	17	60

you live in?	5+1	0	0	0	3	7	10
Total		27	78	84	112	99	400

When comparing the number of rooms and the number of people living in the housing inhabited, it is seen that 86% of the people living in 1+1 housing type live alone and 14% of them have 2 people. While 20% of those living in 2 + 1 housing type live alone, 30% live with two people, 22% with three people, 18% with four people, and 10% with 5 people or more. Of those living in 3 + 1 type of house, 2% live alone, 20% with two people, 22% with three people, 30% with three people, 26% with five people or more. Of those living in 4 + 1 housing type, 1% live alone, 10% live with two people, 25% with three people, 35% with four people, 39% with 5 or more people. For those living in 5 + 1 housing type; 30% are families with 4 people and 70% are families with 5 or more people.

Table 8. Comparison of the number of rooms in the house and house preferences during the pandemic process

Have your housing preferences changed during the pandemic process? * How many rooms do you live in? Crosstabulation

		How many rooms do you live in?					Total
		1+1	2+1	3+1	4+1	5+1	
Have your housing preferences changed during the pandemic process?	Yes	3	15	101	23	4	146
	No	4	45	162	37	6	254
Total		7	60	263	60	10	400

When comparing the number of rooms in the houses of the participants and the change in their housing preferences during the pandemic process, 3% of those whose housing preferences changed are in 1+1 housing type, 10% in 2+1 housing type, 69% in 3+1 housing type, 15% in 4+1 housing type and 3% of them live in 5+1 housing type.

Table 9. Answers to questions about the space features needed during the pandemic process

		Count	Column Responses %
Please mark the space features you need during the pandemic process.	Garden	285	33,1%
	Larger balcony	180	20,9%
	Larger house	88	10,2%
	More rooms	71	8,2%
	Social areas	179	20,8%
	I don't need	50	5,8%
	Others	8	0,9%
	Total	400	100,0%

When asked about the places needed during the pandemic process, 33.1% of the respondents need a garden, 20.9% a larger balcony, 10.2% a wider house, 8.2% more rooms, 20.8% stated social areas and 5.8% stated that they do not need anything.

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Table 10. Answers to questions about changes in living room

		Count	Column Responses %
What changes have you made in Living Areas (Living Room etc.)?	I changed the seating arrangement	98	19,2%
	I bought furniture	23	4,5%
	I had to replace the TV	22	4,3%
	I bought flowers	82	16,1%
	I bought / replaced the lighting furniture	18	3,5%
	I bought decoration	38	7,5%
	I did not make changes	215	42,2%
	Others	14	2,7%
	Total	400	100,0%

When asked what kind of changes you have made in your living spaces; 19.2% changed the seating arrangement, 4.5% bought furniture, 4.3% changed the location of the television, 16.1% bought flowers, 3.5% bought lighting elements or changed their location, 7.5% stated that they bought decoration elements, 42.2% stated that they did not make any changes.

Table 11. Answers to questions about changes in kitchen

		Count	Column Responses %
What changes did you make for the kitchen?	I changed the seating arrangement	16	3,3%
	I bought furniture	4	0,8%
	I bought / replaced the lighting element	4	0,8%
	I created a cleaning area for food from outside	68	14,0%
	I created a storage area for food from outside	61	12,6%
	I bought a TV	5	1,0%
	I bought or arranged storage furniture (closet, etc.)	25	5,1%
	I bought flowers	43	8,8%
	I did not make changes	254	52,3%
	Other	6	1,2%
	Total	400	100,0%

When asked what kind of changes have you made in your kitchen, the respondents; 52.3% did not make changes, 3.3% changed the seating arrangement, 0.8% bought furniture, 0.8% bought lighting elements, 14% created a clean area for items coming from outside,% 12.6% of them stated that they created a storage area for food coming from outside, 1% bought a television, 5.1% bought or arranged storage furniture, and 8.8% stated that they bought flowers.

Table 12. Answers to questions about changes in wet areas (bathroom and / or toilet)

		Count	Column Responses %
What changes have you made to Wet Areas (Bathroom and / or Toilet)?	I bought / replaced the lighting furniture	8	1,8%
	I bought or arranged storage furniture (closet, etc.) for cleaning products	52	11,7%
	I bought or arranged storage furniture (closet, etc.) for dirty clothes	32	7,2%
	I created a space for outside items.	51	11,4%
	I did not make changes	301	67,5%
	Other	2	0,4%
	Total	400	100,0%

When asked what kind of changes have you made in wet areas (toilet, bathroom), the respondents; 67.5% did not make changes, 1.8% bought or replaced lighting elements, 11.7% bought or arranged storage furniture for cleaning materials, 7.2% bought or arranged storage furniture for dirty laundry and 11.4% stated that it created an area for items coming from outside.

Table 13. Answers to questions about changes in bedroom

		Count	Column Responses %
What changes have you made for the Bedroom ?	I changed the furniture.	36	9,0%
	I created a space for outside items.	9	2,3%
	I bought / replaced the lighting furniture	9	2,3%
	I bought furniture	23	5,8%
	I did not make changes	312	78,0%
	Others	11	2,8%
	Total	400	100,0%

When asked about what kind of changes you have made in your bedroom, the respondents; 78% of them stated that they did not make changes, 9% of them changed the location of the furniture, 2.3% stated that they created an area for the items coming from outside, 5.8% stated that they bought furniture.

Table 14. Answers to questions about changes in entrance hall

		Count	Column Responses %
What changes did you make for the Entrance Hall?	I created a space for outside items	30	7,5%
	I bought / replaced the lighting furniture	1	0,3%
	I bought shoe cabinet	5	1,3%
	I bought a cloakroom	38	9,5%
	I bought flowers	3	0,8%
	I did not make changes	313	78,3%
	Others	10	2,5%
	Total	400	100,0%

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When asked what kind of changes you made in the entrance hall during the pandemic process, the respondents; 78.3% of them answered that they did not make any changes. Of the survey respondents, 7.5% created a space for items coming from outside, 0.3% bought or replaced lighting elements, 1.3% bought shoe racks, 9.5% bought a cloakroom, 0,8% bought flowers, marked those options.

Table 15. Answers to questions about changes in children's room

		Count	Column Responses %
What changes have you made for the Children's Room?	There is no children's room.	57	13,0%
	I created a distance learning venue.	59	13,5%
	I created a playground.	34	7,8%
	I created a space for outside items.	19	4,3%
	I bought / replaced the lighting furniture	8	1,8%
	I bought furniture	2	0,5%
	I did not make changes	257	58,7%
	Other	2	0,5%
	Total	400	100,0%

When asked what kind of changes have you made for the children's room, 13% of the respondents stated that they do not have a children's room and 58.7% did not make any changes. Of the respondents, 13.5% created a distance education space, 7.8% created a playground, 4.3% created a space for items coming from outside, 1.8% bought or replaced lighting elements, 0.5% bought furniture of them stated that.

Table 16. Answers to questions about changes in to half-Open and / or Open Spaces (Balcony, Terrace, Patio, etc.)

		Count	Column Responses %
What changes have you made to half-Open and / or Open Spaces (Balcony, Terrace, Patio, etc.)?	No Half-Open and / or Open Space.	12	2,2%
	I bought / planted flowers	105	19,5%
	I created a space for outside items.	0	0,0%
	I bought / replaced the lighting furniture	82	15,2%
	I bought decoration elements	35	6,5%
	I bought a sitting furniture	34	6,3%
	I bought / planted Field Crops (Tomato, Pepper, Basil etc.)	59	10,9%
	I did not make changes	209	38,8%
	Other	3	0,6%
	Total	400	100,0%

When asked what kind of changes you have made in semi-open and / or open spaces (balcony, terrace, veranda etc.) 38.8% stated that they did not make any changes and 2.2% stated that they did not have a semi-open or open space. Of the respondents, 19.5% bought or planted flowers, 15.5% bought or replaced lighting elements, 6.5% bought decoration

elements, 6.3% bought seating elements, 10.9% bought or planted field crops (tomato, pepper, basil, etc.) of them stated that.

Table 17. Comparison of the space features needed in the pandemic process and the features of the house where you live

		How many rooms do you live in?					
		1+1	2+1	3+1	4+1	5+1	Total
Please mark the space features you need during the pandemic process.	Garden	4	38	193	43	7	285
	Larger balcony	3	28	120	25	4	180
	Larger house	1	20	57	7	3	88
	More rooms	1	16	47	6	1	71
	Social areas	2	29	114	29	5	179
	I don't need	2	5	34	8	1	50
	Others	1	3	4	0	0	8

When comparing the number of rooms of the houses with live and the spaces they need during the pandemic process in which the respondents, those who need a garden; 1.5% of them live in 1+1 housing type, 13% of them live in 2+1 housing type, 68% of them live in 3+1 housing type, 15% of them live in 4+1 housing type, 2.5% of them live in 5+1 housing type. Those who need a larger balcony; 2% of them live in 1+1 housing type, 16% of them live in 2+1 housing type, 66% of them live in 3+1 housing type, 14% of them live in 4+1 housing type and 2% of them live in 5+1 housing type. Those who need a larger house; 2% of them live in 1+1 housing type, %23 of them live in 2+1 housing type, 65% of them live in 3+1 housing type, 9% of them live in 4+1 housing type and 1% of them live in 5+1 housing type. Also, those who need more room; 1% of them live in 1+1 housing type, 23% of them live in 2+1 housing type, 66% of them live in 3+1 housing type, 8% of them live in 4+1 housing type, 1% of them live in 5+1 housing type. Moreover, those who need social space; 2% of them live in 1+1 housing type, 16% of them live in 2+1 housing type, 63% of them live in 3+1 housing type, 16% of them live in 4+1 housing type, 3% of them live in 5+1 housing type.

Table 18. Comparison of the space features needed in the pandemic process and the number of people living together

		What is the number of people you live together?					
		Single	2	3	4	5 and over	Total
		Count	Count	Count	Count	Count	
Please mark the space features you need during the pandemic process.	Garden	17	60	56	85	67	285
	Larger balcony	13	32	36	54	45	180
	Larger house	3	18	14	23	30	88
	More rooms	2	12	17	17	23	71
	Social areas	13	24	34	53	55	179

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	I don't need	5	11	12	9	13	50
	Others	2	1	0	3	2	8

When comparing the number of people living together with the space features needed during the pandemic process; 50 people (12.5%) stated that they do not need any space. Those who need a garden; 6% live with one person, 21% live with two people, 19% live with three people, 30% live with four people, 25% live with five or more people. Those who need a larger balcony; 7% live alone, 18% live with two people, 20% live with three people, 30% with live four people, and 25% live with five or more people. Those who need a larger house; 4% live alone, 20% live with two people, 16% live with three people, 26% live with four people, and 34% live with five or more people. Those who need more room; 3% live alone, 17% live with two people, 24% live with three people, 24%live with four people, and 32% live with five or more people. Also those who need social areas; 7% live alone, 13% live with two people, 19% live with three people, 30% live with four people, 31% live with five or more people.

RESULTS

Houses are the most common type of building in cities, which are the most needed and produced compared to other buildings, and also houses supply the basic living needs of people such as; resting, security, nutrition and establishing a family. In the Covid-19 pandemic, people must spend more time at their houses. Personal precautions are of great importance in preventing transmission of the disease. In addition, the situation of preventing the epidemic and not getting sick has emerged thanks to the careful behaviour of the people and by staying in the house. During this period, it was understood that the house was the safest place. According to the results of the research, during the pandemic process, the spaces needed by houses users, garden, larger balcony, larger house, more rooms, and social spaces (Figure 12).

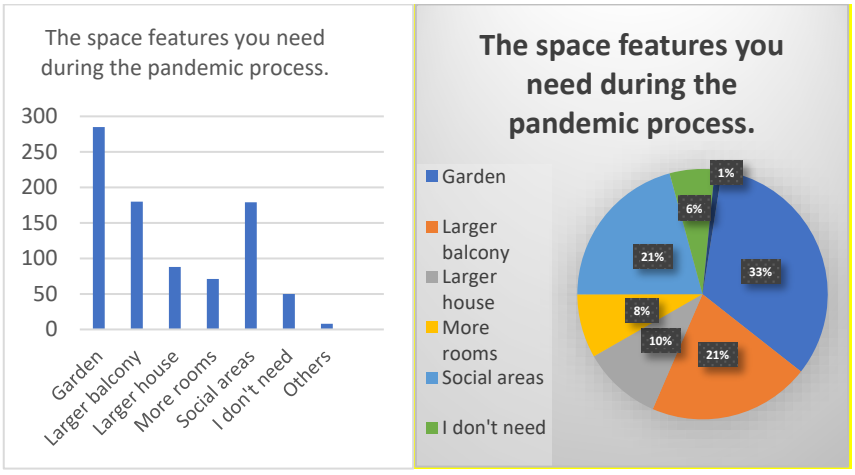

Figure 12. The graphic of the space features needed during the pandemic process.

In this process, it is seen that most research participants need open and/or semi-open spaces such as balconies, gardens, and social areas. It

turns out that designers should also give importance to semi-open and open space designs while designing apartment houses. Compared to the number of people living together and the space characteristics needed in the pandemic process; 3 and more people who living with families need spatial features such as a larger balcony, larger house, garden, social area. As the number of family members increases, their needs for house's space features also increase. It has been determined that most of the apartment house users living in type of 3 + 1 apartment housing change in their choice of housing. They stated that the residents living in 3 + 1 apartment housing type will prefer the houses with gardens, larger balconies and houses with larger square meters, houses with more rooms and social areas. 3 + 1 type of housing usually has built for family housing in Turkey. However, during the pandemic process, it has been determined that 3 + 1 house types do not supply the needs of the users and the users are not satisfied with this type of house (Figure 13).

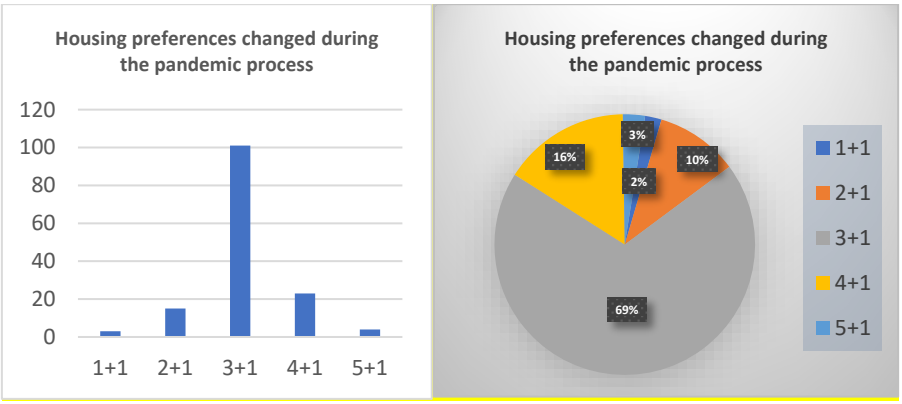

Figure 13. The graphic of housing preferences changed during the pandemic process.

During the pandemic process, they stated that most of the apartment house users do not use common areas such as elevators and social areas, and that the technical equipment of the sterilization areas in these areas should be designed. It is concluded that people will continue to need sterile spaces after the pandemic. This result emerges as a problem to be solved in terms of architectural discipline. During this period, apartment residents who had to spend most of their daily lives in their residences stated that they adopted pets, did their jobs from home, started growing ornamental and field plants, bought sports equipment for their residences and started doing sports. In addition, as a result of continuing education-training remotely during the pandemic process, the need for education areas for children in residences has emerged. Thus, the lifestyles of users in their homes have changed or new lifestyles have been added. In addition, they stated that apartment residents created storage and sterilization areas for their belongings coming from outside in the entrance, kitchen and wet areas of their residences and that such areas should be available for the residences. As a result of the research, the apartment house users stated that they longed for nature as a result of their isolation in their houses. As a result, they stated that they mostly

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made changes in their open / semi-open spaces and started to use these areas more. They stated that they made decoration in their open and / or semi-open spaces, bought sitting and lighting elements, and bought / planted flowers and / or field plants. An unexpected or unprepared situation has been encountered in the world, as a result, it is necessary to design flexible houses that will appeal to changing, added or different life styles.

CONFLICT OF INTEREST

The authors declared that this study has not conflict of interest.

FINANCIAL DISCLOSURE

The authors declared that this study has received no financial support.

ETHICS COMMITTEE APPROVAL

Ethics committee approval was not required for this article.

LEGAL PUBLIC/PRIVATE PERMISSIONS

In this research, the necessary permissions were obtained from the relevant participants (individuals, institutions, and organizations) during the survey and in-depth interviews.

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Resume

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An Overview of Quality of Urban Life in Konya (Turkey) from the Perspectives of Experts via Analytical Hierarchy Process (AHP)

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Abstract

Purpose

This study mainly aims to evaluate comparatively the Quality of Urban Life (QoUL) in Konya city on the basis of Karatay, Meram and Selçuklu districts from the perspectives of two expert groups and to show the suitability of Analytical Hierarchy Process (AHP) methodology for QoUL Assessment.

Design/Methodology/Approach

In the scope of the study, AHP has been utilized to explore the importance weights of each and overall performances of QoUL criteria in the hierarchy in terms of 19 sub-criteria of 5 criteria groups of *"Environmental Quality, Physical Quality, Functional Quality, Safer Places, and Social Connection and Interaction at Micro and Macro Environment"* from the perspectives of local authority experts and academicians.

Findings

The expert groups have determined different priority weights on the basis of the criteria groups and sub-criteria, and also each district have different criteria performance scores separately. However, the multi-criteria district-based overall QoUL priority rankings of both expert groups are same with different weight rates. Meram is the district with the highest quality of life (QoL), while Karatay is the district with the lowest QoL from the perspective of expert groups.

Research Limitations/Implications

The outputs of the methodology contribute to a better understanding of comparative QoUL performances of three districts via comparing each of them in terms of each QoUL criteria from the perspectives of experts for decision-makers. However, the lack of inhabitant opinions of the city for an overall participatory QoUL assessment is the limitation of the study. Thus, studies focusing on inhabitants'' views have potential to valuable contribution to further researches and urban planning & design applications.

Social/Practical Implications

In practice, the manuscript has potential to guide local government units and other relevant stakeholders regarding with appropriate actions and transformations to increase the QoUL and create urban areas with high QoUL. The widespread use of the proposed QoUL assessment methodology, which is adaptable for other cities to a significant QoUL evaluation, can lead to a better participatory planning process and finally more qualified urban environments thus can enhance QoUL.

Originality/Value

The study presents a rational and adaptive QoUL assessment approach for local authorities, relevant occupation disciplines and researchers who aim to enhance QoUL.

Keywords: *Analytical Hierarchy Process (AHP), Konya, liveability, quality of urban life, quality of urban life assessment*

INTRODUCTION

The deterioration of many urban environments due to increasing number and size of cities have led to a growing concern regarding the problems of city for the future of cities and for the well-being of city dwellers (Pacione, 2003). Enhancing the QoUL of residents has become a fundamental component in the urban growth management strategies of many cities (Allen, 2016) as a response to the confronted urban problems. There has been growing public interest in understanding the relationships between the economic, environmental and social aspects of life (DIT, 2012). Increasing population in cities has increased the importance of researches examine the relationship between the qualities and characteristics of an urban setting and the perceived satisfaction of its users (MacLean & Salama, 2019) via QoUL concept, which is a multi-dimensional and interdisciplinary notion (Papachristou & Rosas-Casals, 2015; Włodarczyk, 2015) that is able to monitor the multi-dimensional nature of cities (Psatha et al., 2011).

Liveable cities support the health, wellbeing and QoL of people who live and work in them. The way they are planned, designed, built and managed can enhance or detract from liveability. The physical characteristics that contribute to the liveability of cities include land use, built form, quality and conservation of public spaces and natural environments, efficiency of transport networks, accessibility to work, education, health and community services and social and recreational opportunities (DIT, 2012). Lowe et al. (2013) suggests that liveable places are safe, attractive, socially cohesive and inclusive, environmentally sustainable, affordable and diverse housing, easy access via convenient public transport, walking and cycling infrastructure to urban amenities such as education, public open space, local shops, health and community services, leisure and cultural opportunities. The relevant literature points out the relationship between liveability and the quality of space and the built environment (ACE, 2019; Carmona, 2019; Parkinson et al., 2006).

Measurement of QoUL is a complex multi-dimensional process due to multiple criteria and multiple stakeholders it involves. Multi-criteria decision-making (MCDM) methods can considerably serve as beneficial decision support systems for measurement of QoUL. AHP is a structured MCDM technique for organizing and analysing complex decisions, based on mathematics and psychology (Ganebnykh et al., 2019). AHP simplifies complex and multi-criteria decision-making process, thus leads to better decisions determining most appropriate solutions in a clear and rational way (Ganebnykh et al., 2019; Harker & Vargas, 1987; Lotfi & Solaimani, 2009; Onnom et al., 2018).

Current study aims to evaluate QoUL of Konya city's three districts comparatively from the perspective of two expert groups via an AHP based QoUL assessment methodology. As part of the assumption of *"well-designed interventions in the built environment ensure social, economic, health, and environmental benefits, thus enhance the QoUL via creating*

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liveable environments", QoUL assessment methodology is structured on to the five significant evaluations criteria: environmental quality, physical quality, functional quality, safer places, social connection and Interaction at Micro and macro environment. In this framework manuscript has five parts:

At "*Introduction"* part, the aim of the study and importance of QoUL researches were explained.

Quality of Urban Life (QoUL) notion and QoUL Assessment Criteria were handled at the *"theoretical background"*. In this term, liveability, QoL and QoUL notions were described showing the differences between them. Additionally theoretical and methodological approaches to the conceptualizing and measuring of QoUL and the necessity of subjective and objective dimensions to measure QoUL were evaluated. QoUL Assessment Criteria, consisting "Environmental Quality, Physical Quality, Functional Quality, Safer Places, Social Connection and Interaction at Micro and macro environment", were explained comprehensively through relevant literature.

Thirdly at *"Material and Methodology"* part, the characteristics of Karatay, Meram and Selçuklu districts of Konya city which constitute the main material of this study were explained. Also, the advantages of AHP based QoUL assessment methodology are discussed with the review of relevant researches. Afterwards, the basics of survey were also discussed via explaining the "survey design", "survey application" and "AHP based QoUL assessment phases".

Finally, the findings of the study were presented within the scope of three evaluation principles consisting "Expert assessments regarding QoUL criteria groups", "Expert assessments regarding QoUL sub-criteria" and "Assessments of experts for QoUL in central districts of Konya city".

LITERATURE REVIEW

Quality of Urban Life (QoUL) Notion

One of the confusing things in the QoUL literature is the proliferation of notions of well-being, satisfaction, happiness (Marans, 2012; Papachristou & Rosas-Casals, 2015), liveability, QoL and space and place quality.

Liveability reflects the wellbeing of a community and comprises the many characteristics that make a location as a place where people want to live now and in future (Lowe et al., 2013). QoL is often confused with liveability. Liveability can be regarded as a subset of QoL concept that covers a much broader range of topics such as education, poverty, economic deprivation, health, the environment and congestion (DIT, 2012).

According to Murgaš & Klobučník (2018), QoL and QoUL are two different notions thus, the QoUL exists as an original category of QoL. QoL is the QoL of the individual, and it is secondary to where the individual lives, whether in the city or village. QoL is often considered a notion that refers both to prosperity and well-being (Włodarczyk, 2015). World Health

Organization (WHO, 2020) defines Quality of Life as an individual's perception of their position in life in the context of the culture and value systems where they live and in relation to their goals, expectations, standards and concerns. It is a broad ranging concept affected in a complex way by the person's physical health, psychological state, personal beliefs, social relationships and their relationship to salient features of their environment. Mohit (2014) suggests that QoL can be construed from a happiness and life satisfaction approach due to the fact of happiness and life satisfaction are the central objectives of most people's well-being in life. QoL is the concept of the good life, which is lived in a good place (Murgaš & Klobučník, 2018). Although happiness and life satisfaction are not the same, they are mutually interrelated with the notion of QoL (Mohit, 2014).

QoUL has been conceptualized by several authors (MacLean & Salama, 2019; Marans, 2012; Marans & Stimson, 2011; Murgaš & Klobučník, 2018). Despite the high attractiveness of QoUL concept, it has no a generally accepted definition (Parkinson et al., 2006; Salihoğlu, 2016). However, similarities and correlations observed in QoUL measurement concepts in related literature are significant to understand OoUL.

The QoUL is a societal quality, where the key word is a place. QoUL is the good life, which is lived in a certain city as a good place. QoUL is holistic and has two dimensions – the personal, which comprises life satisfaction in a certain city, and the spatial, which comprises quality of place. External conditions create the quality of place for living a good life. Thus, QoUL approach has both subjective (well-being) and objective (quality of place) components and dimensions (Atkins et al., 2015; Marans, 2012; McCrea et al., 2005; Murgaš & Klobučník, 2018).

The QoL at societal level is related with the capabilities and chances offered to society members in order to obtain a good personal QoL (Psatha et al., 2011). The perception of quality of life varies from person to person as well as from one place to another and from one scale to another (residential environment, city, national, international or regional) (Ministry of Development, 2018).

Atkins et al. (2015) conceives that objective QoUL factors refer to measurable and countable things such as cost of housing, climate, number of urban amenities (hospitals, schools), public transport availability, and crime level, while the subjective QoUL factors are linked to personal feelings such as likes, dislikes, social connection and beliefs, traditions and spiritual connections to places (Atkins et al., 2015).

QoUL has an objective dimension, but the assessment of this notion depends on a subjective system of values and opinions as to the extent to which people's needs and aspirations are satisfied (Włodarczyk, 2015). For many years, scholars have been arguing that "quality" of any entity has a subjective dimension that is perceptual as well as having an objective reality (Marans, 2012; Marans & Stimson, 2011). The reviewed literature shows the importance of measurement of urban amenities in terms of objective dimension as well as subjective dimension of QoUL.

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Papachristou & Rosas-Casals (2015) have emphasized the complementary role of objective indicators in QoUL studies. According to Dempsey (2008) it would be misleading to suggest that good, or high, quality is a wholly subjective concept. The measurement of high quality should not be limited to users'/residents' subjective opinions or satisfaction with, or perceived rating of, a good or service. The quality of spaces can also be measured objectively. Therefore, QoUL requires an understanding of both components and relationships between them (Marans, 2012) and studies addressing combination of subjective and objective dimensions of QoUL can contribute to more effective QoUL assessments (Atkins et al., 2015).

Theoretical and methodological approaches to the conceptualizing and measuring of QoUL are widely addressed with an increasing interest Michalos (2014) emphasized that since the 1960s two overlapping but fairly distinct research communities and traditions have developed concerning ideas about the quality of life, individually and collectively, one with a fairly narrow focus on health-related issues and one with a quite broad focus. QoUL studies are oriented towards subjective and objective dimensions of QoUL and QoUL measurement (Marans & Stimson, 2011). A number of studies undertaken in this scope interpret it in a variety of ways and propose different tools and methods for measuring it. Studies investigating the QoUL vary considerably in terms of scale such as neighbourhood (Delsante, 2016; Dempsey, 2008; Din et al., 2013; Leby & Hashim, 2010; Salihoğlu &Türkoğlu, 2019), city (Allen, 2016; Lotfi & Solaimani,2009; Rezvani et al., 2013; Turkoglu et al., 2006), region (Pacione, 2003), country (Sarı & Kındap, 2018; Włodarczyk, 2015), international (such as Mercer Quality of Living Survey, the Economist Intelligent Unit's Liveability Index) and the focused measurement dimensions i.e. social, economic, environmental, physical, political and psychological and mobility (Din et al., 2013). Many different approaches of this concept can be found not only between papers of different disciplines (health sciences, social sciences or planning), but also in the context of the same scientific field (Psatha et al., 2011). Contemporaneously with the studies focusing on objective QOUL criteria (Stimson & Marans, 2011), subjective QoUL criteria (McCrea et al., 2011) or both criteria (Allen, 2016; Merschdorf, 2014; Papachristou & Rosas-Casals, 2015) in empirical researches at different scales/contexts, there are conceptual studies aiming to present an effective road map on the quality of QoUL measurement by reviewing (Lowe et al., 2013; MacLean & Salama, 2019; Marans, 2012; Marans & Stimson, 2011; Murgaš & Klobučník, 2018).

In QoUL studies, different indicators are formed with selected variable set, the weights assigned to the variables, the characteristics of the area, the adopted approach and method (Salihoğlu, 2012; Sarı & Kındap, 2018). The subjective and objective indicators of QoUL are far from having a standard (Psatha et al., 2011) due to the multidimensionality of the QoUL concept. However, some indicators and indicator titles such as

environmental, social and economic indicators are repeated in many studies (Sarı & Kındap, 2018).

QoUL Assessment Criteria

The QoUL assessment criteria titled as "Desirable Liveability Indicators" were set through government's 'Cleaner, Safer, Greener' programme by United Kingdom Office of the Deputy Prime Minister (OPDM). "Desirable Liveability Indicators" consisting 13 sub-liveability indicators under four main headings and concentrating on the public realm and the built environment, in terms of both observed outcomes and citizens' perceptions of their local urban environment have commonly been used in QoUL researches in England (Parkinson et al., 2006; Yeang, 2006) and in the related literature. Turan & Erdönmez Dinçer (2017) analysed the Pariser Platz and Potsdamer Platz squares in Berlin comparatively, based on the "Desirable Liveability Indicators" of OPDM. Mousavi (2013), on the other hand, discussed the physical and social dimension of the definition of liveability dimension in measuring the liveability of historical urban environments. Five main QoUL criteria, were confronted with partially or holistically in the abovementioned literature are "Environmental Quality, Physical Quality, Functional Quality, Safer Places, Social Connection and Interaction at Micro and macro environment". Finally, these indicators explained comprehensively at below through relevant literature, have also guided the current study.

Environmental quality criteria in context of QoUL

The pressures on space, ecosystems, infrastructures, facilities and personal lifestyles due to global population growth are increasing. The importance of environmental problems, which also affect the quality of life, is increasing. Evaluation and monitoring of urban environmental quality become an important issue in decision making and planning of more liveable and sustainable cities (Krishnan & Firoz, 2020; Silva & Mendes, 2012). This criteria category focuses on four elements regarding environmental quality: "noise pollution", "environmental cleanliness", "crowd (human density)" and "building quality" (Parkinson et al., 2006; Yeang, 2006). Urban air pollution and urban noise are major factors that can degrade quality of life in cities. These problems generally get worsened as a result of unbalanced urban development, increase of mobility and road traffic (Silva & Mendes, 2012). A clean and natural environment, the beauty and aesthetics of the living environment (Ganebnykh et al., 2019; Leby & Hashim, 2010) and the observed and perceived cleanliness of the streets in the built environment are also an important environmental quality parameter. A balanced and effective distribution of population density (Leby & Hashim, 2010; Lowe et al., 2013) is necessary for more liveable environments. The crowdedness of cities is also a subjective QoUL indicator. The creation of quality-built environments (architecture, street design, building quality, aesthetics etc.) should be encouraged in liveable cities (Lowe et al., 2013), buildings

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should have a high level of maintenance (Leby & Hashim, 2010; Shamsuddin & Abu Hassan, 2013).

Physical quality criteria in context of QoUL

Urban space and place quality and place value are intrinsically interconnected, and qualified physical environments positively affect health, social, economic and environmental outcomes, thus positively affect the quality of life for their users (Carmona, 2019; İnceoğlu & Aytuğ, 2009). This criteria category consists of "quality of the built environment", "less abandoned spaces", "quality of parks and green spaces", "maintenance of residences and open spaces" and " public realm quality" criteria.

There is a broad consensus on the fact that a built environment high-qualified positively impacts people's everyday lives (ACE, 2019; Carmona, 2019). Designing a high-quality built environment is a creative and innovative process whose final outcome has a fundamental impact on how people perceive, function and behave. Quality makes a direct contribution to our everyday lives and should be considered as an agent of change. High-qualified architecture can enrich lives of individuals and a society in different ways. High-qualified built environments, form effective interaction for the communities thus, strengthen culture and identities, support sustainable development, enable economic contribution via creating attractive spaces and creating healthy living environments (ACE, 2019). In general, high quality public spaces (pedestrian roads, squares, building interfaces, etc.) and open-green spaces contribute to the improvement of liveability by strengthening economic and environmental factors (Beck, 2009). It is important to design public spaces where communication with the city and city dwellers will be provided in while ensuring the QoUL (Tekeli et al., 2004). Therefore, quality of public spaces in terms of parameters such as design, comfort, safety and maintenance should be supported. Carmona (2019) has pointed out a very strong positive association between place derived value of all types (health, social, economic and environmental) and greenness in the built environment (notably the presence of trees and grass, water, and open space).

Functional quality criteria in context of QoUL

While the functional quality of a building is to provide appropriate level of support for the desired activities to provide appropriate economic contribution and affordable price (İnceoğlu & Aytuğ, 2009), functional quality for the cities points out suitability of urban actions in socio-economic and environmental context. This category covers the criteria of "convenient pedestrian circulation", "quality of public transport", "low traffic speeds & density" and "live vitality and viability of services and urban amenities" regarding how cities and urban areas are used. While the first three criteria are indicators of liveability in themselves, the fourth criteria represent a reflection of the success of liveability in

attracting people and businesses to a region (Parkinson et al., 2006). The relative easiness of walking and bicycle rides (transportation safety, pavement and pedestrian pathways, comfort, etc.), which is an important component of functional place quality by providing physical, environmental and economic benefits to the city and to the community, can reveal whether the urban area is pedestrian friendly. The quality of public transport (comfort, time, price policy, accessibility, route efficiency, safety, speed of public transport, distance to public transport stop, etc.) and relative assessments of traffic density (traffic speeds and traffic purge measures, transport safety, etc.) contribute to improve QoUL by detecting and eliminating problems caused by transportation. Carmona (2019), examined 271 studies on the quality of the place, pointed out that there is a very strong positive relationship between place derived value of all types (health, social, economic and environmental) and functional quality indicators such as; "the diversity of land uses (mixed uses)", "low levels of traffic", "the walkability and bikeability of places", "the use of more compact (less sprawling and fragmented) patterns of development" and "a good public transport network", etc. Vitality and viability of services and urban amenities (socio-cultural facilities, parks, infrastructure, cleanliness, etc.) in terms of accessibility, diversity, service quality and maintenance have positive effects on the vitality and life comfort level of the city. This indicator is useful in measuring people's usage levels in urban centres and the performance of the local retail business environment (Parkinson et al., 2006).

Safer places criteria in context of QoUL

In the relevant literature, indicators of crime and security perceptions are accepted as a basic requirement to ensure liveability. The areas have low crime rates and where the residents' fear of crime rates is lower are more liveable areas. Security of a place or city can be measured via objective indicators such as; crime rates (crimes against property, crimes against individuals, juvenile crime rates), street lighting level, traffic safety, domestic violence per 10,000 people, personal assault, robbery records, etc. (Ganebnykh et al., 2019; Leby & Hashim, 2010; Lowe et al., 2013; Parkinson et al., 2006; Türkoğlu et al., 2008; Yeang, 2006) and also personal security perception indicators such life and property security, being alone at home during the day and night, walking alone at night in public places, being alone at night, etc. (Leby & Hashim, 2010; Lowe et al., 2013; Türkoğlu et al., 2008). Leby & Hashim (2010) evaluated accident rates and frequency as safety indicators. In this study, "safer place" criteria were evaluated with "low crime rate" and "safety of life and property".

Social connection and interaction at micro and macro environment quality criteria in context of QoUL

QoUL is a concept that expands with social quality. Family, friends, neighbours and relatives of the individual are important social support

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providers in terms of QoUL (Hollar, 2003). Social cohesion studies focusing on social connections, social relations and understanding of common benefit in social life can reveal important findings for the relationship or degree of "living together" and "social trust" for the relevant society (Ataseven & Bakış, 2018). “The number of relatives and friends in the environment” is an objective indicator for the existence of social connection. In addition, friendship and social communication are key to human resource and participation. The second feature that connects societies is “good neighbourhood relations” (Türkoğlu et al., 2008). The concept of belonging in the urban space, as a result of the dynamic and reciprocal relationship between the individual and the environment, expresses the state of belonging to a place, where people feel right and responsible for that space. Belonging is supported by feeling of security, and there is a relationship between physical environment and personal feelings, thoughts, attitudes and societal culture (Güleç Solak, 2017). According to Özden (2010), urban sustainability can be achieved by creating socially and spatially compatible, integrated areas. At this point, social integration and harmony includes elements such as the socio-cultural, economic and spatial coexistence of a community within the framework of respect, tolerance and trust, the purification of urban tension and conflict. In this study, the criteria of “social connection and interaction at micro and macro environment” were evaluated with “the number of relatives and friends living nearby”, “good neighbourhood relations”, “feeling part of the community” and “ensuring social integration / harmony” sub-criteria.

METHODOLOGY AND METHODS

The main material of this study is the Meram, Karatay and Selçuklu districts located in the city centre of Konya. The method of the study is literature review and expert questionnaires which are compatible with AHP based QoUL assessment.

Study Site: Konya City

Konya, consists of 31 districts, is the largest province in Central Anatolia in terms of surface area (Figure 1). According to data of Turkey Statistical Institute (TSI, 2019) Konya province has a population of 2.232.374 and is the seventh most populous city of Turkey. The population in the central districts of Konya (Karatay, Meram, Selçuklu) is 1.346.330, which constitutes 60.3% of the population of the Konya Metropolitan Area. Selçuklu is the district has highest population (662.808; 29.69%). The most populous other districts than Selçuklu are respectively Meram (344.546; 15.43%) and Karatay (338.976; 15.18%).

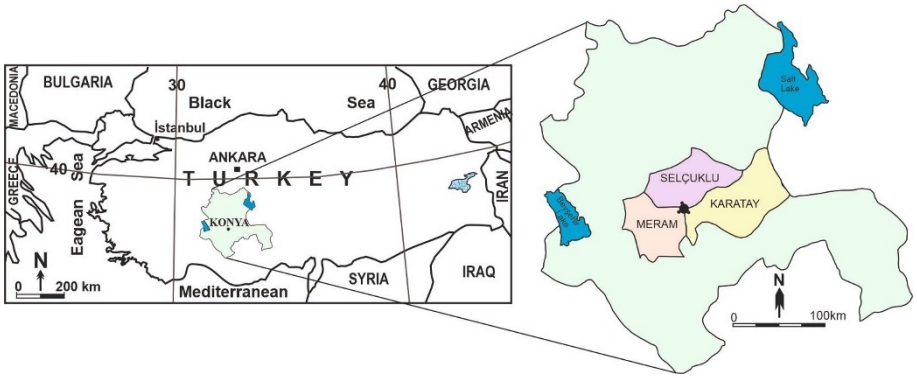

Figure 1. Location of Konya City and Central Districts (illustration: author)

Konya, is one of the most economically developed agricultural and industrial city of Turkey. Konya, which is one of the leading places in the country in terms of agriculture, the abundance of usable lands and agricultural technologies, is the province in Turkey has the largest agricultural contribution with a share of 5.8% (MEVKA, 2019). Besides, Konya, which hosts five universities, is also accepted as a student city. While the strong human capital infrastructure in the city leads to less costly and more efficient physical infrastructure and public services, it also makes an important contribution to the development of investment and business environment (Mangır, 2016). The city, which has a rich cultural heritage as well as natural wealth due to being the capital of Anatolian Seljukian and Karamanoğlu Principality in the historical process, has potential for multiple types of tourism as well as culture and faith tourism.

In the "Life Index Province Rankings and Index Values in the Cities in 2015" study prepared by Turkey Statistical Institute Life index indicators were handled in 11 titles with their sub-indicators. According to this study Konya is at 18th rank of 81 provinces in Turkey with the overall index value of 0.6163 while the provinces of Isparta [0,6745], Sakarya [0,6737], Bolu [0,6553], Kütahya [0,6520] and Istanbul [0,6494] are in the top 5, while Ankara is in the 17th place [0, 6190], while İzmir is ranked 21st [0,5996].

Characteristics of Karatay, Meram and Selçuklu districts

Karatay is the district where traditional Konya urban texture is located in. There are 1-2 storey houses having semi-rural character at low density in the urban periphery. However, 6 and 8 storey, high density residential environment is being created in new settled and / or urban renewal areas. Meram where population density has increased in recent years also is the greenest district. There are residential areas at very low density in the county has a natural protected status. Multi-storey (more than 10 storey) houses are being built in urban transformation areas such as Ahmet Özcan and Şefik Can Streets also at the Havzan District. There are scattered residential areas at the southern of the district. Selçuklu is the latest constructed district of Konya where the high-storey buildings mostly exist in. There are two sub-centers-Bosna Hersek and bus station

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sub-centers- which have high population density in Selçuklu. In addition, Yazır neighborhood consisting prestige residences has the highest population density in Selçuklu county (Yavuz, 2021).

Serdaroğlu Sağ (2021) conducted a study in Konya focused on assessing urban development and sprawl for the period between 1985 and 2020, states that Konya underwent a rapid urban growth in time and the physical growth of the city has had an expanding and disorganized manner for the last 30 years. In line with population growth of Karatay, Meram and Selçuklu districts, residential and non-residential constructions have increased. The construction permits issued for Selçuklu (40%) in period of 2009-2019, are much more than the construction permits issued for Karatay (31%) and Meram (29%) (Yavuz, 2021) (Figure 2). In terms of QoUL, this population and construction increase have positive consequences such as improved living conditions in residential areas, vitality of services and urban amenities, differentiated living, working and entertainment areas, etc. However, it has negative consequences such as decreased environmental quality due to the high-density built-up environment, decreased social connection and interaction due to gated communities, etc.

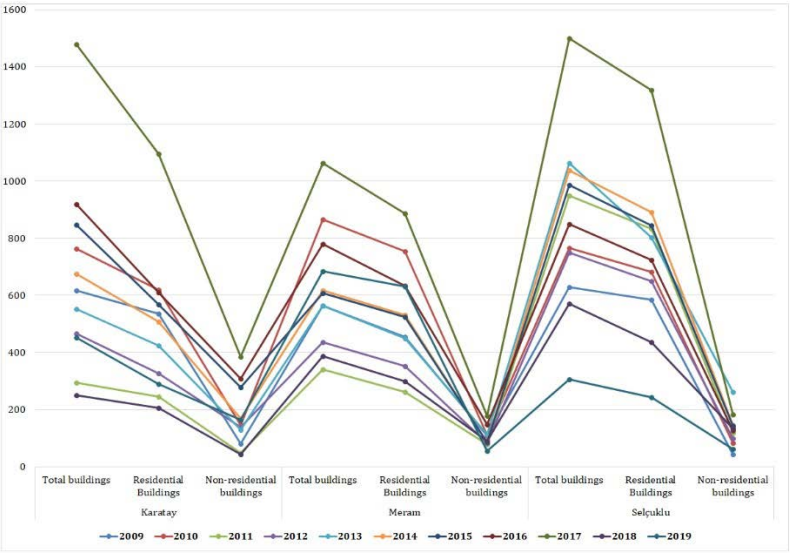
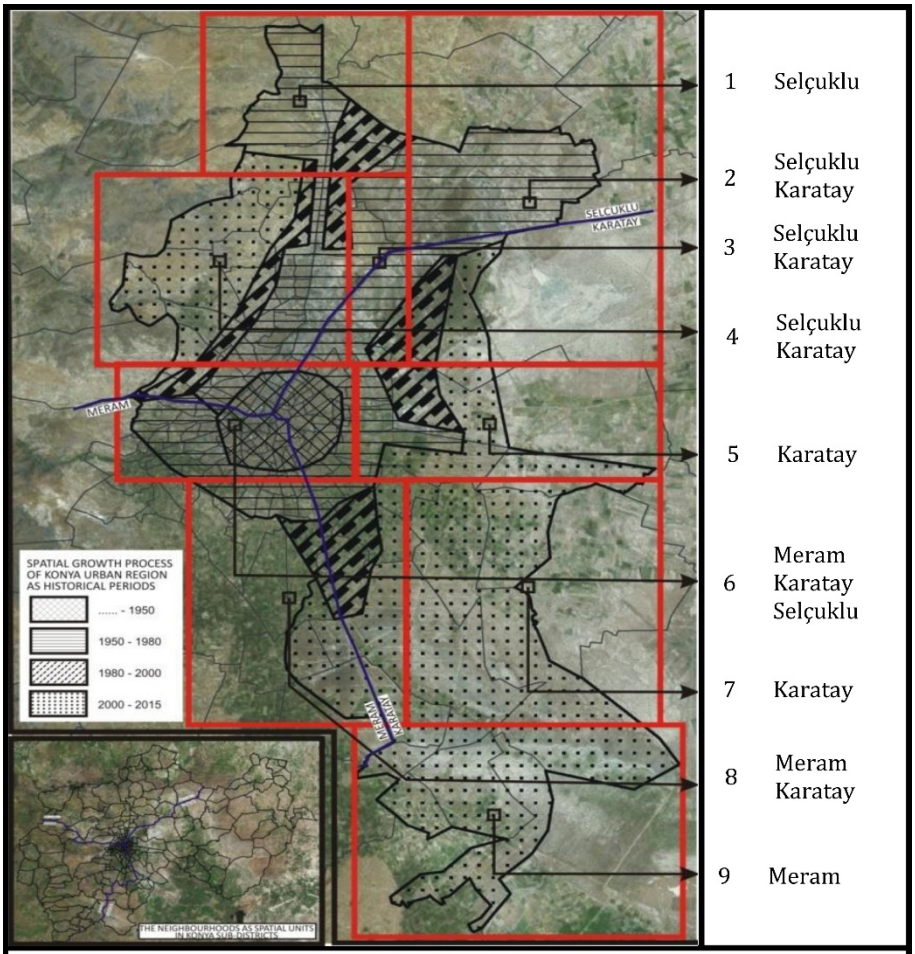


Figure 2. Built Up Area Development Comparison of Karatay, Meram and Selçuklu (Prepared via Turkish Statistical Institute data of 2009-2019 construction permits)

Karakayacı & Karakayacı (2019), aimed to search the impact of urbanization pressure on the farmland in Konya, explained the spatial growth process of Konya urban region and its spatial, social and economic structure via 9 sub-regions (Figure 3). Their findings also give an idea about the status of Karatay, Meram and Selçuklu districts in terms of QoUL criteria below: **i)** In terms of "environmental quality" criteria status of the district being more or less congested and building quality. **ii)** In terms of "physical quality" criteria such as quality of the built environment (high- or low-density residential areas, scattered built-up environment), quality of parks and green spaces and public realm quality.

iii) In terms of "functional quality" criteria status of the vitality and viability of services and urban amenities such as the status of public transportation (strong or poor) and existence of public institutions (university, business districts etc.). **iv)** In terms of "social connection and interaction at micro and macro environment" criteria the characteristics of the built environment (such as scattered settlements, gated community development, harmony and inconsistency in the spatial distribution of income groups, etc.) to ensure social integration / harmony.



Characteristics: **1.** University area, dense student population, middle-low income, the strong public transportation, sub-business centre; **2.** Industrial and military areas, airport, urban parks, the strong transportation connections; **3.** Middle income, the strong public transportation; **4.** Dense student population, middle income, the strong public transportation, sub-business centre, gated community growth, etc.; **5.** Industrial areas, publics institutions, new university areas, urban parks, the strong transportation connections and public transportation; **6.** Central business district, publics institutions, new university areas, high income and residential areas, the strong transportation connections and public transportation, etc.; **7.** Low income, agricultural land, poor public transportation, scattered built -up environment; **8.** Middle low income, agricultural land, public transportation, green areas, low-dense residential areas; **9.** Low income, agricultural land, poor public transportation, scattered built -up environment, rural activities, passive green areas.

Figure 3. Spatial growth process and characteristics of Konya's central districts (Adapted from Karakayacı & Karakayacı, 2019)

QoUL Assessment via AHP

AHP, a multicriteria decision making approach in which factors are arranged in a hierarchy structure (Saaty, 1990) was developed by

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Thomas Saaty in 1980 and it has proven to be an extremely useful method for decision making and planning (Harker & Vargas, 1987). The AHP offers a systematic approach in defining stakeholder goals and preferences in the solution process of complex, multi-criteria and multi-stakeholder decision problems (Sitorus et al., 2019). AHP is commonly used as a decision support system in a wide range of uses, both for individual and group decision-making because of its applicability, correctness, theoretical suitability, and capacity for addressing any intangible and tangible criteria (Dissanayake et al., 2020).

Table 1. The Relevant Literature Used AHP Methodology in QoUL Assessment

Reference	**Methodology**	**Aim**	**Study Area**
Ganebnykh et al., 2019	AHP	To determine indicators of urban development quality and their weight coefficient using AHP	-
Hoşgör et al., 2016	AHP	To determine the priorities of the factors that affect the Quality of Work Life of administrative and academic personnel	Istanbul University Faculty of Health Sciences
Lotfi & Solaimani, 2009	AHP	To measure and prioritize the urban quality of life in the two case study cities	Two northern cities of Iran
Antognelli & Vizzari, 2016	AHP with a combination of GIS techniques	To get the overall liveability index map	Italy
Chen, 2020	AHP in combination with other techniques such as Hopfield neural network, TOPSIS, Gini, PCA, fuzzy Borda, and TS fuzzy neural network methods	To select a suitable MCDM model for evaluating the liveable environment of cities.	13 cities of China
Dissanayake et al., 2020	AHP+gradient analysis	To create a life quality index (LQI) and identify the spatial distribution pattern of LQI in Kandy City, Sri Lanka	Kandy City, Sri Lanka
Hsueh & Lin, 2018	AHP+ Delphi method	To get the weight value of each dimension and each critical success factor of urban environmental quality	Fujian, China
Onnom et al., 2018	AHP+Geographic Information System	To develop a Liveable City Index for Medium Class Cities in Developing Countries	Thailand
Yıldız et al., 2019	AHP+fuzzy logic+ Delphi+TOPSIS	To evaluate life quality	Thirty-one member countries of the European Union

AHP based QoUL assessment methodology initiates a simple, transparent and rapid stakeholder-oriented decision support system that measures QoUL which is substantially a MCDM problem. Thus, there are many

QoUL studies in the relevant literature, which use merely AHP (Ganebnykh et al., 2019; Hoşgör et al., 2016; Lotfi & Solaimani, 2009) or use AHP in combination with other techniques such as fuzzy logic, TOPSIS, Delphi, GIS, ANP (Antognelli & Vizzari, 2016; Chen, 2020; Dissanayake et al., 2020; Hsueh & Lin, 2018; Onnom et al., 2018; Yacan, 2016; Yıldız et al., 2019) (Table 1).

Survey Design and Application

Survey design

The actions of some of the experts such as architects, planners, designers, engineers are directly or indirectly effective in the formation of the built environment and the creation of (un)liveable environments. QoUL can be measured via objective evaluations of experts abovementioned and via the subjective evaluations of inhabitants of the city. Hence, in this study experts who have a direct or indirect role in planning and shaping urban spaces in the assessment are handled for Konya city centre's QoUL assessment. In this way, it is also aimed to make more effective determinations by bringing together the objective and subjective evaluations of the experts residing in the city.

Although there are three districts distinction, experts' QoUL assessments enabling the priorities or importance degrees of indicators for the district-wide were made on a macro scale instead of microenvironmental assessment such as neighbourhood being lived in. Thus, QoUL evaluations made by academicians and technical personnel working in local government units such as city planners, architects, engineers, etc., provide important contributions in terms of presenting both professionally objective data and subjective data as a resident.

This study uses AHP method to evaluate QoUL in Konya city on the basis of Karatay, Meram and Selçuklu districts from the perspectives of two expert groups (local authority experts-LAEs and academicians).

The AHP is utilized to derive importance weights for each QoUL criteria comparing in a pairwise manner and explore the each of and overall performances of QoUL criteria in the hierarchy from the perspectives of LAEs and academicians. The outputs of the methodology contribute to understand the comparative QoUL performances of the three districts via comparing each of them in terms of each QoUL criteria.

QoUL assessment criteria of the study have majorly been adopted from the "Desirable Liveability Indicators" of OPDM were confronted with partially or holistically in literature. Consequently, five main QoUL criteria group (Environmental Quality, Physical Quality, Functional Quality, Safer Places, Social Connection and Interaction at Micro and macro environment) and 19 sub-criteria (Table 2) have been developed within the scope of "determining the QoUL level of Karatay, Meram and Selçuklu districts in Konya city" through a comprehensive literature review.

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Table 2. QoUL Assessment Criteria Used in the Study

QoUL criteria:	QoUL sub-criteria:		Reference:
Environmental Quality [EQ]	**EQ-1**	Being noisier or quieter	Leby & Hashim, 2010; Lowe et al., 2013; Parkinson et al., 2006; Salihoğlu, 2016; Yeang, 2006
	EQ-2	Being dirtier or cleaner	Leby & Hashim, 2010; Lowe et al., 2013; Parkinson et al., 2006; Salihoğlu, 2016; Tapsuwan et al., 2018; Yeang, 2006
	EQ-3	Being more or less congested (human density)	Leby & Hashim, 2010; Lowe et al., 2013; Parkinson et al., 2006; Türkoğlu et al., 2008; Yeang, 2006
	EQ-4	Building quality, better or worse?	ACE, 2019; Leby & Hashim, 2010; Lowe et al., 2013; Parkinson et al., 2006; Yeang, 2006
Physical Quality [PQ]	**PQ-1**	Quality of the built environment	ACE, 2019; Ganebnykh et al., 2019; Lowe et al., 2013; Parkinson et al., 2006; Shamsuddin & Abu Hassan, 2013; Yeang, 2006
	PQ-2	Less abandoned spaces	Parkinson et al., 2006; Yeang, 2006
	PQ-3	Quality of parks and green spaces	Carmona, 2019; Delsante, 2016; Leby & Hashim, 2010; Lombardi ve ark., 2012; Lowe et al., 2013; Parkinson et al., 2006; Yeang, 2006
	PQ-4	Maintenance of residences and open spaces	Leby & Hashim, 2010; Lowe et al., 2013:22; Türkoğlu et al., 2008
	PQ-5	Public realm quality	Leby & Hashim, 2010; Lowe et al., 2013; Parkinson et al., 2006; Yeang, 2006
Functional Quality [FQ]	**FQ-1**	Convenient pedestrian circulation	Carmona, 2019; Delsante, 2016; Leby & Hashim, 2010; Lowe et al., 2013; Parkinson et al., 2006; Yeang, 2006
	FQ -2	Quality of public transport	Carmona, 2019; Delsante, 2016; Lowe et al., 2013; Parkinson et al., 2006; Yeang, 2006
	FQ -3	Low traffic speeds &density	Carmona, 2019; Leby & Hashim, 2010; Lowe et al, 2013
	FQ -4	Vitality and viability of services and urban amenities	Carmona, 2019; Leby & Hashim, 2010; Lombardi et al., 2012; Parkinson et al., 2006; Yeang, 2006
Safer Places [SP]	**SP-1**	Low crime rate	Ganebnykh et al., 2019; Leby & Hashim, 2010; Lowe et al., 2013; Parkinson et al., 2006; Tapsuwan et al., 2018; Türkoğlu et al., 2008; Yeang, 2006
	SP-2	Safety of life and property	Leby & Hashim, 2010; Lowe et al., 2013; Türkoğlu et al., 2008
Social Connection and Interaction [SCI]	**SCI-1**	The number of relatives and friends living nearby	Türkoğlu et al., 2008
	SCI-2	Good neighbourhood relations	Leby & Hashim, 2010; Lowe et al., 2013; Türkoğlu et al., 2008
	SCI -3	Feeling part of the community	Güleç Solak, 2017; Lowe et al., 2013
	SCI-4	Ensuring social integration / harmony	Choon et al., 2011; Özden, 2010; Türkoğlu et al., 2008; Lowe et al., 2013

*"Liveability Dimensions" of Parkinson et al., 2006 and Yeang, 2006 has been cultivated via the cited literature in the table by author.

A comprehensive questionnaire compatible with AHP methodology and also consisting open ended questions have been prepared in order to measure the knowledge, experience, perceptions and approaches of the experts within the framework of research questions and related literature.

Survey application

The questionnaire was applied to the experts in two phases. Firstly, a pilot questionnaire study was applied regarding QoUL assessment scale, was used in this study. After the observation of appropriateness of the assessment scale, the number of samples was increased and a survey was conducted for two expert groups in 2018, with the goal of 100 questionnaires. 92 questionnaires were eligible for evaluation in the context of consistency, which is mentioned in the AHP systematic.

LAEs questionnaires have been applied to 73 LAEs consisting urban planners, architects and engineers working in local authorities such as Konya Metropolitan Municipality, Karatay, Meram and Selçuklu Municipalities and Provincial Directorate of Environment and Urbanization. Within the academician surveys 19 questionnaire have been applied to academicians who are urban planners, architects and topographical engineers and also live in Konya city. Urban planners are predominant in expert groups (54.3%) (Figure 4).

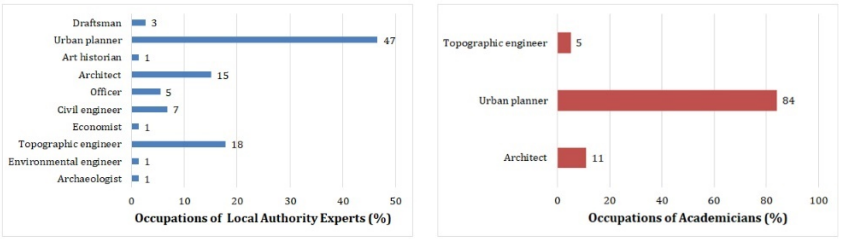

Figure 4. Occupations of Local Authority Experts and Academicians

Respondent experts mostly live in Selçuklu (44.6 %), then respectively in Meram (39.1%), Karatay (15.2%) and other districts (1.1%). LAEs and academicians have same priority order. However, among academicians, the rate in Meram and Selçuklu is equal (42.1%). The rankings of "the districts where the expert groups work" are Selçuklu (48.9%), Meram (37.0%) and Karatay (14.0%) similar with rankings of "the districts where experts live in".

LAEs mostly live in Selçuklu (45.2%), then respectively in Meram (38.4%) and Karatay (15.1%) districts. Additionally, similar with this dispersion LAEs mostly work in Selçuklu (47.9%), then respectively in Meram (38.4%) and Karatay (13.7%) (Figure 5).

The majority of academicians live in Meram (42.1%) and Selçuklu (42.1%) districts. The people living in Karatay are at the level of 15.1%. Selçuklu (52.6%) is in the first place among the districts studied. Academicians work in Meram are at the level of 31.6%, and in Karatay, the working level is the lowest (15.8%), as is the rate of living in. Data on

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the areas where academicians live and work show that residents of Karatay work in Karatay, but the place selections for home and workplace in Meram and Selçuklu districts differ slightly (Figure 5).

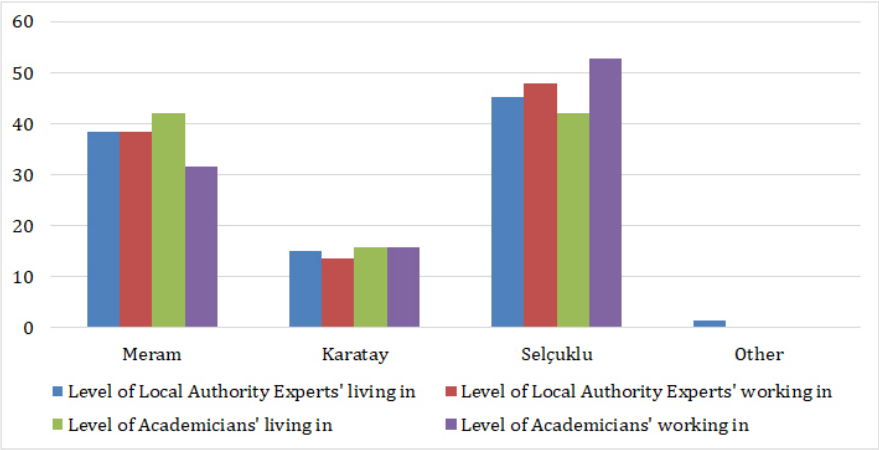

Figure 5. Counties Where Expert Groups Live and Work in (%)

Analysis: AHP based QoUL assessment

AHP based QoUL assessment has been applied in five phases (Figure 6): (i) Structuring AHP hierarchy, ii) Performing pairwise comparisons & local weight calculations, iii) Performing global weight calculations, and iv) Performing general priority calculations: The overall priority of an alternative suitable.

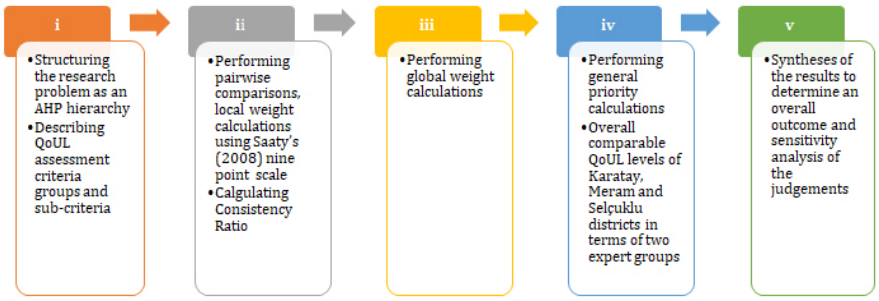

Figure 6. AHP Based QoUL Assessment Methodology

(i) Structuring the research problem as a hierarchy: The research problem & aim of current study has been converted into an AHP hierarchical structure consisting aim, criteria groups and sub-criteria. Whereas the aim was to get a multicriteria QoUL for Konya city on the basis of Karatay, Meram and Selçuklu districts from the perspectives of two expert groups, QoUL assessment criteria groups are described in five categories such as "*EQ: Environmental Quality, PQ: Physical Quality, FQ: Functional Quality, SP: Safer Places, SCI: Social Connection and Interaction at Micro and macro environment*", and 19 sub-criteria *[4 EQ, 5 PQ, 4 FQ, 2 SP, 4 SCI]* abovementioned and defined comprehensively in theoretical background were developed (Figure 7, Table 2).

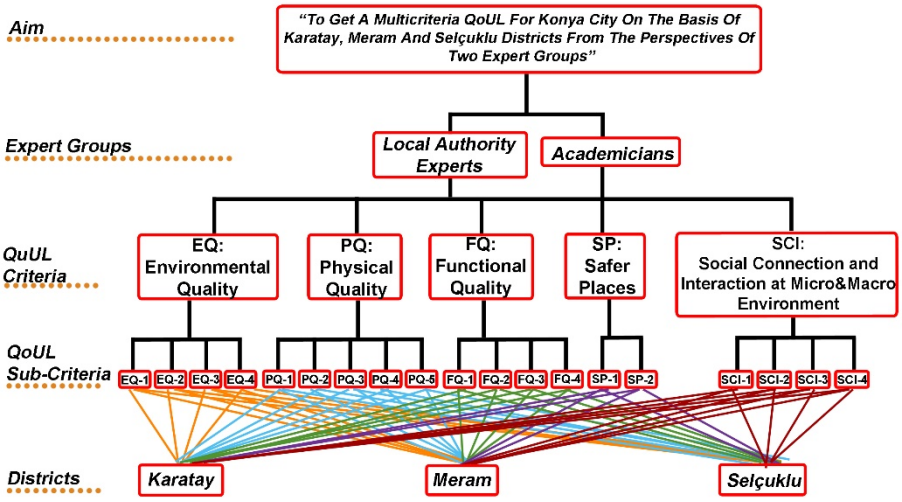

Figure 7. AHP Hierarchy for QoUL Assessment

ii) Performing pairwise comparisons and local weight calculations: In this phase, pairwise comparisons of QoUL dimensions (here criteria groups) and selected QoUL sub-criteria are performed using Saaty's (2008) nine point *[where 1: equal importance; 3: moderate importance; 5: strong importance; 7: very strong importance; 9: extreme importance and 2,4,6,8 are intermediate values]* scale (Figure 6).

The obtained data from the survey have been evaluated via IBM SPSS (Statistical Package for the Social Sciences) Statistics program and a Microsoft Office Excel worksheet compatible with AHP calculations. In this process, if QoUL sub-criteria i.e. EQ-1 is perceived "very strong importance" than EQ-2 and is rated as 7; EQ-2 is "very less important" than EQ-1 and must be rated as 1/7. Following these comparisons, the experts' judgements were reviewed in terms of Consistency Ratio necessitates not to be equal or more than the standard limit (0.1). Finally, the relative importance and priority weights called as *local weights* are calculated using AHP' Eigen vector approach.

iii) Performing global weight calculations: In this phase, overall priority values & global weights are calculated (Figure 6) through separately multiplying local weights of each QoUL criteria groups by the local weights of each of the QoUL criteria in the same group. Finally, the overall priority values of all QoUL criteria of which total value is equal to 1 are obtained.

iv) Performing general priority calculations: The overall priority of an alternative suitable for AHP hierarchy is derived via multiplying each priority of an alternative by the priority of its corresponding criteria and adding over all the criteria (Saaty, 2003). In this context, expert groups have separately evaluated status of 3 districts for each QoUL criteria in 0-9 scale *[where 0: none; 1: very low; 3: low; 5: middle; 7: high; 9: very high; and 2,4,6,8 are intermediate values].* Consequently, overall comparable QoUL levels of Karatay, Meram and Selçuklu districts in terms of two expert groups were obtained (Figure 6).

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v) Syntheses of the results to determine an overall outcome and sensitivity analysis of the judgements: At this phase, the overall results of AHP based QoUL assessment are discussed in terms of each expert group's judgement similarities or differences related with each of districts and QoUL criteria performance (Figure 6).

RESULTS AND DISCUSSION OF THE FINDINGS

The expert groups are satisfied with the environment they live in at the level of 82.6% in total. The satisfaction level of LAEs from the district they live in is 90.4%. LAEs, who are not satisfied with the environment in which they live, mostly complain about the ignored needs of the inhabitants of the city in planning process, problems related to urban transformation and incoherent constructions. The satisfaction level of academicians with the district they live in is 52.6% while their dissatisfaction reasons are the lack of parking lots, lack of gated communities, the insufficient social facilities despite being a city centre, the insufficient infrastructure in places where the density is increased due to the plan changes, insufficiency of open areas enabling social communication and recreational activities, insufficient public transportation, excessive and noisy traffic, weak transportation facilities.

Expert Assessments Regarding QoUL Criteria Groups

Pairwise comparisons of "QoUL criteria groups" compatible with AHP technique show that "Environmental Quality" is the most important QoUL criteria from the perspective of expert groups. The expert groups then overrated the "Social Connection and Interaction at Micro and Macro Environment ", "Functional Quality", "Physical Quality" and "Safer Places" criteria groups, respectively. Although the priorities of LCAs and academicians regarding QoUL criteria groups are in the same order; LCAs more supported the "Functional Quality" and "Social Connection and Interaction at Micro and Macro Environment" criteria groups, while academicians supported the "Environmental Quality", "Physical Quality" and " Safer Places" criteria groups more (Figure 8).

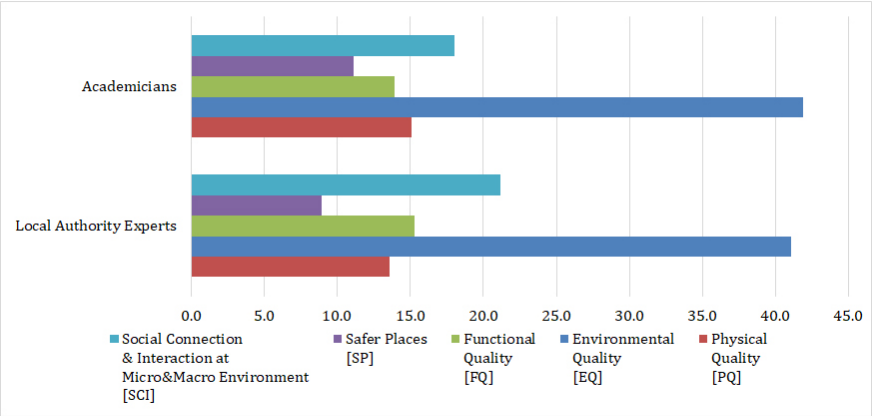

Figure 8. Expert Assessments Regarding QoUL Criteria Groups (%)

Expert Assessments Regarding QoUL Sub-Criteria

LAEs have emphasized the importance of the [EQ] "Environmental Quality" criteria category (41.1%) in the *"local weight distributions"* for QoUL criteria groups. When the *local weight distributions* of all QoUL criteria are evaluated *holistically* from the perspective of *LCAs*, the most prioritized criteria are [EQ-1] "Being noisier or quieter" (16.16%), [EQ-3] "Being more or less congested" (12.84%) and [SCI-1] "The number of relatives and friends living nearby" (11.53%). However, the least prioritized criteria by *LAEs* are [PQ-3] "Quality of parks and green spaces" (1.21%), [PQ-4] "Maintenance of residences and open spaces" (1.40%) and [PQ-5] "Public realm quality" (1.48%) (Figure 9).

Academicians have also emphasized the importance of the [EQ] "Environmental Quality" criteria category (41.9%) in the *"local weight distributions"* for QoUL criteria groups. When the *local weight distributions* of all QoUL criteria are evaluated *holistically* from the perspective of *academicians*, the most prioritized criteria are [EQ-1] "Being noisier or quieter" (17.41%), [EQ-3] "Being more or less congested " (9.85%) and [SCI-1] "The number of relatives and friends living nearby" (9.60%). However, the least prioritized criteria by *academicians* are [PQ-5] "Public realm quality" (1.51%), [PQ-3] "Quality of parks and green spaces" (1.53%) and [PQ-4] "Maintenance of residences and open spaces" (2.20%) (Figure 9).

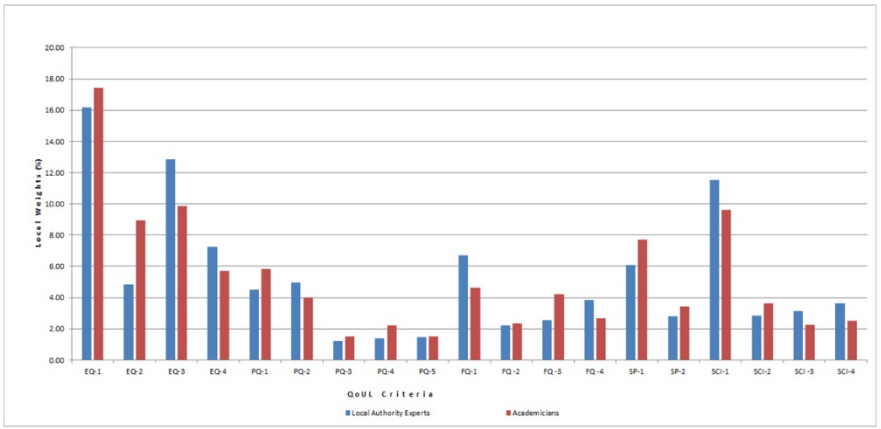

Figure 9. Expert Assessments Regarding Local Weights of QoUL Sub-Criteria

Expert assessments regarding local weights of environmental quality [EQ] criteria

[EQ-1] "Being noisier or quieter" (16.16%) and [EQ-3] "Being more or less congested" (12.84%) criteria have the highest priority in "Environmental Quality" category from the point of *LCAs*. However, [EQ-2] "Being dirtier or cleaner" has the lowest priority (4.82%). According to *academicians* [EQ-1] "Being noisier or quieter" (17.41%) and [EQ-3] "Being more or less congested" (9.85%) criteria have the highest priority in "Environmental Quality" category. However, [EQ-4] "Building quality, better or worse?" has the lowest priority (5.69%) of *academicians* (Figure 10).

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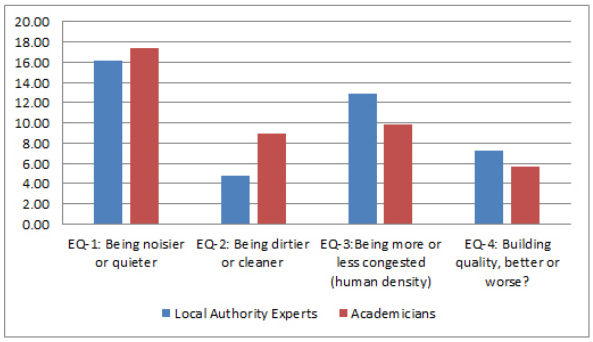

Figure 10. Expert Assessments Regarding Local Weights of Environmental Quality [EQ] Criteria (%)

Expert assessments regarding local weights of physical quality [PQ] criteria

According to *LCAs* [PQ-2] "Less abandoned spaces" (4.94%) and [PQ-1] "Quality of the built environment" (4.52%) have the highest priority; while [PQ-3] "Quality of parks and green spaces" (1.21%) is the least prioritized "Physical Quality" sub-criteria. According to *Academicians;* [PQ-1] "Quality of the built environment" (5.85%) and [PQ-2] "Less abandoned spaces" (3.99%) have the highest priority; while [PQ-5] "Public realm quality" (1.51%) is the least prioritized "Physical Quality" sub-criteria (Figure 11).

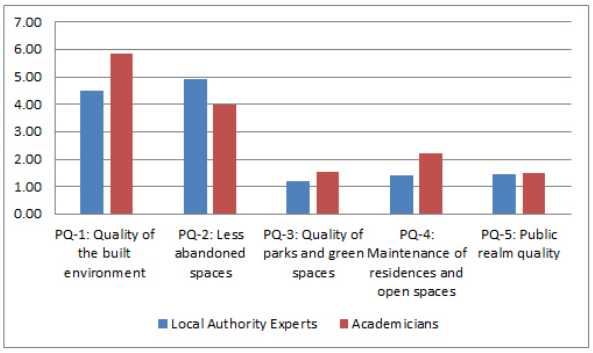

Figure 11. Expert Assessments Regarding Local Weights of Physical Quality [PQ] Criteria (%)

Expert assessments regarding local weights of functional quality [FQ] criteria

According to *LCAs* in "Functional Quality" category, the highest values are in [FQ-1] "Convenient pedestrian circulation" (6.72%) and [FQ-4] "Vitality and viability of services and urban amenities" (3.82%). [FQ-2] "Quality of public transport" is the least prioritised (2.22%) sub-criteria by *LCAs* in this category. According to *Academicians* in "Functional Quality" category, the highest values are in [FQ-1] "Convenient pedestrian circulation" (4.61%) and [FQ-3] "Low traffic speeds &density" (4.23%). However, [FQ-2] "Quality of public transport" is the least prioritized (2.36%) criteria in this category (Figure 12).

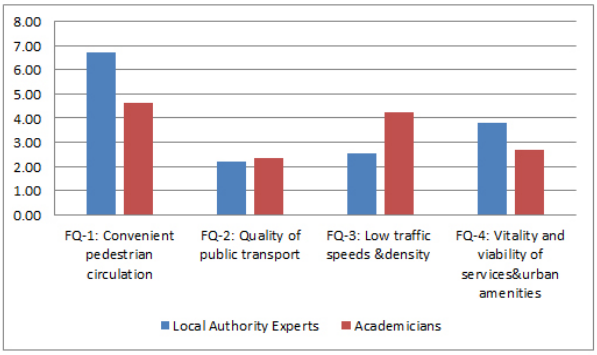

Figure 12. Expert Assessments Regarding Local Weights of Functional Quality [FQ] Criteria (%)

Expert assessments regarding local weights of safer places [SP] criteria

In terms of "Safer Places" [SP-1] "Low crime rate" are considered more important (6.08%) than the [SP-2] "Safety of life and property" (2.82%) criteria by LCAs. According to *Academicians* in terms of "Safer Places" [SP-1] "Low crime rate" are considered more important (7.72%) than the [SP-2] "Safety of life and property" (3.42%) sub-criteria by academicians (Figure 13).

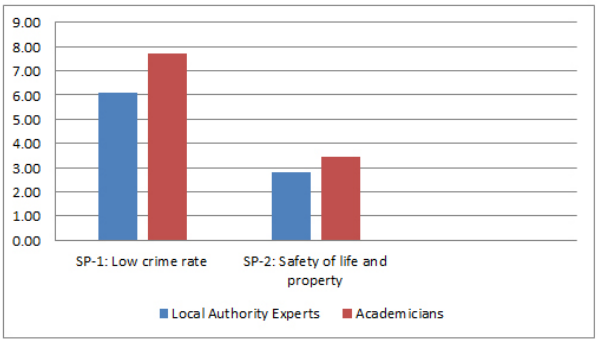

Figure 13. Expert Assessments Regarding Local Weights of Safer Places [SP] Criteria (%)

Expert assessments regarding local weights of social connection and interaction at micro and macro environment [SCI] criteria

According to *LCAs;* In "Social Connection and Interaction at Micro and macro environment" category, the importance of [SCI-1] "The number of relatives and friends in the environment" has been emphasized (11.53%), while [SCI-2] "Good neighbourhood relations" has been least prioritized (2.83%). In "Social Connection and Interaction at Micro and Macro Environment" category, the importance of [SCI-1] "The number of relatives and friends in the environment" (9.60%) and [SCI-2] "Good neighbourhood relations" have been emphasized (3.65%) by *academicians*. However, [SCI-3] "Feeling part of the community" has been least prioritized (2.27%) (Figure 14).

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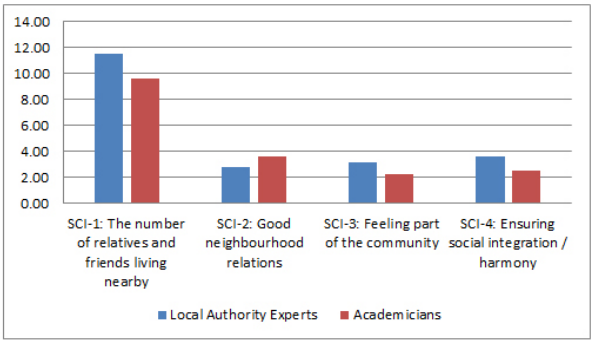

Figure 14. Expert Assessments Regarding Local Weights of Social Connection and Interaction at Micro and macro environment [SCI] Criteria

Global weight distributions of both expert groups have similar priority rank with their own local weight distributions (Figure 15).

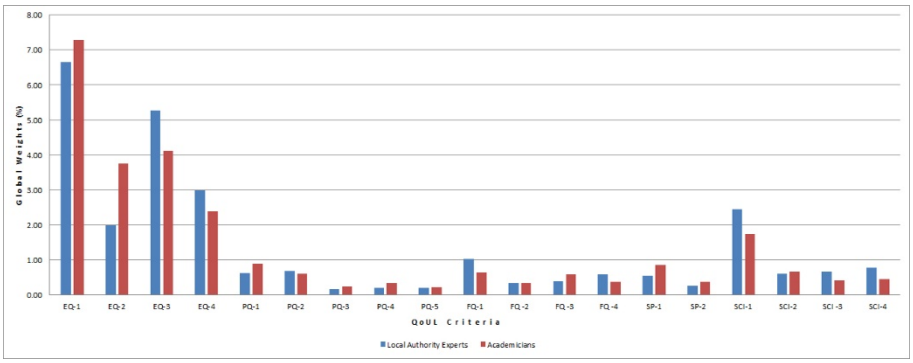

Figure 15. Expert Assessments Regarding Global Weights of QoUL Sub-Criteria

Table 3. Assessments of Experts for QoUL Criteria Importance Weights

Criteria	Local Weights (%)				Global Weights (%)			
	Local Authority Experts	Rank	Academicians	Rank	Local Authority Experts	Rank	Academicians	Rank
EQ-1	16,16	1	17,41	1	6,64	1	7,29	1
EQ-2	4,82	4	8,94	3	1,98	4	3,75	3
EQ-3	12,84	2	9,85	2	5,28	2	4,13	2
EQ-4	7,25	3	5,69	4	2,98	3	2,38	4
PQ-1	4,52	2	5,85	1	0,61	2	0,88	1
PQ-2	4,94	1	3,99	2	0,67	1	0,6	2
PQ-3	1,21	5	1,53	4	0,16	5	0,23	4
PQ-4	1,4	4	2,2	3	0,19	4	0,33	3
PQ-5	1,48	3	1,51	5	0,2	3	0,23	5
FQ-1	6,71	1	4,61	1	1,03	1	0,64	1
FQ -2	2,22	4	2,36	4	0,34	4	0,33	4
FQ -3	2,56	3	4,23	2	0,39	3	0,59	2
FQ -4	3,82	2	2,69	3	0,59	2	0,37	3
SP-1	6,08	1	7,72	1	0,54	1	0,86	1
SP-2	2,82	2	3,42	2	0,25	2	0,38	2
SCI-1	11,53	1	9,6	1	2,44	1	1,73	1
SCI-2	2,83	4	3,65	2	0,6	4	0,66	2
SCI -3	3,15	3	2,27	4	0,67	3	0,41	4
SCI-4	3,64	2	2,5	3	0,77	2	0,45	3

* Color scales have been prepared based on the QoUL criteria groups.

In terms of overall global weight dispersions, all the environmental quality criteria such as [EQ-1] "Being noisier or quieter", [EQ-2] "Being dirtier or cleaner", [EQ-3] "Being more or less congested" and [EQ-4] "Building quality, better or worse?", and also the criteria of [SCI-1] "Number of

relatives and friends in the environment" are the top 5 prioritized QoUL criteria by both expert groups. Although, the least prioritized QoUL criteria by both expert groups in terms of overall global weight dispersions are [PQ-3] "Quality of parks and green spaces", [PQ-4] "Maintenance of residences and open spaces", [PQ-5] "Public realm quality", [FQ-2] "Quality of public transport", [FQ-3] "Low traffic speeds and density", [FQ-4] "Vitality and viability of services and urban amenities" and [SP-2] "Safety of life and property". Priority rankings of these criteria, whose weight values are approximate, differ slightly within their own criteria groups (Figure 15, Table 3).

Assessments of Experts for QoUL in Central Districts of Konya City (Karatay, Meram and Selçuklu)

Following the weight determinations for QoUL criteria, both expert groups have separately evaluated status of 3 districts for each QoUL criteria via rating them in 0-9 scale *[where 0: none; 1: very low; 3: low; 5: middle; 7: high; 9: very high; and 2, 4, 6, 8 are intermediate values].* The scores of the expert groups for each criterion were included in the calculation as group decision with arithmetic mean. In the holistic evaluations of the experts on the district-based QoUL situation in Konya with a multi-criteria approach (Table 4, Table 5); LAEs and academicians agree that QoUL in the context of criteria Meram is more successful [LAEs: 38.5%; Academicians: 41.6%] than respectively Selçuklu [LAEs: 35.1%; Academicians: 34.5%] and Karatay [LAEs: 26.4%; Academicians: 23.9%] districts.

Table 4. LAEs' Assessments Regarding the QoUL in Central Districts of Konya City (Karatay, Meram and Selçuklu)

QoUL Criteria Groups	Weight	QoUL Sub-Criteria			Local Weight	Global Weight	Karatay	Meram	Selçuklu
Environmental Quality [EQ]	0,411	EQ-1	Being noisier or quieter	1	0,162	0,066	4	7	4
		EQ-2	Being dirtier or cleaner	4	0,048	0,020	4	6	6
		EQ-3	Being more or less congested (human density)	2	0,128	0,053	5	5	7
		EQ-4	Building quality, better or worse?	3	0,072	0,030	4	6	6
Physical Quality [PQ]	0,136	PQ-1	Quality of the built environment	2	0,045	0,006	4	6	6
		PQ-2	Less abandoned spaces	1	0,049	0,007	4	5	5
		PQ-3	Quality of parks and green spaces	5	0,012	0,002	5	6	6
		PQ-4	Maintenance of residences and open spaces	4	0,014	0,002	5	7	7
		PQ-5	Public realm quality	3	0,015	0,002	4	6	6
Functional Quality [FQ]	0,153	FQ-1	Convenient pedestrian circulation	1	0,067	0,010	4	6	5
		FQ -2	Quality of public transport	4	0,022	0,003	5	6	6
		FQ -3	Low traffic speeds &density	3	0,026	0,004	5	5	4
		FQ -4	Vitality and viability of services&urban amenities	2	0,038	0,006	4	5	5
Safer Places [SP]	0,089	SP-1	Low crime rate	1	0,061	0,005	4	6	5
		SP-2	Safety of life and property	2	0,028	0,003	4	6	5
Social Connection and Interaction at Micro&Macro Environment [SCI]	0,212	SCI-1	The number of relatives and friends living nearby	1	0,115	0,024	4	6	5
		SCI-2	Good neighbourhood relations	4	0,028	0,006	4	5	5
		SCI -3	Feeling part of the community	3	0,031	0,007	5	6	5
		SCI-4	Ensuring social integration / harmony	2	0,036	0,008	4	6	6
						Total Weight:	0,264	0,385	0,351
						Normalized relative importance weight(%):	26,4	38,5	35,1
						Ranking:	3	1	2

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Table 5. Academicians' Assessments Regarding the QoUL in Central Districts of Konya City (Karatay, Meram and Selçuklu)

QoUL Criteria Groups	Weight	QoUL Sub-Criteria			Local Weight	Global Weight	Karatay	Meram	Selçuklu
Environmental Quality [EQ]	0,419	EQ-1	Being noisier or quieter	1	0,174	0,073	3	7	4
		EQ-2	Being dirtier or cleaner	3	0,089	0,037	4	6	6
		EQ-3	Being more or less congested (human density)	2	0,098	0,041	4	6	5
		EQ-4	Building quality, better or worse?	4	0,057	0,024	3	7	6
Physical Quality [PQ]	0,151	PQ-1	Quality of the built environment	1	0,058	0,009	3	7	6
		PQ-2	Less abandoned spaces	2	0,040	0,006	4	5	5
		PQ-3	Quality of parks and green spaces	4	0,015	0,002	3	6	5
		PQ-4	Maintenance of residences and open spaces	3	0,022	0,003	4	7	6
		PQ-5	Public realm quality	5	0,015	0,002	3	5	5
Functional Quality [FQ]	0,139	FQ-1	Convenient pedestrian circulation	1	0,046	0,006	3	5	4
		FQ -2	Quality of public transport	4	0,024	0,003	3	4	5
		FQ -3	Low traffic speeds &density	2	0,042	0,006	3	5	4
		FQ -4	Vitality and viability of services&urban amenities	3	0,027	0,004	3	5	5
Safer Places [SP]	0,111	SP-1	Low crime rate	1	0,077	0,009	3	6	5
		SP-2	Safety of life and property	2	0,034	0,004	3	6	5
Social Connection and Interaction at Micro and Macro Environment [SCI]	0,180	SCI-1	The number of relatives and friends living nearby	1	0,096	0,017	3	5	5
		SCI-2	Good neighbourhood relations	2	0,037	0,007	4	5	4
		SCI -3	Feeling part of the community	4	0,023	0,004	4	6	5
		SCI-4	Ensuring social integration / harmony	3	0,025	0,004	3	6	4
						Total Weight:	0,239	0,416	0,345
						Normalized relative importance weight(%):	23,9	41,6	34,5
						Ranking:	3	1	2

The evaluations of the expert groups are presented comparatively in Table 6 in order to reveal the weaknesses and strengths of the Karatay, Meram and Selçuklu districts in context of QoUL criteria.

Table 6. Experts' Performance Assessments Regarding the QoUL Criteria in Central Districts of Konya City (Karatay, Meram and Selçuklu)

	QoUL Criteria:	Karatay		Meram		Selçuklu	
		Local Authority Experts	Academicians	Local Authority Experts	Academicians	Local Authority Experts	Academicians
EQ-1	Being noisier or quieter	4,21	4,10	7,47	8,47	4,49	4,83
EQ-2	Being dirtier or cleaner	1,23	1,99	1,82	3,65	1,77	3,30
EQ-3	Being more or less congested (human density)	3,51	2,58	3,89	3,80	5,44	3,46
EQ-4	Building quality, better or worse?	1,68	1,09	2,79	2,45	2,77	2,15
PQ-1	Quality of the built environment	1,02	1,19	1,77	2,57	1,73	2,09
PQ-2	Less abandoned spaces	1,35	1,22	1,94	1,39	1,65	1,38
PQ-3	Quality of parks and green spaces	0,35	0,35	0,45	0,61	0,41	0,56
PQ-4	Maintenance of residences and open spaces	0,37	0,52	0,52	0,91	0,52	0,78
PQ-5	Public realm quality	0,40	0,34	0,56	0,60	0,52	0,57
FQ-1	Convenient pedestrian circulation	1,75	0,96	2,57	2,00	2,38	1,64
FQ -2	Quality of public transport	0,61	0,63	0,78	0,75	0,83	0,98
FQ -3	Low traffic speeds &density	0,82	1,12	0,96	1,68	0,78	1,43
FQ -4	Vitality and viability of services&urban amenities	1,03	0,67	1,38	0,96	1,42	1,06
SP-1	Low crime rate	1,53	1,53	2,50	3,29	2,05	2,90
SP-2	Safety of life and property	0,72	0,78	1,11	1,39	0,99	1,26
SCI-1	The number of relatives and friends living nearby	3,09	2,44	4,32	3,70	4,12	3,46
SCI-2	Good neighbourhood relations	0,81	1,16	1,04	1,40	0,99	1,09
SCI -3	Feeling part of the community	0,93	0,56	1,20	0,96	1,02	0,75
SCI-4	Ensuring social integration / harmony	0,97	0,64	1,43	1,04	1,25	0,82

TOTAL QoUL PERFORMANCE ASSESSMENT (%):	Karatay		Meram		Selçuklu	
	26,4	23,9	**38,5**	**41,6**	35,1	34,5

* Color scales have been prepared based on the QoUL criteria groups.

Assessments of experts for QoUL in Karatay

The weaknesses and strengths of Karatay (Table 6), which is evaluated as *the worst district in terms of life QoUL criteria* by LCAs (26.4%) and academicians (23.9%), are explained below.

By *LCAs Karatay* is thought to be *more successful in terms of QoUL criteria* such as [EQ-1] "Being noisier or quieter" (4.21%), [EQ-3] "Being more or

less congested" (3.51%), [SCI-1] " The number of relatives and friends living nearby" (3.09%), [FQ-1] "Convenient pedestrian circulation" (1.75%), [EQ-4] "Building quality, better or worse" (1.68%), [SP-1] "Low crime rate" (1.53%) and [PQ-2] "Less abandoned spaces" (1.35%). *Academicians*, on the other hand, have reported that *Karatay* is *more successful in context* of the criteria of [EQ-1] "Being noisier or quieter" (4.21%), [EQ-3] "Being more or less congested" (3.51%), [SCI-1] " The number of relatives and friends living nearby" (3.09%), [EQ-2] "Being dirtier or cleaner" (1.99%), [SP-1]" Low crime rate" (1.53%) and [PQ- 2] "Less abandoned spaces" (1.22%).

LCAs consider that *Karatay* is *weakness in terms of QoUL criteria* of [SP-2] "Safety of life and property" (0.72%), [FQ-2] "Quality of public transport" (0.61%), [PQ-5] "Public realm quality" (0.40%), [PQ-4] "Maintenance of residences and open spaces" (0.37%) and [PQ-3] "Quality of parks and green spaces" (0.35%). *Academicians*, on the other hand, have reported that *Karatay* is *weakness in terms of QoUL criteria* of [FQ-2] "Quality of public transport" (0.63%), [SCI-3] "Feeling part of the community" (0.56%), [PQ-4] "Maintenance of residences and open spaces" (0.52%), [PQ-3] "Quality of parks and green spaces" (0.35%) and [PQ-5] "Public realm quality" (0.34%).

Assessments of experts for QoUL in Meram

The weaknesses and strengths of Meram (Table 6), which is rated as *the best district in terms of life QoUL criteria* by LCAs (38.5%) and academicians (41.6%), are explained below.

By *LCAs Meram* is thought to be *more successful in terms of QoUL criteria* such as [EQ-1] "Being noisier or quieter" (7.47%), [SCI-1] " The number of relatives and friends living nearby" (4.32%), [EQ-3] "Being more or less congested" (3.89%), [EQ-4] "Building quality, better or worse" (2.79%), [FQ-1] "Convenient pedestrian circulation" (2.57%), [SP-1] "Low crime rate" (2.50%) and [PQ-2] "Less abandoned spaces" (1.94%). *Academicians*, on the other hand, have reported that *Meram* is *more successful in context* of the criteria of [EQ-1] "Being noisier or quieter" (8.47%), [EQ-3] "Being more or less congested" (3.89%), [SCI-1] " The number of relatives and friends living nearby" (3.70%), [EQ-2] "Being dirtier or cleaner" (3.65%), [SP-1]" Low crime rate" (3.29%), [PQ-1] "Quality of the built environment" (2.57%), [EQ-4] " Building quality, better or worse?" (2.45%) and [FQ-1] "Convenient pedestrian circulation" (% 2.00).

LCAs consider that *Meram* is *weakness in terms of QoUL criteria* of [FQ-3] "Low traffic speeds &density" (0.96%), [FQ-2] "Quality of public transport" (0.78%), [PQ-5] "Public realm quality" (0.56%), [PQ-4] "Maintenance of residences and open spaces" (0.52%) and [PQ-3] "Quality of parks and green spaces" (0.45%). *Academicians*, on the other hand, have reported that *Meram* is *weakness in terms of QoUL criteria* of [FQ-4] "Vitality and viability of services and urban amenities" (0.96%), [SCI-3] "Feeling part of the community" (0.96%), [PQ-4] "Maintenance of

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residences and open spaces" (0.91%), [FQ-2] "Quality of public transport" (0.75%), [PQ-3] "Quality of parks and green spaces" (0.61%) and [PQ- 5] "Public realm quality" (0.60%).

Assessments of experts for QoUL in Selçuklu

The weaknesses and strengths of Selçuklu (Table 6), which is the district ranked second *in terms of high QoUL criteria* by LCAs (35.1%) and academicians (34.4%), are explained below.

Selçuklu is thought to be *more successful in terms of QoUL criteria* such as [EQ-3] "Being more or less congested" (5.44%), [EQ-1] "Being noisier or quieter" (4.49%), [SCI-1] " The number of relatives and friends living nearby" (4.12%), [EQ-4] "Building quality, better or worse" (2.77%), [FQ-1] "Convenient pedestrian circulation" (2.38%) and [SP-1] "Low crime rate" (2.05%) by *LCAs*. *Academicians*, on the other hand, have reported that *Selçuklu* is *more successful in context* of the criteria of [EQ-1] "Being noisier or quieter" (4.83%), [EQ-3] "Being more or less congested" (3.46%), [EQ-2] "Being dirtier or cleaner" (3.30%), [SP-1]" Low crime rate" (2.90%), [EQ-4] " Building quality, better or worse?" (2.15%) and [PQ-1] "Quality of the built environment" (2.09%)

LCAs consider that *Selçuklu* is *weakness in terms of QoUL criteria* of [FQ-2] "Quality of public transport" (0.83%), [FQ-3] "Low traffic speeds &density" (0.78%), [PQ-5] "Public realm quality" (0.52%), [PQ-4] "Maintenance of residences and open spaces" (0.52%) and [PQ-3] "Quality of parks and green spaces" (0.41%). *Academicians*, on the other hand, have reported that *Selçuklu* is *weakness in terms of QoUL criteria* of [SCI-4] "Ensuring social integration & harmony" (0.82%), [PQ-4] "Maintenance of residences and open spaces" (0.78%), [SCI-3] "Feeling part of the community" (0.75%), [PQ- 5] "Public realm quality" (0.57%) and [PQ-3] "Quality of parks and green spaces" (0.56%).

CONCLUSIONS AND RECOMMENDATIONS

This study, evaluated comparatively the QoUL of Karatay, Meram and Selçuklu districts from the point of two expert groups via AHP methodology. The findings show that from the perspective of two expert groups, Meram is the district with the highest QoUL, while Karatay is the district with the lowest QoUL. Although the expert groups have different priority weights on the basis of the criteria groups and sub-criteria and also each district has different performance scores in the context of the relevant criteria, the multi-criteria holistic QoUL rankings of both expert groups on the basis of districts are similar.

Performance determinations of the criteria, that are *above the average QoUL value and increase* in the relevant district's holistic QoUL criteria ranking, for Karatay, Meram and Selçuklu are presented at the below due to their priorities.

- For *Meram* the criteria of [EQ-1] "Being noisier or quieter", [SCI-1] "The number of relatives and friends living nearby", [EQ-3] "Being more or less congested", [EQ-2] "Being dirtier or cleaner",

[SP-1] “Low crime rate”, [PQ-1] "Quality of the built environment", [EQ-4] "Building quality, better or worse", [FQ-1] “Convenient pedestrian circulation" and [PQ-2] “Less abandoned spaces”.

- For *Selçuklu* the criteria of [EQ-3] "Being more or less congested", [EQ-1] “Being noisier or quieter", [SCI-1] “The number of relatives and friends living nearby”, [EQ-2] “Being dirtier or cleaner”, [SP-1] “Low crime rate”, [EQ-4] "Building quality, better or worse", [PQ-1] "Quality of the built environment", [FQ-1] “Convenient pedestrian circulation" and [FQ-1] “Convenient pedestrian circulation”.
- For *Karatay* the criteria of [EQ-1] “Being noisier or quieter", [EQ-3] "Being more or less congested", [SCI-1] “The number of relatives and friends living nearby” and [PQ-1] "Quality of the built environment".

Performance determinations of the criteria, that are *under the average QoUL value and decrease* in the relevant district’s holistic QoUL criteria ranking, for Karatay, Meram and Selçuklu are presented at the below due to their priorities.

- *For Karatay* the criteria of [PQ-5] “Public realm quality”, [PQ-4] “Maintenance of residences and open spaces”, [PQ-3] “Quality of parks and green spaces", [FQ-2] “Quality of public transport” and [SCI-3] “Feeling part of the community".
- For *Meram* the criteria of [PQ-3] “Quality of parks and green spaces", [PQ-5] “Public realm quality”, [PQ-4] “Maintenance of residences and open spaces”, [FQ-2] "Quality of public transport" and [FQ-3] “Low traffic speeds &density”.
- For *Selçuklu* the criteria of [FQ-3] “Low traffic speeds &density”, [SCI-3] “Feeling part of the community", [PQ-5] “Public realm quality”, [PQ-4] “Maintenance of residences and open spaces” and [PQ-3] “Quality of parks and green spaces".

Differences of opinion in the context of occupations of expert groups also differed their degrees of concern regarding QoUL sub-criteria and/or criteria groups. Although the views of LCAs who are mostly practitioners, and the academicians related with QoUL in a theoretical sense, differ in terms of criteria importance, similar findings derived via experts’ holistic QoUL assessments indicate of both indicate an objective assessment.

Faced weaknesses of the districts against QoUL determined through the applied AHP based QoUL, should be strengthen. Objective indicators should also be adapted to overcome these problems. Also, the reasons for these criteria that reduce the quality of life should be questioned.

The findings clearly show the knowledge of which indicators need to be improved in order to create and increase QoUL, or which mitigation strategies should be more prioritised by policy makers and decision makers in the city on each district basis. Thus, separate and local planning strategies can be formulated for each district which are at different QoUL levels in order to create liveable urban areas which have high QoL in

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Konya. Besides, district-based highlighted indicators as high QoUL indicators by experts can be a starting point for districts that stay in the background in terms of overall QoUL rankings or in the context of the relevant indicator. Urban areas have good and very good QoUL indicators should be protected and also appropriate development and control arrangements should be adopted. In areas with moderate QoUL quality indicators should not be disrupted in the future by the preventive strategies of the authorities. In areas with inadequate and very poor QoUL, all planning measures and implementation strategies should be evaluated in order to improve quality at the highest possible level.

Within the light of low QoUL rates, in Karatay public realm quality and maintenance of residences and open spaces should be enhanced. Also, the public transportation facilities should be enhanced and improved. Built environment should support the social interactions of the community and esthetical environment quality.

In Meram district, which suffers from similar QoUL reduction problems with Karatay, strategies that increase the population and traffic density in a balanced way should be adopted in addition to the strategies stated.

Similar with both districts, problems of decrease in parks, green spaces, public realm and public transport quality also problem of low traffic speeds and density should be tackled in Selçuklu district. In this context the quantity of green areas should be increased, public transportation opportunities should be increased, maintenance of residences and parks should be provided. Finally, strategies that increase the population and traffic density in a balanced way, should be adopted, as should be adopted for Meram, too.

Planning urban areas having high QoL, solving existing urban problems and improving the QoUL are the main concerns of planners and local administrators, and planning gains legitimacy with its contribution to the QoUL. In this context, research findings provide important contributions for decision-makers as the key stakeholders of urban development regarding Konya city such as; (i) to identify the strengths and weaknesses of the QoUL effectively thus to reveal the problems that require special attention and solution, (ii) to determine the direction and degree of the relationship between urban facilities and services and the urbanites and to compare them with subsequent measurements, (iii) providing information about the distribution of satisfaction and dissatisfaction in society and space, (iv) monitoring the effects of policies on the space, (v) determining effective policies that improve conditions in line with the determinations made for the current situation, and (vi) to guide local government units and other relevant stakeholders away on appropriate actions and transformations to increase the QoUL via developing effective policies against the problematic of QoUL decrease and create urban areas with high QoL. The method applied in the study is adaptable and can be applied to effectively evaluate the QoUL in other cities.

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Resume

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Numerical Study of Wind induced Pressures on Irregular Plan Shapes

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Abstract

Purpose

This study researches a numerical analysis of pressure distributions of wind on irregular buildings over wind angles of 0° and 180° with different projection ratios(PR). Wind is an important design parameter that should be considered at the initial part of the design phase in terms of energy potential. For this reason, wind effects in building design is extensively analyzed in this study. The study aims to analyze the effect of irregular building form, projection ratios, the re-entrant corner distances and wind incidence angles on the wind flow and on pressure distributions of wind at all surfaces.

Design/Methodology/Approach

Two L-shaped and T-shaped building models which have the identical building area and building height but have different projection ratios were analyzed by Computational Fluid Dynamics (CFD) of ANSYS. In line with the aim, pressure distributions of wind on and around various irregular buildings are analyzed for the same height level. Model dimensions were reduced to 1/100 scale to save computing time.

Findings

From the study, it has been noticed that the plan shape, projection ratios, distances from the re-entrant corner, considerably influence the wind behavior of buildings. It was noticed that when projection ratio decreased to half, the negative pressure values two times greater in L and T models. When L and T models with the same building area are compared, the highest negative pressure was seen in the L model with the highest projection ratio PR (0.80). In all T models, the highest negative pressure coefficients were noticed on D and F surfaces for both wind angles. In all L models, the highest negative pressure coefficients were found on F surface for both wind angles.

Originality/Value

Studies on the effects of wind on the building are generally seen as an engineering problem. There are limited number of studies on this subject in architecture. However, this is an issue that needs to be investigated, which also concerns architecture. There are many studies in the literature on the wind behavior of irregular buildings. However, projections in plan and distances from the re-entrant corner's effect on pressure coefficients were not be studied comprehensively. The obtained results from the CFD analysis will provide extensive information related to wind effects on buildings. this resource will create awareness about wind for architects and architecture students and can be used as a resource in the design phases.

Keywords: *Building form, projections, wind pressure coefficients,* computational fluid dynamics

INTRODUCTION

Wind is an important design parameter that should be considered at initial part of the design phase. Understanding the behavior mechanism of buildings under the influence of wind is important in designing our buildings correctly. It is possible to notice a rising interest in analyzing wind load effects on buildings in engineering field.

Wind pressure is a significant design output parameter for analyzing the response of all surfaces of buildings under the wind loads. Wind pressure depends on various factors such as building dimension and shapes, wind incidence angle, built environment and wind characteristics (Xu, Yang, Yoshida, and Tamura (2017); Mou *et al*., (2017); Zhao and He (2017), 2017; Sy, Yamada, and Katsuchi (2019); Li *et al*., (2020);Y. He *et al*. (2019).

Mean pressure coefficients are one of the crucial design parameter to perceive wind load effects on buildings. Generally, buildings are organized considering medium pressure coefficients for a curtain surfaces and medium pressure coefficient may vary highly in case of the buildings designed having irregular form. The wind analysis of buildings having irregular forms are extremely complicated due to the complex flow mechanism in irregular formed buildings. Examining the medium wind pressure coefficients on all surfaces of the buildings having irregular plan shaped is significant. Besides, pressure distribution on all surfaces will guide related to wind characteristic of buildings (Bhattacharyya and Dalui (2018); Bairagi and Dalui (2020); Mallick *et al.,* (2020); Liu *et al*., (2020); Chen *et al.,*(2021), Kummitha *et al.,*(2021); Zhou *et al.,* (2021); Hu *et al.,* (2019); Peng *et al.,* (2020). It has been mentioned in many studies that the effect of pressure distribution is quite complicated in irregular formed buildings. (Bandi *et al.*, 2013); R.Kar and Dalui (2016); Tanaka *et al.,*(2012); Bhattacharyya and Dalui (2020); Liu *et al*. (2020); Sanyal and Dalui (2020)). Mallick *et al*. (2020) analyzed wind behavior of buildings via the corner modifications and various wind angles (Mallick, Kumar, & Patra, 2019). Bhattacharyya and Dalui examined E formed high buildings wind behavior. (Bhattacharyya & Dalui, 2018). Sanyal and Dalui (2021) were analyzed internal corners effects on wind behavour of Y formed high building. Medium pressures and wind load effects were analyzed in detail for different angle. (Sanyal & Dalui, 2021). Paul and Dalui (2021) analyzed on optimum form for a regular formed high building exposing wind load. They aim to minimize pressure coeffieints on all facades. (Paul & Dalui, 2021). Al-Najjar and Al-Azhari (2021) studied wind effects on different formed tall buildings. (Al-Najjar & Al-Azhari, 2021). Bairagi and Dalui (2020) examined pressure variation on a regular and setback high-rise buildings. The authors created the buildings having various setbacks (Bairagi & Dalui, 2020). Jendzelovsky and Antal (2021) investigated on pressure variations on tall buildings for an equilateral acute triangle form with experimentally and numerically (Jendzelovsky & Antal, 2021). The aerodynamic behavior of other irregular forms as E form (Bhattacharyya, Dalui, & Ahuja, 2014) and

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C form (Mallick *et al*., 2019) was evaluated for many wind incidence angle. Pal, Raj, and Anbukumar (2021). Pal *et al*. (2021) investigated on wind behavior of square and fish formed high-rise buildings (Pal *et al*., 2020). Behera *et al.,*(2020) studied on wind tunnel tests in order to explore the effect of buildings on each other for different ratios in plan. The highest pressure values on windward facade of the main model were examined. It was noticed that the highest pressure coefficients reduced related to the approaching the main model. Tse *et al.,* (2021) examined the corner effects on wind behavior, especially on pressure distributions on surfaces. It was noticed that the decrease in the corner ratios were more effective for minimize the wind behavior. (Tse *et al*., 2021).

To receive the wind effects on buildings, four methods have been discovered and followed from past to present. These are full-scale measurements, wind tunnel tests, theoretical studies and simulations. However, these field studies are both time-consuming and costly. In recent years, numerical approaches based on computational fluid dynamics (CFD) simulations are being commonly utilized architects for many studies related to understanding the wind behavior. Computational Fluid Dynamics (CFD) method is more economical and commonly accessible compared to the other methods. It provides solving the complex flow conditions via strong mathematical equations (Weerasuriya, 2013). CFD have a significant role in every stage of building design.

Various researches have been realized in order to investigate wind flow and understand wind behavior of buildings. There is considerable study related to regular forms such as square and rectangular building forms. However, there in not more comprehensive studies related on irregular plan shaped buildings.

Ahmad and Kumar (2002) examined the plan shape effect on pressure distributions in low-rise buildings. Gomes *et al.,* (2005) analyzed the L and U formed buildings. They noticed that models present similar behavior for normal wind angle different form the other angles. Kushal *et al.,* (2013) realized that the building form greatly influenced the pressure distributions of wind on all surfaces. Verma *et al*., (2013) studied the wind angle effects for regular plan formed models. Bhattacharyya *et al*. (2014) examined pressure variations for all surfaces of E formed model for various wind angles. Chakraborty *et al.,* (2014) analyzed of + formed models. They comprised the obtained results from the wind tunnel with simulations. Mukherjee *et al.,* (2014) studied on the effects of wind on Y plan formed high rise buildings via measurements and CFD analysis. The results show a good agreement.

The wind effects on buildings is quite significant in the architectural field that should be perceived. This study presents the CFD analysis for L and T shaped models to examine wind pressure variations for wind angles of 0° and 180°. The aim is to analyze the effect of irregular plan shapes, projection ratios and wind incidence angles on the wind behavior of buildings. Wind pressure distributions on all surfaces for L and T formed

models are studied in detail over the wind angle of 0° and 180°. This research intends to explore the wind effects on buildings having different irregular plan geometries. Two L and T shaped buildings were designed to have the same height and building area. The models having different projection ratios were analyzed by CFD of ANSYS. From the analysis, wind pressure variations on and around various irregular formed models are examined. The obtained comprehensive results from the CFD analysis will provide extensive information related to wind effects on and around buildings. Architects and architectural students can utilize from the results at the beginning of the design stage.

METHODOLOGY

To design numerical models properly and provide reliable findings, various parameters must be taken into account. The significant ones are computational domain, meshing, boundary conditions, solver settings, and control of residuals. If parameters are not well considered, the analysis represent unrealistic results. ANSYS FLUENT 20.0 software is used in this research. Computational Fluid Dynamics (CFD) e of is used for the analysis. In recent years, the use of numerical analysis has become widespread by ANSYS-FLUENT among architects and engineers.

In this study model dimensions were reduced to 1/100 scale to save computing time. CFD analysis consist of three part as computational domain, meshing and boundary conditions The process of the research is presented in Table 1. Each step of the research is presented comprehensively.

Computational Domain and Meshing

The computational area must be large enough to avoid reflection of fluid flows that can create extreme pressure zones around the buildings (Franke, 2006). Also, the distances around the models should be distant enough in order to allow the wind flow improvement. (He *et al.*, 2014).

Huang *et al.*, (2005) displayed the computational domains for high-rise single models. The distance between the top of model and computational domain and the distance from the inlet should be at least 5H. H is building height. Besides, side distances of computational domain are 2 to 3 times greater than the building width (W). Besides, the distance between the back side of the building and outlet boundary is proposed minimum 15H (Franke, 2006). Tominaga *et al.* (2008) proposed 5H for side boundaries and inlet and minimum 10H from the outlet (Tominaga *et al.*, 2008). Designing the computational domain correctly is considerably significant in terms of obtaining reliable results (Blocke *et al.*, 2007).

Table 1. Flowchart of the study

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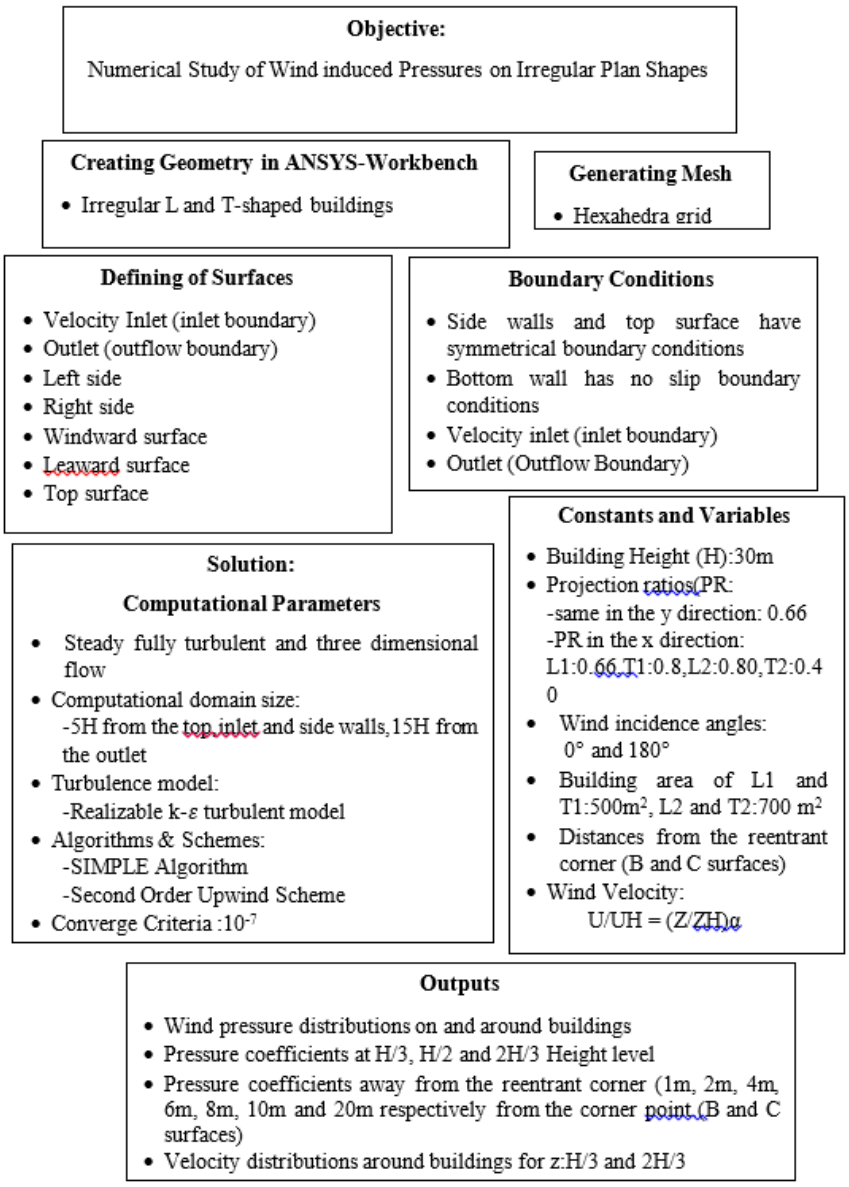

In this research, the distance is 5H from the sides, inlet and top surfaces. Also, the distance from the outlet is 15H (Figure 1). The used grid type is a hexahedra grid. The maximum skewness values, mesh quality and other parameters for the prediction are provided. Model dimensions were reduced to 1/100 scale to save computing time. The position of model in computational domain is shown in Figure. 1.

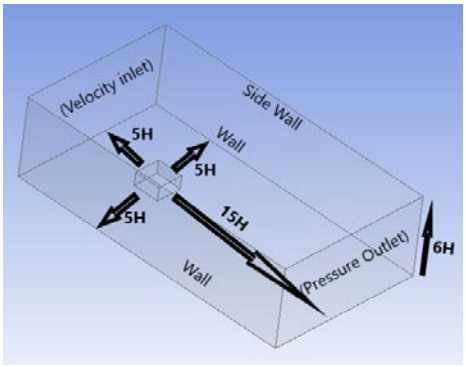

Figure 1. Computational Domain

Boundary Conditions

Boundary conditions are considerably significant on solutions inside the computational domain. Therefore, they should be chosen properly for the reliable results in numerical simulations (Franke, 2006). Inlet, outlet, side and top surfaces boundary conditions are considerably significant. In this research, inlet boundary is assumed as velocity inlet. Side and top surfaces assumed as having symmetric boundary conditions. Besides, ground has no-slip. The chosen turbulent model is realizable k-ε for the analysis.

Boundary layer wind flow near the windward surface was created in the inlet of the domain utilizing power law:

$$U/U_H = (Z/Z_H)^{\alpha} \quad \ldots\ldots(1)$$

Where U is the horizontal wind velocity at an elevation Z; U_H is the velocity at the reference elevation Z_H (10 m/s); Z_H is the boundary layer height (1.0 m) and α is power law index (0.133).

For solving the pressure-velocity coupling, SIMPLE algorithm of Patankar was used (Patankar, 1980). Moreover, Second-Order Upwind Scheme was driven for the terms convection and viscous terms. In the study, the convergence criterion was assumed as 10-7.

Models

Two L and T formed models designed as having the same plan area and height but having different projections in plan. Wind pressure coefficients were analyzed numerically on irregular formed building models over wind incidence angles of 0° and 180°. The aim is to analyze the effect of plan shape, the reentrant corner, projection ratio of wing and wind incidence angles on the wind behavior on buildings. Models could be categorized according to building form and their dimensions including projection ratio of wing (PR) ratio according to both x and y direction. Information about the models is given in Figure 2 and Table 2 in detail. Projection value (PR) is calculated for both x and y direction. It is assumed as the ratio of the wing to the whole length. All of the models have same projection ratio of 0.66 on y direction. The surfaces on models were denoted with letters as presented in Figure 2. All of the models have projection irregularity in plan which is coded A3 irregularity in the

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Turkish Earthquake code. They are all designed as having a building height of 30 m. While the model L1 and T1 have the same building area of 500 m^2, the model L2 and T2 have the same building area of 700 m^2.

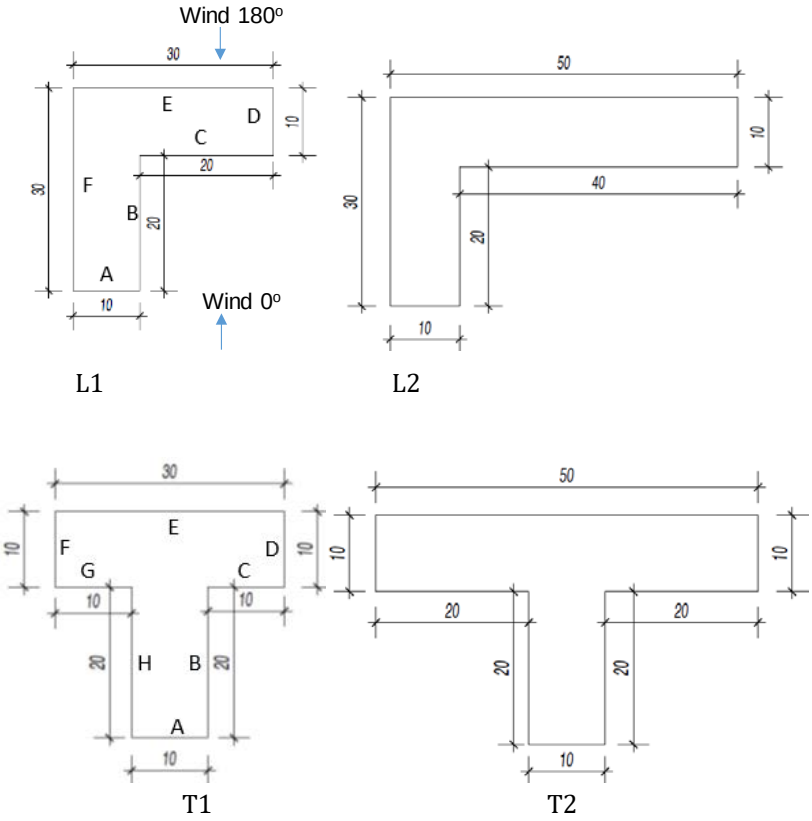

Figure 2. Building models

Table 2. Projections and computational domain information

Model	PR1 (x)	PR2 (y)	Computational Domain (m) X x Y x Z
L1	0.66	0.66	330 x 180 x 630
L2	0.80	0.66	350 x 180 x 630
T1	0.33	0.66	330 x 180 x 630
T2	0.4	0.66	350 x 180 x 630

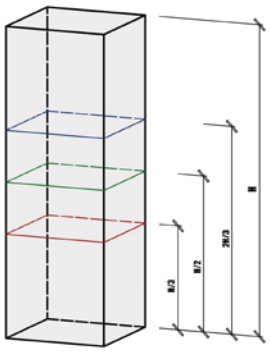

Figure 3. Horizontal lines for pressure coefficients

To examine wind characteristics of on L and T plan-shaped models, pressure coefficients are sliced at the height level of 2H/3, H/2 and H/3, as presented symbolically in a simple square form on Figure 3. Another important point investigated in the study is the changes in the pressure coefficients as they move away from the reentrant corner points. Therefore, vertical lines are created on B and C surfaces. These lines are at a distance of 10mm, 20mm, 40mm, 60 mm, 80 mm and 100mm respectively from the corner point according to 1/100 scale (Figure 4).

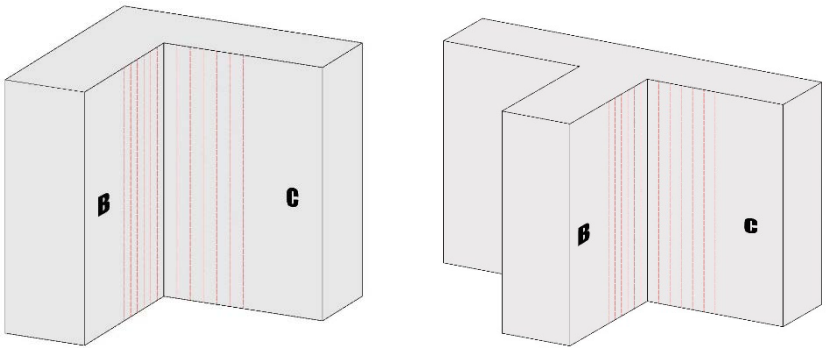

Figure 4. Vertical lines position

RESULTS AND DISCUSSION

In the study, wind pressure and velocity variations on and around for L and U formed models were analyzed in detail based on the changes in projection ratios, building areas, distances from reentrant corners and height levels. The obtained findings from the CFD simulations is analyzed comprehensively in this section.

Variations on Pressure Coefficients at Model Surfaces

The variations on pressure coefficients were analyzed compressively for all surfaces of all models. The models have the same projection ratios on Y direction. However, they have different projection ratios on X direction. All models were analyzed for wind incidence angle of 0^o and 180^o. The distribution of pressure coefficients on the surfaces of models were presented in Table 3-4.

The model denoted as L1 is a 30 m irregular building having a L plan shaped and it has a projection ratio (PR) of 0.66 on both X and Y direction. Wind pressure coefficient distributions on L1 plan shape building model over wind incidence angles of 0° and 180° are illustrated in Figure 5-6.

In L1 and L2 model with an incidence angle of 0°, the surfaces coded as A and C exposed to pushing forces and take positive pressure coefficients. A and C surfaces can be called as a windward surface. On the other hand, leeward and side surfaces take negative pressure coefficients. The surface coded as E behave like a leeward surface and F and D the side surfaces for incidence angle of 0°.

In L1 and L2 model with an incidence angle of 180°, the surface E is windward surface and take positive pressure coefficients. However, negative pressures are observed on E surface nearest to side surfaces

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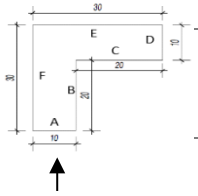
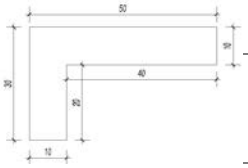
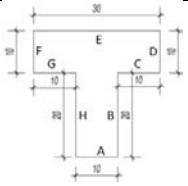
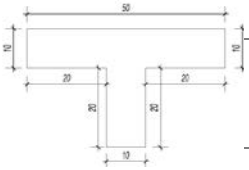
both D and F surface and on the top surface. All the other surfaces take negative pressure coefficients.

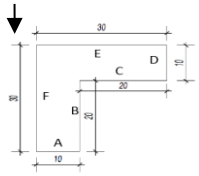
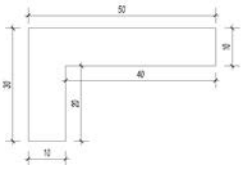
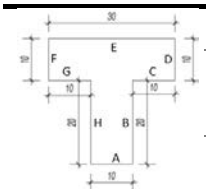
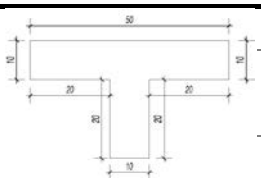
Table 3. The highest and lowest pressure coefficients for all surfaces of all models for wind incidence angle of 0°

	**L1**			**L2**	
	PR_x :0.66, PR_y:0.66 Area:500m²			PR_x :0.80, PR_y:0.66 Area:700m²	
	max. cp (+)	max. cp (-)		max. cp (+)	max. cp (-)
A	0.767	-0.543	A	0.778	-0.600
B	0.657	-0.576	B	0.683	-0.771
C	0.707	-0.676	C	0.700	-0.824
D	-	-0.705	D	-	-0.737
E	-	-0.452	E	-	-0.511
F	-	-1.107	F	-	-1.234
	**T1**			**T2**	
	PR_x :0.33, PR_y:0.66 Area:500m²			PR_x :0.40, PR_y:0.66 Area:700m²	
	max. cp (+)	max.cp (-)		max. cp (+)	max. cp (-)
A	0.894	-	A	0.869	-
B	0.225	-0.226	B	0.413	-0.288
C	0.500	-0.182	C	0.777	-0.288
D	0.368	-0.677	D	0.188	-0.794
E	-	-0.296	E	-	-0.384
F	0.360	-0.673	F	0.177	-0.787
G	0.490	-0.108	G	0.776	-0.301
H	0.229	-0.216	H	0.417	-0.301

In L1 model for the incidence angle of 0°, the surface A behaves windward surface and take positive pressure coefficients. However, negative pressures are observed on A surface nearest to the F surface and on top surface. This is similar in L2 model. While, maximum positive pressure coefficient on the surface A of L1 model was 0.767, absolute value of maximum negative pressure was 0.543. B surface expose to both positive and negative forces. Negative forces were observed on the top of the L1 model nearest to the reentrant corner. Besides, higher positive pressure coefficients were observed nearest to the surface C. It is similar in L2 model. While, maximum positive pressure coefficient was 0.657 on the B surface, absolute value of maximum negative pressure was 0.576. C surface behave like a windward surface. However, negative pressure

coefficients are observed on the C surface nearest to D surface and on top surface. This condition is similar with L2 model. On the C surface, maximum positive pressure coefficient was 0.707, the absolute value of maximum negative pressure was 0.676. D and F surfaces are side surfaces and they are directly under negative pressure. While the maximum absolute negative pressure coefficient was 0.705 on D surface, it was 1.107 on F surface. E was the leeward surface and expose to negative pressure. On the E surface, maximum negative pressure was 0.452.
In L1 model for the incidence angle of 0°, negative pressure coefficients on side surfaces (F and D) are higher than the leeward surface (E). The greatest negative pressure coefficients were observed on surface F (1.107). Besides, the maximum positive pressure coefficient was observed on the A surface (0.767).

Table 4. The highest and lowest pressure coefficients for all surfaces of all models for wind incidence angle of 180°

	**L1**			**L2**	
	PR_x :0.66, PR_y:0.66 Area:500m²			PR_x :0.80, PR_y:0.66 Area:700m²	
	max. cp (+)	max. cp (-)		max. cp (+)	max. cp (-)
A	-	-0.400	A	-	-0.439
B	-	-0.342	B	-	-0.388
C	-	-0.342	C	-	-0.388
D	-	-0.654	D	-	-0.731
E	0.727	-0.544	E	0.733	-0.694
F	-	-1.069	F	-	-1.249
	**T1**			**T2**	
	PR_x :0.33, PR_y:0.66 Area:500m²			PR_x :0.40, PR_y:0.66 Area:700m²	
	max. cp (+)	max.cp (-)		max. cp (+)	max. cp (-)
A	-	-0.252	A	-	-0.306
B	-	-0.334	B	-	-0.367
C	-	-0.334	C	-	-0.367

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D	0.094	-0.770	D	0.067	-0.812
E	0.769	-0.141	E	0.734	-0.255
F	0.107	-0.766	F	0.068	-0.792
G	-	-0.329	G	-	-0.374
H	-	-0.328	H	-	-0.365

In L1 model for the incidence angle of 180°, the surface E is windward surface and take positive pressure coefficients. However, negative pressures are observed on E surface nearest to side surfaces both D and F surface and on the top surface. All the other surfaces take negative pressure coefficients. The maximum absolute negative pressure coefficient on surface A was 0.400. B and C surfaces showed similar behavior. The maximum absolute value of pressure coefficient was 0.342 on both B and C surfaces. The maximum absolute negative pressure coefficient was 0.654 on the D surface. Also, E surface showed the greatest positive pressure coefficient was 0.727. Besides, the greatest absolute negative pressure coefficient was 0.544 on that surface. Moreover, in L1 model for incidence angle of 180° the greatest negative pressure coefficient was 1.069 on the surface F.

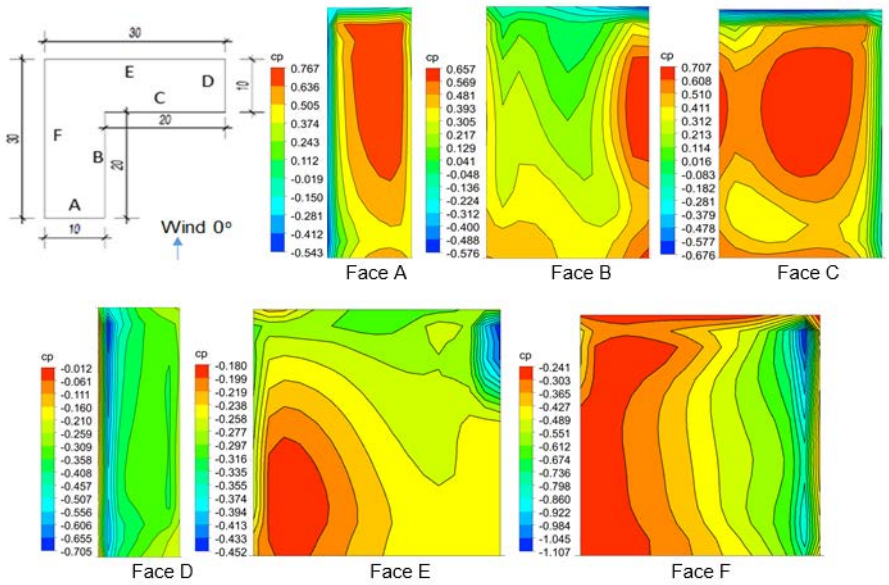

Figure 5. Mean Pressure coefficients in Model L1 for 0° wind incidence angle

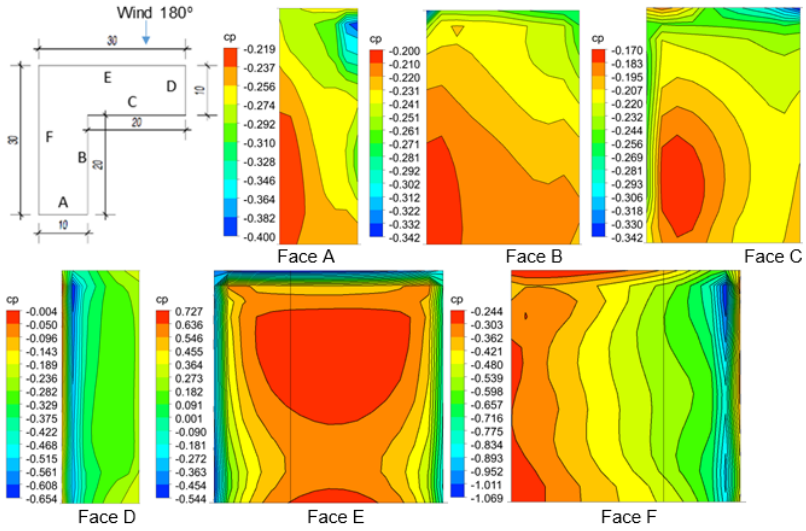

Figure 6. Mean Pressure coefficients in Model L1 for 180˚ wind incidence angle

While, maximum positive pressure coefficient on the surface A of L2 model was 0.778, greatest pressure coefficient was 0.600. On B surface, maximum positive pressure coefficient was 0.683 and greatest negative pressure was 0.771. On C surface, greatest positive pressure coefficient was 0.700 and the greatest negative pressure was 0.824. While the greatest negative pressure coefficient was 0.737 on D surface, it was 1.234 on F surface. On the E surface, the greatest negative pressure was 0.511.

For L2 model for the incidence angle of 0°, Negative pressure values on the side surfaces (F and D) are higher than negative pressure values on the leeward surface (E). Moreover, Surface C displays more critical negative pressure coefficients than the E surface. The greatest negative pressures coefficients were observed on surface F (1.234). Besides, the maximum positive pressure coefficient was observed on the A surface (0.778).

In L2 model for wind angle of 180°, the maximum negative pressure coefficient on surface A was 0.439. B and C surfaces showed similar behavior. The greatest pressure coefficient was 0.388 on both B and C surfaces. The greatest negative pressure coefficient was 0.731 on D surface. Also, E surface which was the windward surface, showed the greatest positive pressure coefficient was 0.733. Besides, the greatest negative pressure coefficient was 0.694 on that surface. Moreover, the greatest negative pressure coefficient was 1.249 on surface F. (Figure 7-8).

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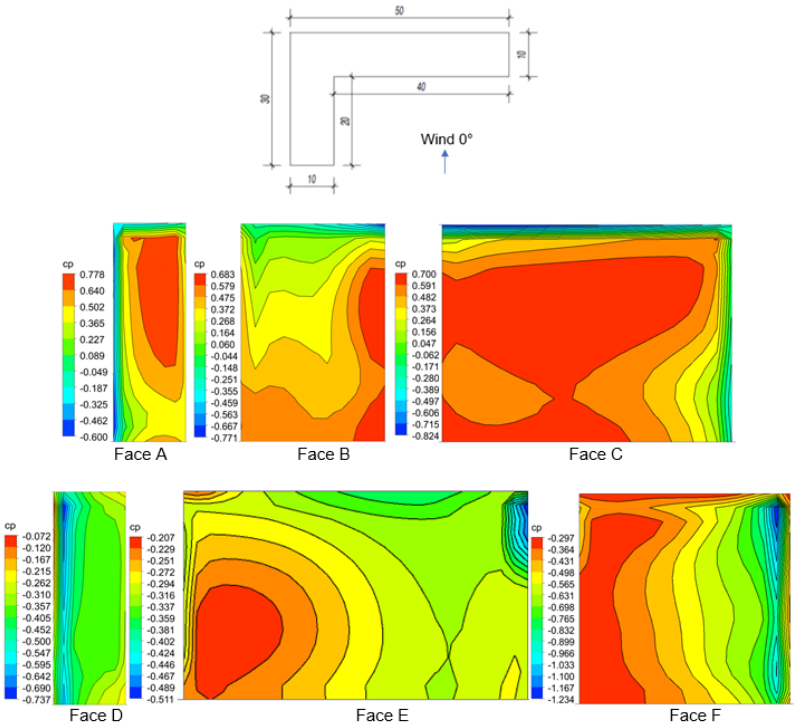

Figure 7. Mean Pressure coefficients in Model L2 for 0° wind incidence angle

In T1 and T2 model with an incidence angle of 0°, the surfaces coded as A, G and C exposed to pushing forces and take positive pressure coefficients. In that condition, A, G and C surfaces behave like a windward surface. On the other hand, negative pressure coefficients were observed in all surfaces except A surface, and positive pressure coefficients are noticed except E surface. E is the leeward surface for 0°wind angle.

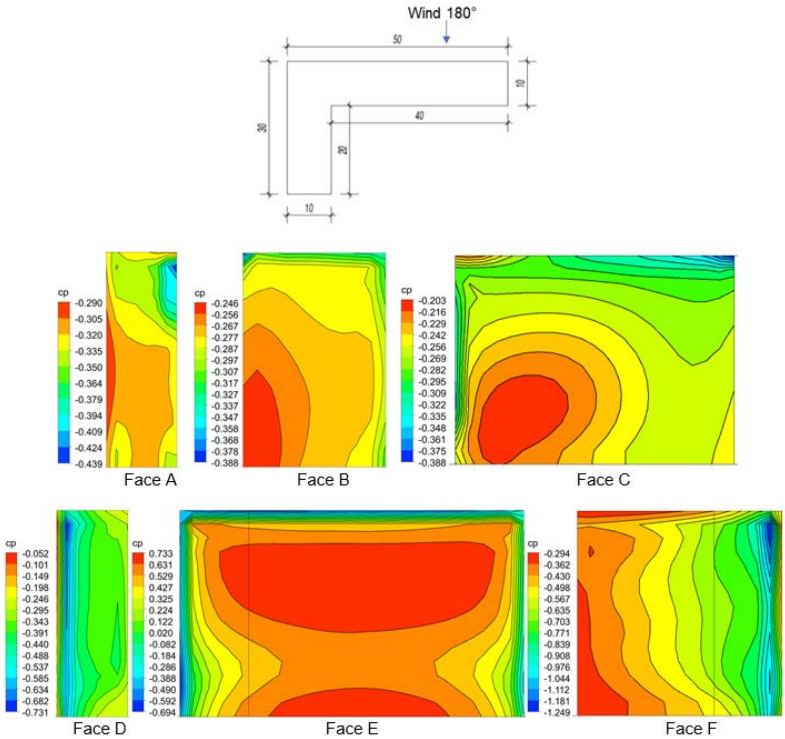

Figure 8. Mean Pressure coefficients in Model L2 for 180° wind incidence angle

In T1 and T2 model with an incidence angle of 180°, the surface E is windward surface and take positive pressure coefficients. However, negative pressures are observed on E surface nearest to side surfaces both D and F surfaces. Positive pressure values are observed at a small value in the regions of the D and F surfaces close to the G and C surfaces. All the surfaces take negative pressure coefficients.

In T1 model for the incidence angle of 0°, maximum positive pressure coefficient on surface A was 0.894. It did not have negative pressure coefficient. All the other surfaces have both positive and negative pressure coefficients. B and H surfaces expose to both positive and negative forces and these values are similar. While, greatest positive pressure coefficient was 0.229 on H surface, greatest negative pressure was 0.226. On C and G surfaces, greatest positive pressure coefficient was 0.500 and the greatest negative pressure coefficient was 0.182. D and F surfaces are side surfaces. While the greatest negative pressure coefficient was 0.677, the maximum positive pressure coefficient was 0.368 on that surfaces. E was the leeward surface and expose to negative pressure. The greatest negative pressure coefficient was 0.296 on E surface.

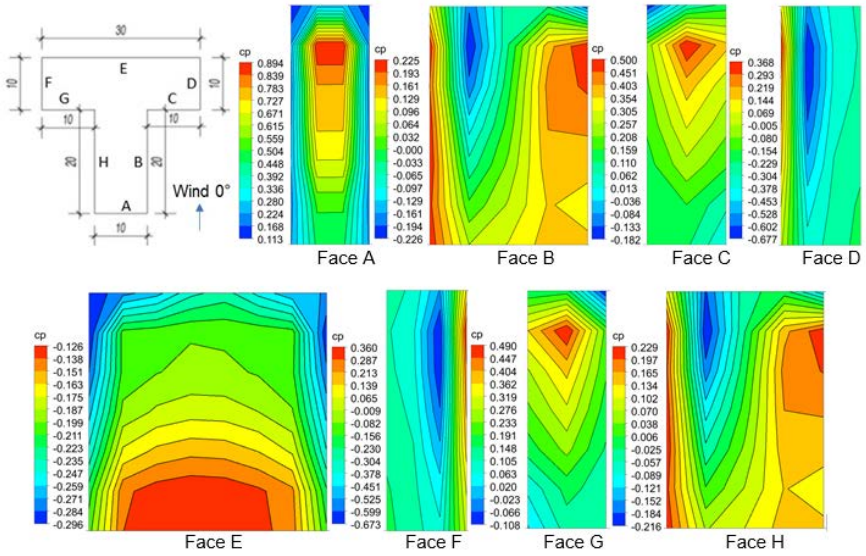

Figure 9. Mean Pressure coefficients in Model T1 for 0° wind incidence angle

In T1 model for the incidence angle of 180°, the surface E is windward surface and take positive pressure coefficients. However, negative pressures are observed on E surface nearest to side surfaces both D and F surface. Besides, D and F, the side surfaces take both positive and negative pressure coefficients. All the other surfaces take negative pressure coefficients. The highest negative pressure coefficient on surface A was 0.252. B and C surfaces and G and H surfaces showed similar behavior. The maximum absolute value of pressure coefficient was 0.334 on that surfaces. The maximum absolute negative pressure coefficient was 0.770 on the side surfaces of D and F surface. The greatest

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negative pressure coefficients were observed on D and F surfaces. Also, the E surface which was the windward surface, showed the highest positive pressure coefficient was 0.769. Besides, the greatest negative pressure coefficient was 0.141 on that surface. (Figure 9-10).

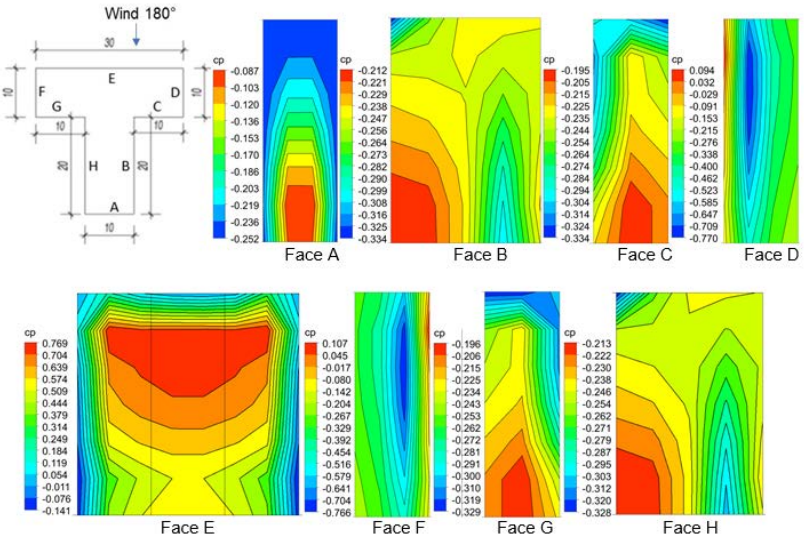

Figure 10. Mean Pressure coefficients in Model T1 for 180° wind incidence angle

In T2 model for the incidence angle of 0°, maximum positive pressure coefficient on the surface A was 0.869. It did not have negative pressure coefficient. All the other surfaces have both positive and negative pressure coefficients except E surface. It shows only negative pressures. B and H surfaces expose to both positive and negative forces and these values are similar. While, highest positive pressure coefficient was 0.417 on the H surface, the highest negative pressure was 0.301. The highest positive pressure coefficient was 0.777, negative pressure coefficient was 0.301 on C and G surfaces. D and F surfaces are side surfaces. While the greatest negative pressure coefficient was 0.794, the maximum positive pressure coefficient was 0.188 on that surfaces. E was the leeward surface and expose to negative pressure. On the E surface, the absolute value of maximum negative pressure was 0.384.

In T2 model for the incidence angle of 180°, the surface E is windward surface and take positive pressure coefficients. However, negative pressures are observed on E surface nearest to side surfaces both D and F surface. Besides, D and F the side surfaces take both positive and negative pressure coefficients. All other surfaces take negative pressure coefficients. The greatest negative pressure coefficient on surface A was 0.306. B and C surfaces and G and H surfaces showed similar behavior. The highest pressure coefficient was 0.374 on that surfaces. The highest negative pressure coefficient was 0.812 on the side surfaces of D and F surface. The greatest negative pressure coefficients were observed on D and F surfaces. On the other hand, the E surface which was the windward surface, showed the highest positive pressure coefficient was 0.734

Besides, the greatest absolute value of negative pressure coefficient was 0.255 on that surface. (Figure 11-12).

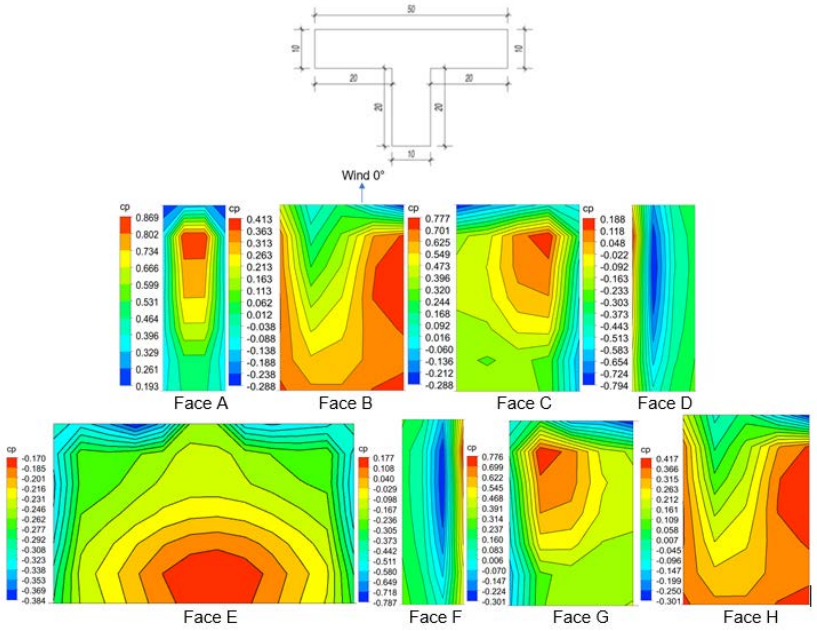

Figure 11. Mean Pressure coefficients in Model T2 for 0° wind incidence angle

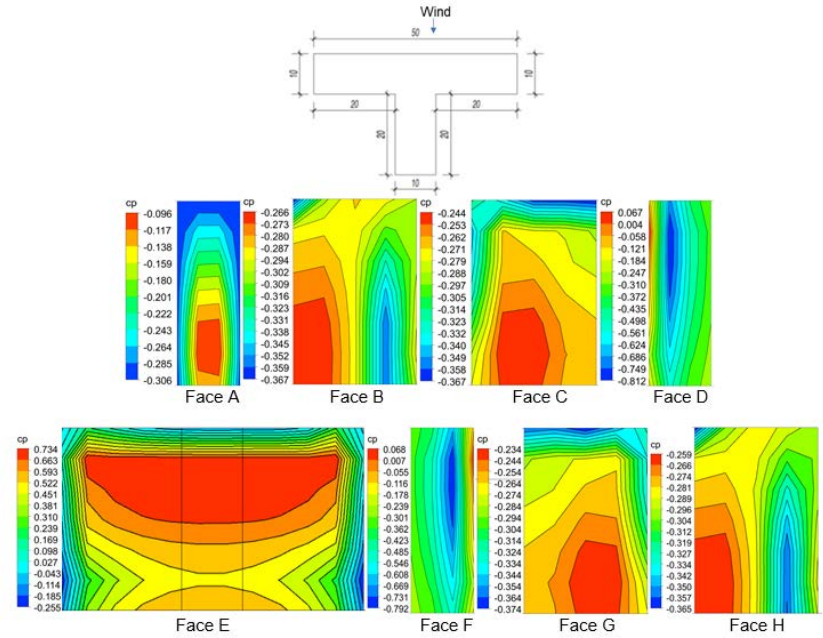

Figure 12. Mean Pressure coefficients in Model T2 for 180° wind incidence angle

To summarize the obtained significant results, when L1 and L2 models were compared, elongation of the surface C, or in other words, the increase of the projection ratio from 0.66 to 0.80, the positive and negative pressure coefficients increased in all L-shaped models for both 0° and 180° wind incidence angle. These increases are more noticeable in negative pressures rather than positive pressures. Moreover, these negative pressure coefficient increases are more clearly observed on B, C and F surfaces in L models where the wind angle is 0°. On the other hand,

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in L models where the wind angle is 180 degrees, these negative pressure coefficient increases are more clearly seen on the D, E and F surfaces. In both cases where the wind angle is 0 degrees and 180 degrees, the maximum negative pressure in all L models is on the F surface. Moreover, In L models, the highest negative pressure was recorded on the F surface when the wind angle was 180 degrees as 1.249. When the wind angle is 180 degrees, similar negative pressures are noticed on the B and C surfaces on both L 1 and L2 model. Besides, in the case where the wind angle is 0 degrees, a significant increase in negative pressure coefficients was observed on C surface in L2 model compared to the L1 model. In other words, the increase in the projection ration caused a rise in the negative pressure coefficient on the C surface. On the other hand, when we look at windward surfaces in L1 and L2 models, when the wind angle is 0 degrees, total positive pressure coefficients on A and C surfaces is considerably higher than the E surface when the wind angle is 180 degrees.

In T models for 0˚ wind incidence angle, with elongation of the surface C and G, or in other words, the increase of the projection ratio from 0.33 to 0.40 in the line of X direction, while the positive and negative pressure coefficients on the B, C, G and H surfaces rise, the positive pressure coefficients on the D and F surfaces decrease significantly. However, negative pressure values increased on D and F surfaces. In addition, a slight decrease was observed in the positive pressure coefficient on the A surface. Moreover, as the E surface got longer, the negative pressure coefficient on its surface increased. With elongation of the surfaces C and G, all negative and positive pressure coefficients increased. In T models for 180˚ wind incidence angle, with elongation of the surfaces C and G, while the positive pressure coefficients on the D, E and F surfaces decrease, the negative pressure coefficients increase. In shortly, with elongation of the surfaces C and G, while all positive pressure coefficients decreased, all negative pressure coefficients increased in T models for 180˚ wind incidence angle. Besides, in T models for 0˚ wind incidence angle, while all negative pressure coefficients increased, positive pressure coefficients increased except A, D and F surfaces. When we look at windward surfaces in T1 and T2 models, when the wind angle is 0^o, total positive pressure on A, C and G surfaces is considerably higher than the E surface when the wind angle is 180 degrees. While the highest positive pressure coefficient was observed in T1 model for 0˚ wind incidence angle, the highest negative pressure coefficient was noticed in T2 model for 180˚ wind incidence angle.

Pressure coefficients on horizontal lines

The surfaces are sliced respectively at 2H/3, H/2, and H/3 height level were given in Figure 3. In Figure 13, the C_p values of all surfaces were given for L1 model for the incidence angle of 0^o and 180^o. In L1 model for the of 0^o wind incidence angle, c_p coefficients on windward surfaces (A and C surface) increased along the height of the building. Moreover, on

leeward surface (E surface) and the side surfaces (D and F surface), c_p coefficients increased slightly along the height of the building. On the contrary, c_p coefficients on B surface tend to decrease along the height of the building. However, these coefficients tend to increase as they near to the windward surfaces of the surface of A and C. In L1 model for the of 180º wind incidence angle, all c_p coefficients increased in all surfaces as the building height increased. Moreover, this increase is clearly observed in the E surface.

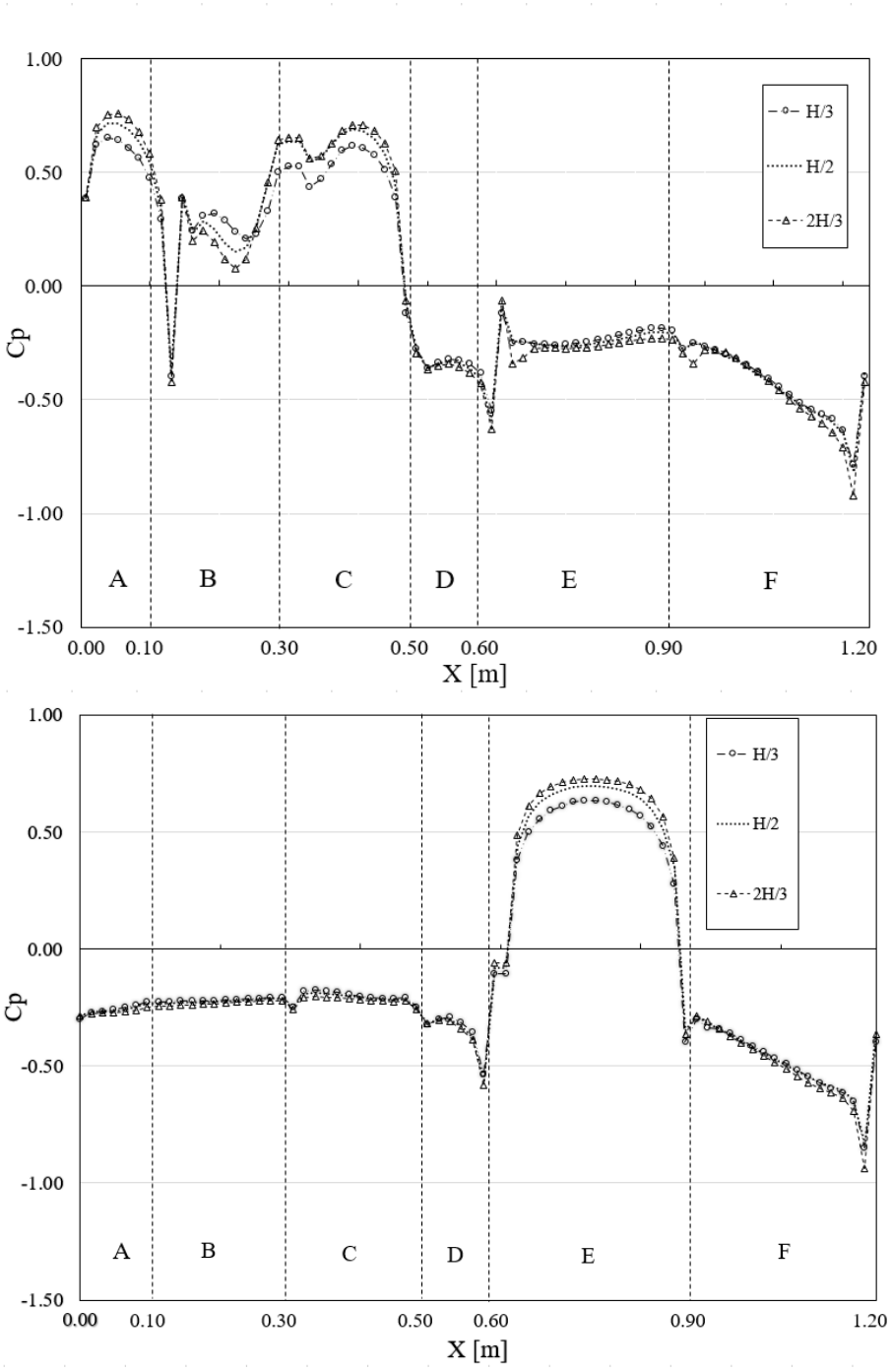

Figure 13. Pressure coefficients of L1 model along the horizontal lines for 0º and 180° wind incidence angle, respectively

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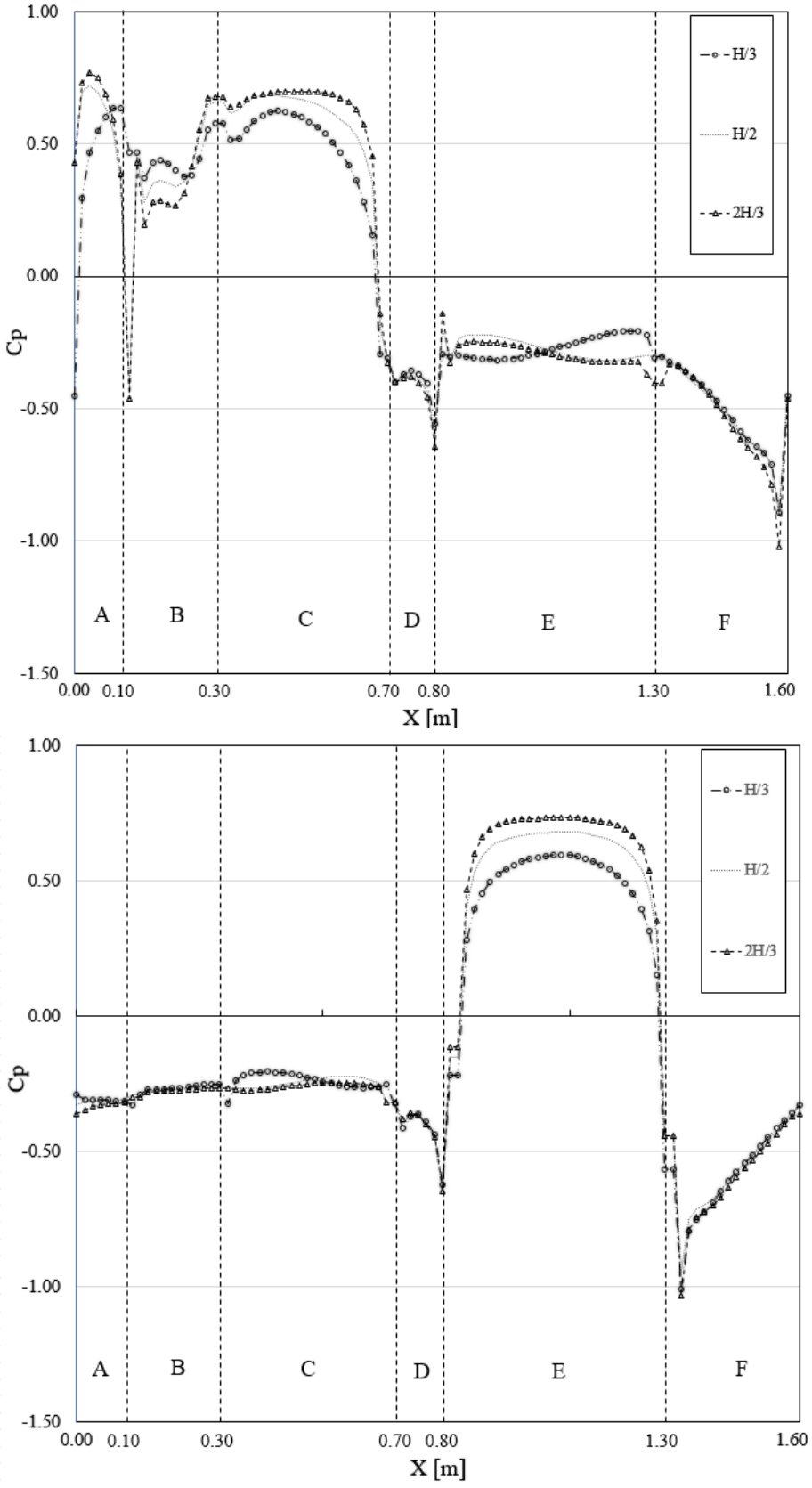

Figure 14. Pressure coefficients of L2 model along the horizontal lines for 0° and 180° wind incidence angle, respectively

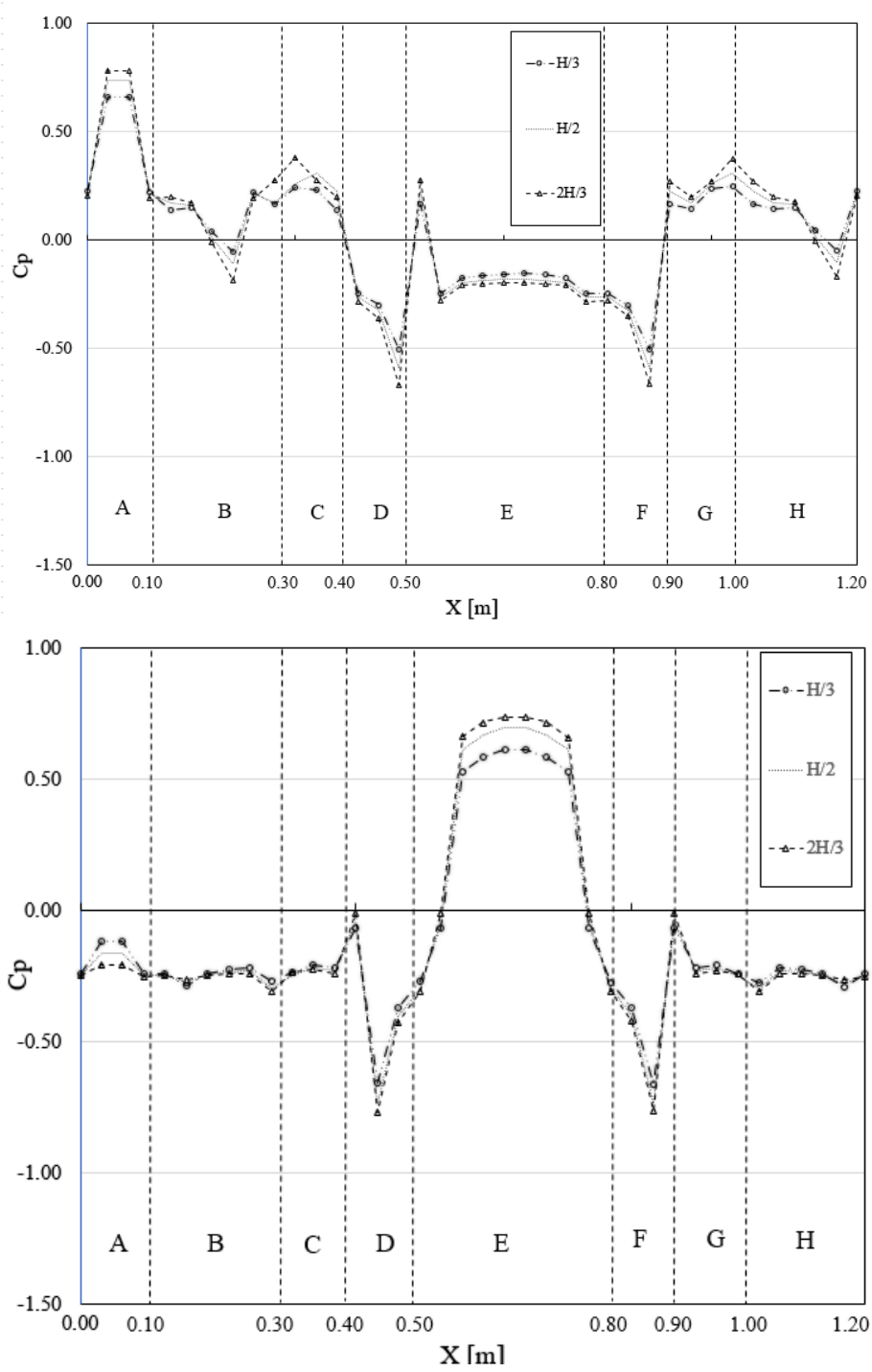

Figure 15. Pressure coefficients of T1 model along the horizontal lines for 0° and 180° wind incidence angle, respectively

In Figure 14, the C_p values of all surfaces were given for L2 model for the incidence angle of 0° and 180°. In L2 model for the 0° wind incidence angle, c_p coefficients on windward surfaces (A and C surface) increased along the height of the building. Moreover, on leeward surface (E surface) and the side surfaces (D and F surface), c_p coefficients increased slightly along the height of the building. On the contrary, c_p coefficients on B surface tend to decrease along the height of the building. However, these coefficients tend to increase as they near to the windward surfaces of the surface of A and C. In L2 model for the of 180° wind incidence angle, all c_p

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coefficients increased in all surfaces as the building height increased. Moreover, this increase is clearly observed in the E surface.

In Figure 15, the C_p values of all surfaces were given for T1 model for the incidence angle of 0° and 180°. In T1 model for the 0° wind incidence angle, while a regular increase or decrease was not observed in the pressure coefficients on B,D,F and H surfaces, it was noticed that the pressure coefficients increased with height of the building on all other surfaces. All these features are similar to the T1 model for the 180° wind incidence angle. However, the rise in pressure coefficients is clearly observed in A and E surfaces for the 180° wind incidence angle (windward and leeward surfaces, respectively).

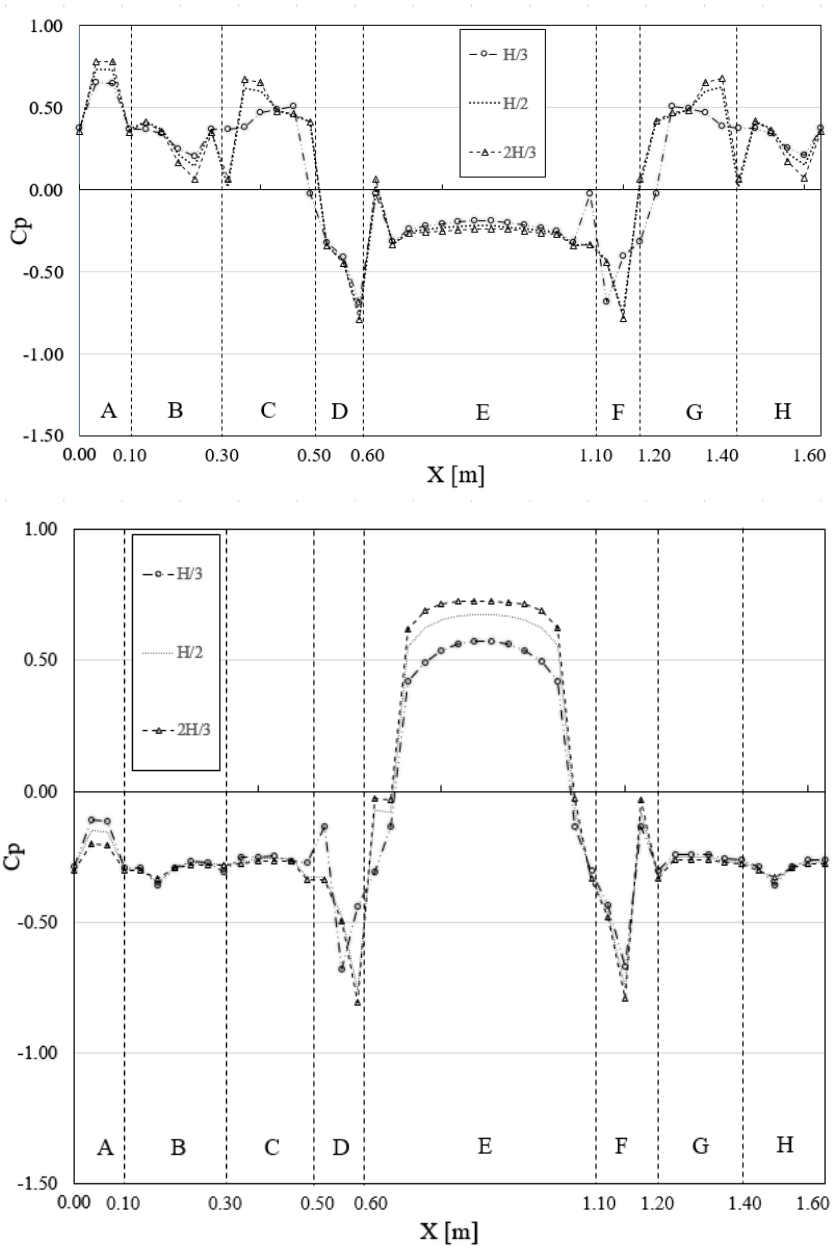

Figure 16. Pressure coefficients of T2 model along the horizontal lines for 0° and 180° wind incidence angle, respectively

In Figure 16, the C_p values of all surfaces were given for T2 model for the incidence angle of 0° and 180°. In T2 model for the 0° wind angle, the increase in the pressure coefficients is clearly observed in A and E surfaces (windward and leeward surfaces, respectively). There was no a regular increase or decrease on the other surfaces. In T2 model for 180° wind incidence angle, the pressure coefficients tend to increase along the building height except surfaces of D and F. Moreover, the rise in the pressure coefficients is clearly observed in A and E surfaces for the 180° wind incidence angle (windward and leeward surfaces, respectively).

Pressure coefficients on vertical lines

The changes on pressure coefficient on the vertical lines designed at different distances from the corner of the building are shown in Figure 17 on the L1 formed models for the situation where the wind comes at an angle of 0°. It has been noticed that the pressure coefficients decrease on B surface as the vertical lines move away from the corner point of the building. Furthermore, the pressure coefficients on all vertical lines decrease approximately to 5 meters of the building height, then increase to 20 meters of the building and then decrease again and negative pressure coefficients are noticed following 25th meter. The highest positive and negative pressure values were noticed on the line 1 meter away from the reentrant corner on the B surface. These highest pressure coefficients are 0.65 and -0.57. Also, for L1 model, a regular increase or decrease were not observed on the pressure coefficients on C surface, as the distance between vertical lines and re-entrant corner increase. The highest positive and negative pressure coefficients on surface C were noticed on the vertical lines nearest to the middle of the C surface. The highest ones were noticed on vertical line which is 10 meter distance from the re-entrant corner. In other words, the highest pressure coefficients were observed on the vertical line in the middle of the C surface. The highest positive and negative pressure coefficients are 0.70 and -0.67, respectively. Moreover, the behavior of the pressure coefficients across the building height is similar to that on the B surface.

The changes on pressure coefficient on the vertical lines are shown in Figure 18 on the L2 formed models for the situation where the wind comes at an angle of 0°. On B surface, as the distance between vertical lines and the re-entrant corner increase, the pressure coefficients decreased as similar to surface B of L2-shaped model. Furthermore, the highest positive and negative pressure coefficients noticed on B surface were 0.68 and -0.68, respectively. These values were noticed on the vertical line from the 1 meter away from the corner. Also, the highest positive pressure coefficient on the C surface were noticed on the vertical line of 20 meter away from the re-entrant corner. The highest negative pressure coefficients were observed on vertical line 6-meter distance between the re-entrant corner. The highest positive and negative pressure coefficients on C surface are 0.69 and -0.81, respectively.

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Moreover, the behavior of the pressure coefficients across the building height is similar to surfaces of L1 model.

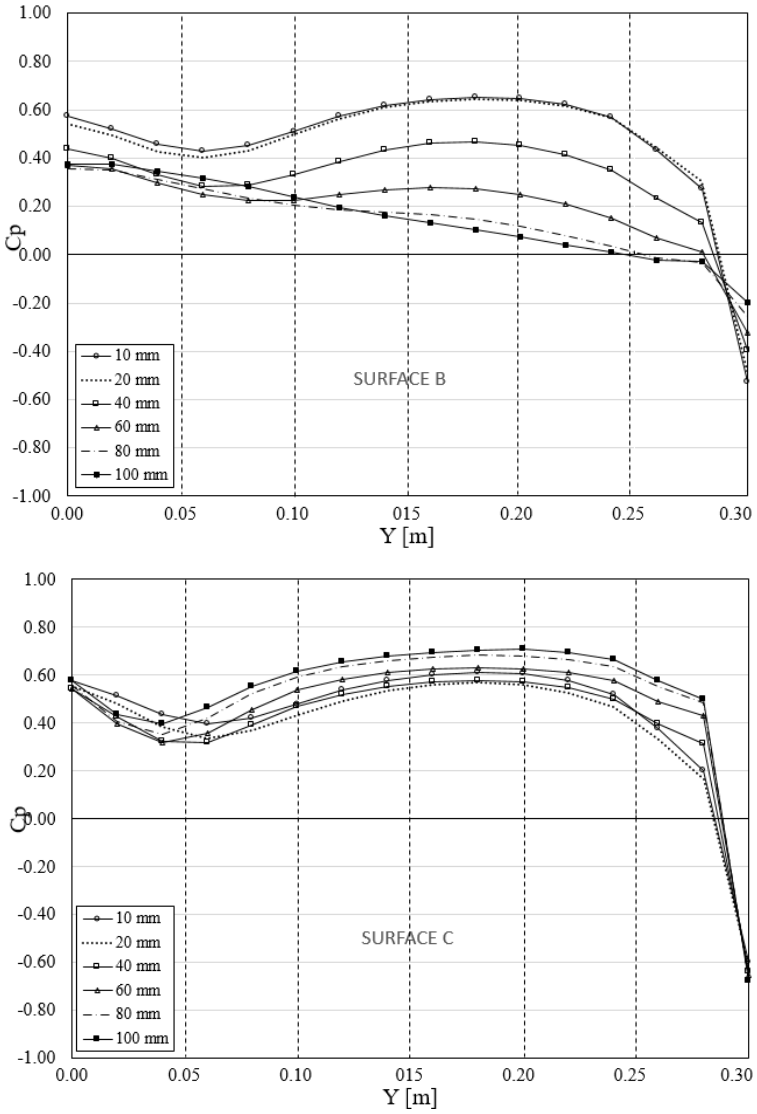

Figure 17. Pressure coefficients along the vertical lines of the L1 model for normal incident flow (0°) to surface B and surface C

The changes on pressure coefficient on the vertical lines designed at different distances from the corner of the building are shown in Figure 19 on the T1 formed models for the situation where the wind comes at an angle of 0°. On B surface, as the distance between vertical lines and re-entrant corner increase, the pressure coefficients decreased. Furthermore, the highest positive and negative pressure coefficients noticed on B surface were 0.19 and -0.15, respectively. These values were noticed on line 1 meter distance from the re-entrant corner. Pressure coefficients on all vertical lines on B surface of the T1 model showed similar behavior along the building height except the vertical lines which were distanced from 8 and 10 meter away from the re-entrant corner. At these vertical lines, the pressure coefficients showed sharp decreases along the height of the building. On the other hand, for T1 model, a regular

increase or decrease were not observed on the pressure coefficients on C surface related to the position of the vertical lines.

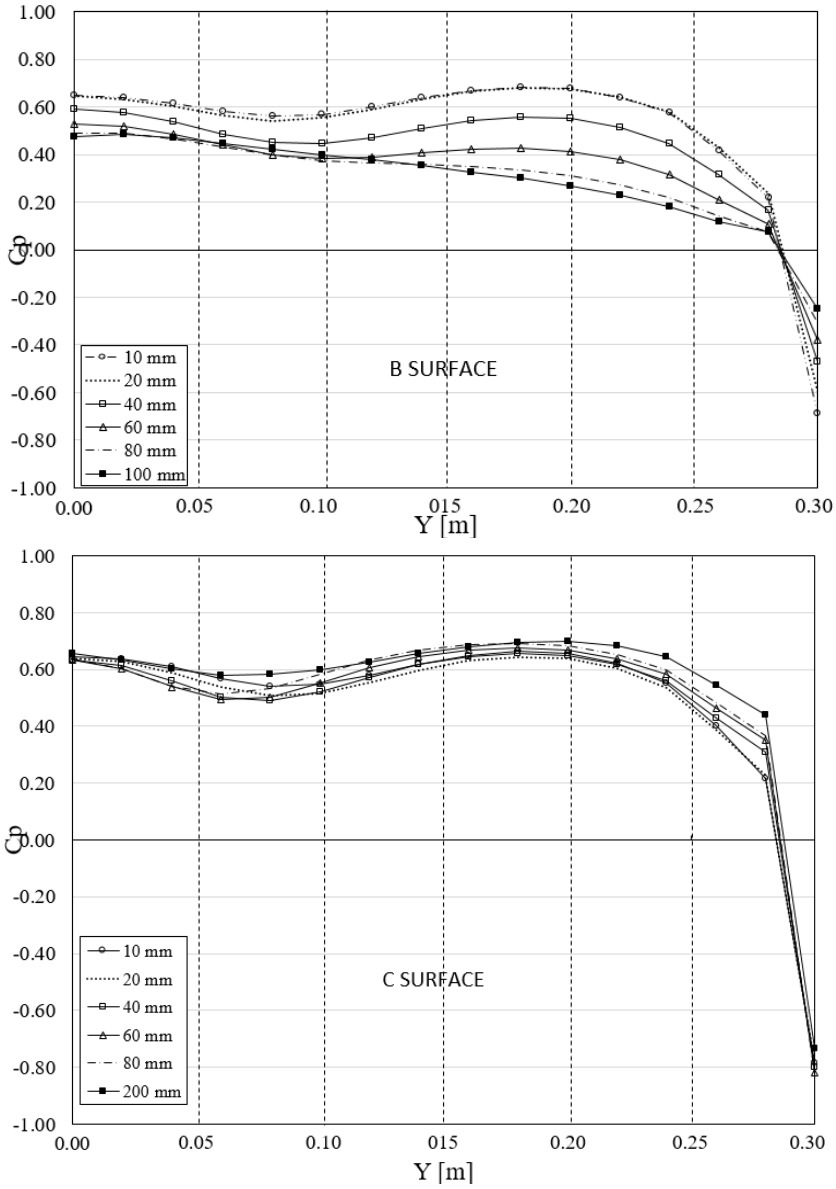

Figure 18. Pressure coefficients along the vertical lines of the L2 model for normal incident flow (0°) to surface B and surface C

The greatest positive pressure coefficients on the C surface were noticed on the vertical lines nearest to the middle of the C surface from 6-meter distance from the re-entrant corner and the highest negative pressure coefficients were observed on line distance of 1 meter from the re-entrant corner. The highest positive and negative pressure coefficients on C surface are 0.47 and -0.13, respectively. Furthermore, the pressure coefficients on all vertical lines increased approximately to 25 meters of the building height, then decrease and negative pressure coefficients were only observed on vertical lines away from 1 meter and 2 meter away from the re-entrant corners.

The changes on pressure coefficient on the vertical lines designed at different distances from the corner of the building are shown in Figure 20 on the T2 formed models for the situation where the wind comes at an

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angle of 0°. On B surface, as the distance between vertical lines and re-entrant corner increase, the pressure coefficients decreased. Furthermore, the greatest positive and negative pressure coefficients noticed on B surface were 0.40 and -0.25, respectively.

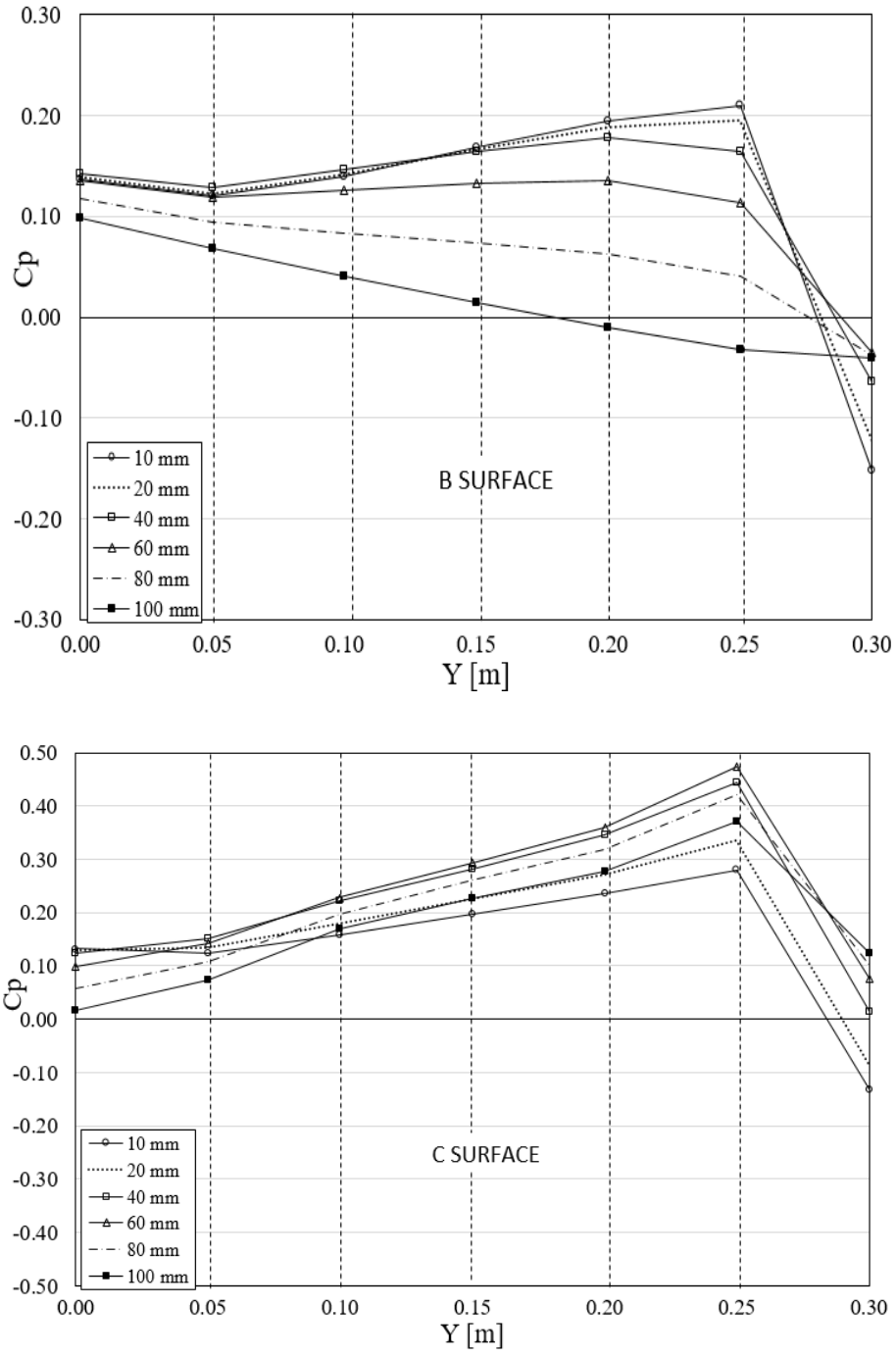

Figure 19. Pressure coefficients along the vertical lines of the T1 model for normal incident flow (0°) to surface B and surface C

These values were noticed on line 1-meter distance from the re-entrant corner. Pressure coefficients on all vertical lines on B surface of the T2 model showed similar behavior with T1 model along the building height except the vertical lines which were distanced from 8 and 10 meter away from the re-entrant corner. At these vertical lines, the pressure

coefficients showed sharp decreases along the height of the building. On the other hand, for T2 model pressure coefficients were generally increased on C surface, as the distance between vertical lines and re-entrant corner increase. Furthermore, the highest positive pressure coefficient on the C surface were noticed on line of 20-meter distance from the re-entrant corner.

The highest negative pressure coefficients were observed on vertical line 1 meter away from the re-entrant corner. The highest positive and negative pressure coefficients on C surface are 0.65 and -0.26, respectively. Furthermore, the pressure coefficients on all vertical lines decreased up to approximately 5 meters of the building height, then increased and again started to decrease from the 25-meter height level of the building.

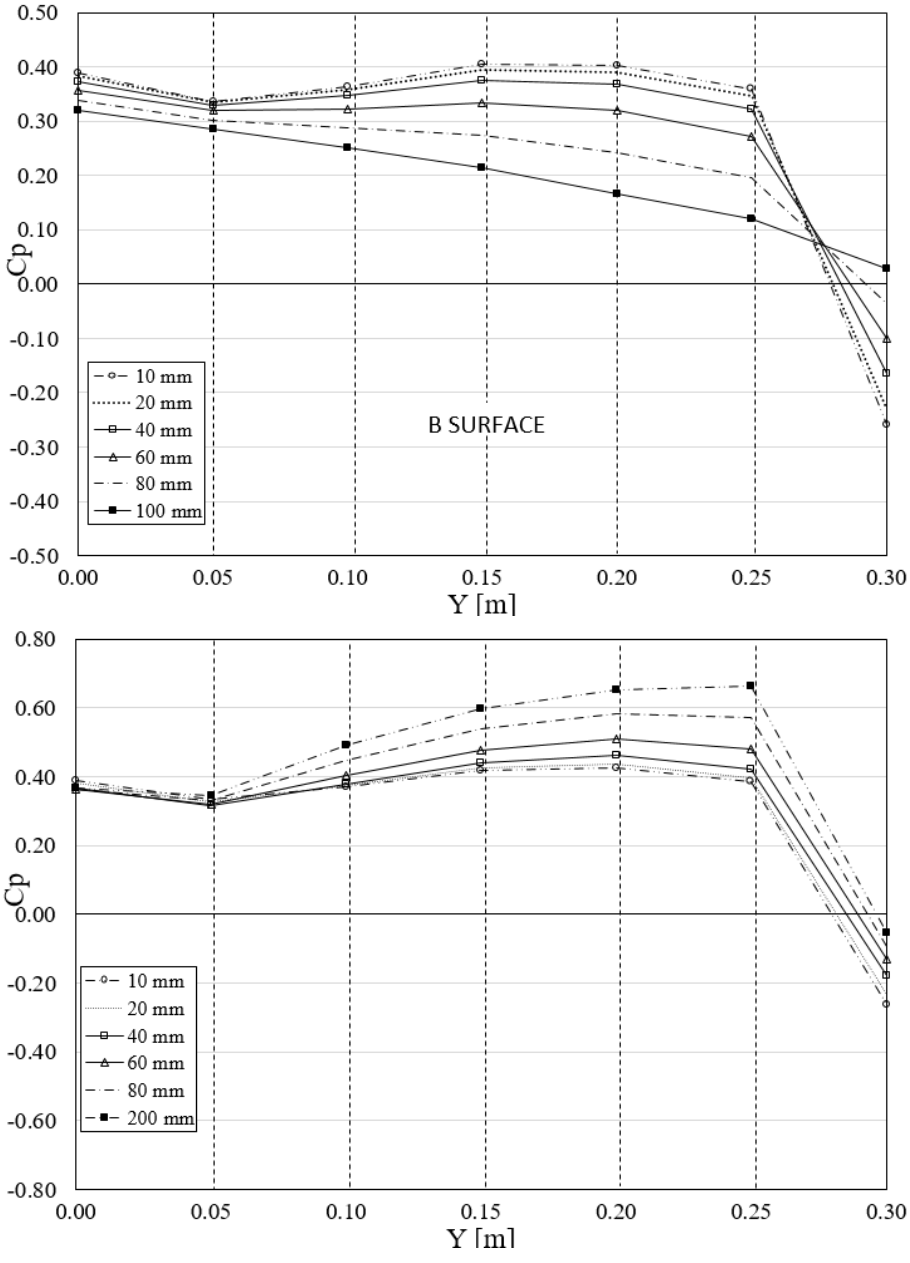

Figure 20. Pressure coefficients along the vertical lines of the T2 model for normal incident flow (0°) to surface B and surface C

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Velocity Distributions

In Figures 21 (a) and 21 (b) the streamlines on mid-horizontal plane and on condition of 0°, and 180° wind angle, was given. Wind flows sharply at high velocity from the windward surface closest to the windward corners. The break and speed up of the flow noticed at the corners and the wind flow reverses just behind these corners, creating negative pressure regions. At 0° wind angle, two symmetrical eddies appear in the trace region of the T-formed building. It was like simple shaped buildings. However, solely a huge and unsymmetrical vortex appears behind the model at L Shaped building.

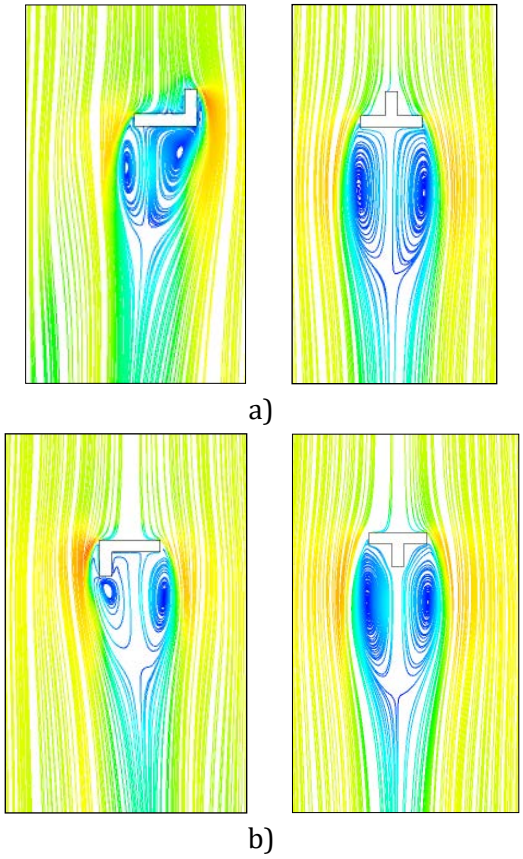

Figure 21. Streamlines around the L-shaped and T shaped model on the horizontal mid-plane (H/2), a) normal incident flow (0°) and b) 180° incident flow, respectively

When wind flow comes to the building the flow divided into two different areas as illustrated in Figures 22-24. Nearest to that areas, significant flows occur. The leeward surface of the model is usually wake area and smaller negative pressures is noticed. This causes drag forces in the leeward direction on surface of the building. The separated streams are reattached at the building's downwind rear stagnation point.

Wind flows around the different building forms were presented in Figures 22-24. On height level of z=H/3, turbulent flow is observed on the side surfaces of the all models. Moreover, the velocity in the track zone decreases and reverse flow zones are formed. The greatest velocity happens on side surfaces. It is observed that the maximum velocity region expanded with increasing height in all models for both wind incidence angle on the side surfaces. On the other hand, it is noticed that the drop

in the velocity in track area reduced with rising in height. At trace region, velocity decreases in all models in the velocity region. However, as the building height decreases, the velocity drops in track zone increases. Velocity region in L2 model is wider than L1 model. On the other hand, the velocity region at T2 models is larger than T1 models.

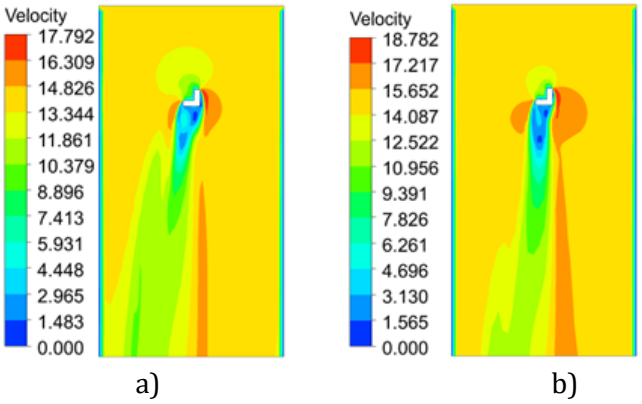

Figure 22. Velocity distributions around L1 model for normal incident flow (0°) a)z=H/3,b)z=2H/3, respectively

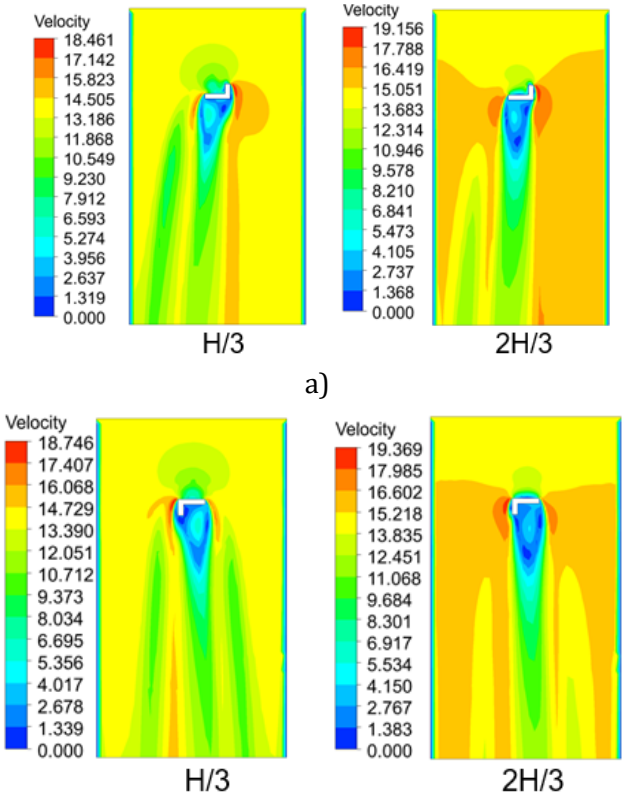

Figure 23. Velocity distributions around L2 model for z=H/3 and 2H/3 level a) normal incident flow (0°) b)180° incident flow, respectively

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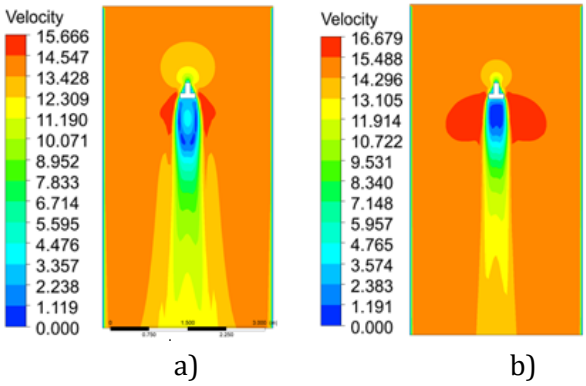

Figure 24. Velocity distributions around T1 model for normal incident flow (0°) a)z=H/3, b)z=2H/3, respectively

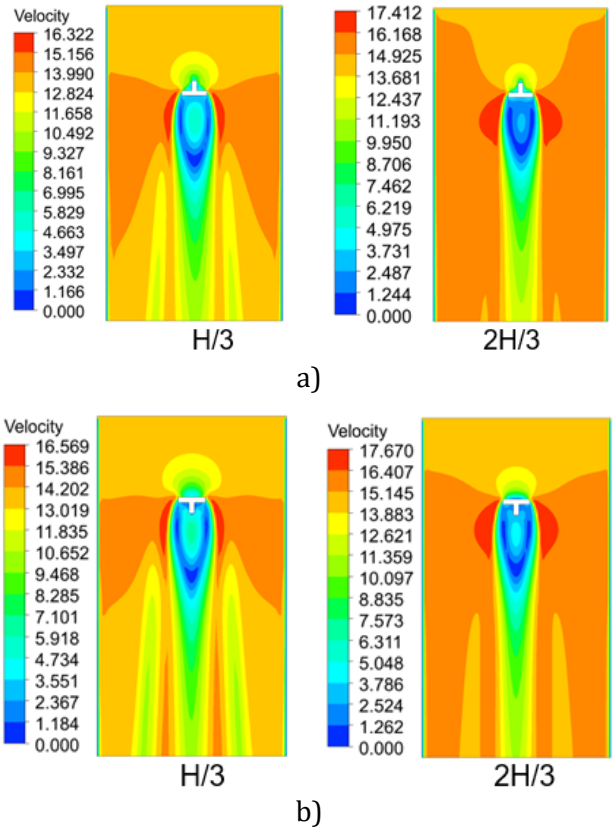

Figure 25. Velocity distributions around T2 model for z=H/3 and 2H/3 level a) normal incident flow (0°) b)180° incident flow, respectively

Conclusions

In this study, the variations on pressure coefficients for irregular formed buildings were analyzed for wind angles of 0° and 180°. The study aims to examine the significance of irregular plan shape, projection ratios, wind incidence angles, height levels, building areas and the re-entrant corner's distance on wind flow mechanism and variations on pressure distributions. L and T-shaped models which have similar building height but have dissimilar plan area and projections in plan were analyzed in detail. ANSYS Fluent 20.0 software is applied for analyzing the models. Flow is assumed as fully turbulent, steady and three dimensional. From analysis broad conclusions were obtained. As a result of the studies, it has been observed that the plan shape, wind incidence angle, projection

ratios of models, distances from the reentrant corner significantly affect the wind characteristics of models. The findings were evaluated based on projection ratios, wind incidence angles, building areas, the position of horizontal and vertical lines and wind flows.

If models were investigated according to the projection ratios and building areas, it was noticed that in L models while the increase in the projection ratio (PR) was considerably influence on positive and negative pressures. It was significantly observed in negative pressure coefficients. All pressure coefficients raise with the expansion of projection ratio (PR). On the other hand, it was noticed in all T models for the both wind incidence angles that while the positive pressure coefficients decrease with increase in the projection ratio and building area, negative pressure coefficients rise with the high projection ratios(PR). With the increase in building area, the highest negative pressures were seen in L2 and T2 models. When L and T models with the same building area are compared, the highest negative pressure was seen in the L model with a high PR (0.80). In L and T formed buildings, it was noticed that the negative pressure coefficients two times greater when the PR value decreased to half. In all T models, the greatest negative pressure coefficients were noticed on the D and F surfaces for both wind angles. In all L models, the greatest negative pressure coefficients were noticed on F surface for both wind angles.

When we looked at the pressure coefficients for building height level of 2H/3, H/2 and H/3, it was observed that they increased related to building height's increase on all surfaces on all models for both 0° and 180° wind incidence angle. On the other hand, when we looked at the pressure coefficients on vertical lines which were replaced various distances from re-entrant corner, it was observed that the re-entrant corners distance significantly effects pressure coefficients. In general, it has been observed that the pressure values on the B surface decreased in all models, and increased on the C surface as moved away from the re-entrant corner.

When wind flows around the different building forms were examined, in all models, highest velocity occurs on side surfaces. It is observed that the maximum velocity region on side surfaces expanded with increasing height. In trace region, velocity decreases in all models. Wind is an important design parameter that should be considered from the initial stage of architectural design. This research intends to provide an awareness on buildings behavior exposing wind loads in order to create solutions for different conditions on each part of architectural design phase especially architects and architectural students The obtained results from the CFD analysis will supply extensive data about the wind load effects on irregular buildings.

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CONFLICT OF INTEREST

No conflict of interest was declared by the author.

FINANCIAL DISCLOSURE

The author declared that this study has received no financial support.

ETHICS COMMITTEE APPROVAL

Ethics committee approval was not required for this article.

LEGAL PUBLIC/PRIVATE PERMISSIONS

There was not required any permission for this article.

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Resume

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Research Article

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Impacts of Judicial Verdicts on Land Acquisition Practices for Real Estate in Pakistan

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Abstract

Purpose

It is commonly observed in many regions in the developing countries that inappropriate and legally invalid modes are adopted by realtors (individuals or enterprises facilitating the sale and purchase of property) to procure land, but the reasons behind these procedures are neither documented nor critically analysed, which this paper attempts to do.

Design/Methodology/Approach

Five case studies have been chosen for detailed probe. Each case brings into focus different approaches adopted by realtors to acquire land and develop real estate ventures. Review of the judicial records, assessment of case study information and holding focus group discussions for each case are the main ingredients of research methods. The data was then analysed using content analysis method; the data was coded, themes were identified and conclusions were drawn accordingly.

Findings

The case study accounts included in this study have sufficiently established that the courts verdicts have a contextual connection. These findings point towards the requirement for alternative frameworks and supporting theoretical basis which are attuned with these non-confirmative practices and lie beyond the realm of established international literature and practices like Hartmann & Spit, 2015; Krabben & Jacobs, 2013.

Research Limitations/Implications

The sensitivity of the case studies made affectees uncomfortable in discussing the cases.

Originality/Value

Judicial interventions are often initiated when the desired efficiency and legality is not ensured, as is in the case of Pakistan. In such cases, the internationally established theoretical paradigms fall short of providing any explanations (Hartmann & Spit, 2015; Krabben & Jacobs, 2013). This paper examines in particular how in such scenarios, the status of such land acquisition practices, turns out especially where superior judiciary had to intervene for streamlining the process.

Keywords: *Real estate, land acquisition, court intervention, disposal of property, realtors*

INTRODUCTION

Real estate comprises enterprises related to developing, disposing, owning, financing, renting and appropriating immovable properties in a tangible context. From a societal perspective, this enterprise offers several merits. It streamlines the rights and responsibilities of owners, state institutions and the society in respect to land and developments undertaken on it. It helps establish the rule of law in relation to various forms of utilization of space by the concerned, privileges possessed and granted as well as limitation in these respects. Clear demarcation of property rights also prevents anarchic practices in various contexts. It is perhaps for this backdrop that property rights have been described and protected by constitutional arrangements in working democracies all across the globe [see for example cases of US Constitution (Harvey,2010; Jacobs, 2010 and Caron, 2018)]. Detailed mechanisms of property developments, promotions, marketing, sales and purchases, modes of dispute resolution, methods of transaction and disposal are provided in legal and administrative frameworks emanating from constitutional arrangements.

Ordinary people repose enormous trust in property market investments. Traditionally the investment in land and property is considered as the safest avenue for ordinary people. In the Pakistani context, circumstantial changes of various kinds have seriously distorted this mechanism. Unabated encroachments and forced occupation of developed and demarcated plots have been commonly done by the politically influential stake holders. Similarly individual owners of apartments, shops and other dwellings have been harassed in many locations, to affect choices of owning, disposing or renting their properties. Like all other markets, land and property dealings require a peaceful environment where transacting parties have complete freedom to make choices. This trading privilege is utmost vital to realize the full potential of the concerned parcel of property. The other attributes that support fair transactions include dependable land / property titles, error free mutation procedures, articulated valuation mechanism, clear schedules of charges and taxation as well as transparency in management of records by land owning agencies. Prevailing scenario in this respect is very disappointing on almost each count in the context of Pakistan. Incidences of fictitious and fraudulent allotments, duplicate and even multiple claims, dubious record keeping and cumbersome mechanism of registration are some of the common ailments in property markets. Even the high profile transactions are not free from such encumbrances. Thus, when some real estate enterprises claim to eradicate all such malpractices and performance errors, investors and ordinary people tend to prefer them over the others. However such enterprises may not follow the practices for land acquisition in a legal and administratively valid manner, which makes the core focus of this research. The paper documents and analyses the practice of these

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enterprises in instances where conflict arose, and the SCP had to establish special benches to oversee their progress. The finding points towards the fact that even within the formal sector real estate market, there is room for these unorthodox practices which fall beyond the internationally established theoretical and workable paradigms (Hartmann & Spit, 2015; Harvey, 2010; Oyedele, 2018) and need further theorization, which this paper attempts to do. The rulings by the Judiciary are one such practice, which is reviewed here in detail, and its impact on investors and various stakeholders is analysed. The scope of the paper is to highlight the requirement for development of a theoretical paradigm that addresses irregularities in contested legal deals and deviate from legal and administratively valid practices.

LITERATURE REVIEW

Real Estate in Developing Countries

Real estate can be defined in several ways. According to one definition, it is an enterprise of property production, management and transaction (Hasan, Ahmed, Raza, Sadiq, & Ahmed, 2015). Real estate is an immovable asset or property that is fixed to one location. For urban properties, this includes land and any structure built on it (Oyedele, 2018). Real estate is also considered as a legal term that refers to land and development done on it in various forms and formats. It is not limited to residential use alone. It flourishes and gains greater value when diversity of uses are planned and allowed in an intelligent manner (Bony & Rahman, 2014). Benefits of investing in real estate are several. Steady income, long term financial security, tax benefits, coverage of mortgage payments, gradual value appreciation of real estate over time, hedging capacity against inflation and independence in decision making are some points (Oyedele, 2018).

Wide range of typologies exists for real estate enterprises. Developed and transactable properties can be of various kinds such as apartments, condominiums, villas, commercial accommodation, transitional rentable spaces, warehouses, mansions, retail outlets, service centres and many emerging spatial typologies. The stakeholders comprise real estate developers or realtors, investors, agents, buyers and sellers, service providers, banks and financial institutions as well as regulators. A well performing real estate mechanism is generally gauged by the periodic rise in the volume of trading, transparency, enforcement of essential principles of equity, rational accruing to the investment of shareholders, an all positive image of the business and a general trust subscribed by all the concerned participants (Rehman, 2014). The realtors face many challenges in a bid to accelerate the trading as well as its up scaling. Choice of sites free from encumbrances, follow up of building/zoning regulations, financial governance and its evidences, satisfaction of all stakeholders and assurance of profit making opportunities in a continuous manner are some of the tough hurdles that have to be crossed all the while. Amongst the various activities, the maintenance of

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a strong current of transactions remains a paramount challenge. Thus, the realtors stretch out the sales to the financially strong clientele with an objective to expand the capital base. In practice, realtors are not necessarily concerned about the social advantages of the outputs generated by the ventures. As land is precious and finite ingredient of any real estate enterprise, the realtors continue to explore the available options to facilitate ample supply through buy outs, re-cycling and renewal modes, conversions and even intensive utilization. It is common sense that developable urban land – especially in relatively stronger market environments – is in short supply. To augment this factor of production, realtors resort to all business strategies (Rajak & Roy, 2016).

Benefits of investing in real estate are several. Steady income, long term financial security, tax benefits, coverage of mortgage payments, gradual value appreciation of real estate over time, hedging capacity against inflation and independence in decision making are some points. Methods of investments include personal family savings, partnerships, total cost based buying, mortgage, invest in crowd funded real estate and Real Estate Investment Trusts (REIT). Real estate sector has made great advances through information technology options and smart solutions for connecting different stakeholders. Over time connection between the developer and buyer has also greatly improved. Challenges in real estate investment however include timing, being successful in the first deal, general risks involved, opportunity costs of rival investment, getting the right value for money and fraud are common place. Real estate markets in developing countries are underfunded and non-professionally managed. Fraudulent practices are also common in developing countries (Oyedele, 2018). In this backdrop, individuals have to equip themselves with strategic knowledge that can empower them to take correct and timely decisions. Assessment of real estate project for its legality, performance, market appeal, cost benefit options and re-sale prospects are some variables that may be reviewed by individuals before making choices (Ariyawansa & Gunawardhana, 2016).

Real Estate and Land Management Tools

Real estate development comprises of several stages. Land acquisition is the first stage, while maintenance of the estate may be termed as the final stage. From the time of inception to the end of development, the risks related to delays in land acquisition (market and regulatory risks), and actual sale of units (development potential risks) are important factors. These processes depend on the various models involved in the land acquisition, design and development processes. The two models outlined in international literature are 'active' and 'passive' models (Hartmann & Spit, 2015; Krabben & Jacobs, 2013). The active model for land development relies on the role of urban professionals in directly being associated with land development, as is the case in Dutch cities, whereas the passive model, as practiced in German cities in the form of land readjustment, depends on national policies and may or may not

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lead to efficient and legitimate access to the housing market (Hartmann & Spit, 2015). The decision related to the adoption of a model directly impacts land value and cost recovery in the longer run. Pre-selling is another option adopted by builders and developers (Oyedele, 2018; Jacobs, 2010).

In order to attract and incentivize the private developers, tax abatements and reliefs are common practices (Mandelker, 2017). Regulatory controls are applied in different manners. In usual cases, the regulatory checks on land acquisition and development are done exercising the usual policing approach. This may be altered and replaced by a practice where public agencies can buy the concerned owner's right to use the land in ways harmful to the community. This shall leave the said owner to use the land only in an appropriate and non-harmful manner. In the American legal context, individualistic bias is often found in taking planning decisions. Planning functions best in such situations where there is a consensus among all the community members. Planning authority must deny development permits in areas which can cause nuisance, danger to the very sustenance of communities and a disaster risk. For instance, development permits must not be allowed in locations which fall in flood plains. In the usual scheme of development, no amount of ordinary construction precaution shall save the future settlers in such areas or the nearby neighbourhoods (Mandelker, 2017).

Several models are practiced by developers, especially in South Asia. Direct acquisition from owner, development agreement between farmer/land owners, long term lease from government/land owners, farmers direct investment, redevelopment and private equity funding either through local firms or foreign direct investment are possibilities. Possible risks encountered by realtors include failure in getting desired benefits, unclear land titles, change in government policies, failure in negotiating timely agreements, initial upfront investment, consequences due to ambiguous agreements and conflict among stakeholders (Shah, 2017). These methods fall beyond the realm of general theoretical discourses and have limited analysis available, which this paper attempts to do.

Procedures, processes and approaches adopted by realtors for land acquisition

Mathews, Pai, Sebastian, & Chakraborty (2018) conducted an interesting study in the Indian context. According to them, for rapidly urbanizing regions, it is important to study the mechanisms of land supply for various purposes and for different categories of people. It is also vital for the public agencies to develop a mechanism of land value capture that can enable them retrieve the cost so that present and future investment in building infrastructure can be carried out. Six methods have been studied in this research. The Town Planning Scheme in Gujarat allows private land owners to contribute their land to a public scheme where, after consolidation, physical planning and allocation for infrastructural

provisions, it is given back to the land owners. The owners benefit due to an enhanced threshold status when compared with the original land form, while the government charges a betterment levy to acquire the investment undertaken. Land pooling in Amravati, Andhra Pradesh is done by voluntary pooling of land by owners, for including the land by the government into the master plan. The authority assembles land for various purposes, including infrastructure and housing for the urban poor linked to the area. The authority benefits by the land it retains for amenity purposes and the fee charged in respect to betterment bought to the land. In this particular case, thirteen thousand hectares of land was pooled in two months, which is the largest single undertaking in India of its kind.

In Navi Mumbai Airport Influence Area, the land owners were invited to contribute land for various infrastructural and other required development purposes. In lieu, the participating land owners benefited from additional development rights on the remaining land. Charges were recovered from the sale of amenity parcels, betterment levies on non-participating land owners and space area enhancement related premiums.

Joint Development Model in Haryana is another public private partnership model. The private developer, after seeking permission from the authority, plans, subdivides and sells the plots as per approved plan. The developer also undertakes internal infrastructure development while the trunk/external development is done by the authority. The authority captures the land value through a share in profits as well as partial costs recovered from developers for trunk infrastructure. In Mumbai, the land owners whose land is reserved for a public purpose as per master plan hand over a certain portion for social and physical amenities. In return, they benefit from additional development rights or transferable development rights. The Authority benefits due to free acquisition of land and infrastructure improvement levy imposed on all the users. Furthermore, Cluster Redevelopment Scheme enables private developers to undertake urban renewal in derelict locations (0.4 hectares in the city and 1 hectare in suburbs). For the investment made in urban renewal, the developer benefits from enhanced floor space ration. Development fees is charged by the government in such schemes.

To examine the significance of these alternatives, several parameters are applied. Recognition of public purpose, public purpose land secured, operational process, enabling framework, compensational resettlement and rehabilitation, recognition of rights, participation mandates, cost recovery mechanisms, post development benefits, grievance redressal and extension of court's jurisdiction are some of the parameters. There are some indirect costs which also need to be addressed in any property transaction and an estimate of this cost need to be made in advance. Land Readjustment (Hong & Tierney, 2018) and Transfer of Development Rights (Shahab, Clinch, & O'Neill, 2018) are two such

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concepts/ methods. But both these methods assume strong administrative and institutional frameworks in place within the various tiers of government, which is not the case in the context of Pakistan. In theory Land Readjustment is meant to promote sustainable urban development, and the emphasis is on 'institutional and inclusion concerns' (Hong & Tierney, 2018, p. 1) through retention of population, community engagement, densification, public participation and improvement of security of tenure. Thus, in the Pakistani context, models based on public-private partnership and land pooling have greater chances of applicability, since they are based on an understanding and a working relationship between the public and implementation authorities.

In Pakistan, Land Acquisition Act of 1894 cannot be invoked for obtaining land for public housing. However, it can be put to use for infrastructure development, such as building dams, constructing roads and canal works and similar projects. While determining compensation, courts of law review the evidence of sales of land in the same locality during the past one year. However, a scientific procedure to determine the market value of land needs to be worked out. According to the Punjab Private Site Regulations 2005, the developers are bound to own eighty percent land, but they submit plans of real estate schemes which occupy hundred percent of the land. This causes sudden rise in the value of land (Rizwan, 2009).

Conflicts, disputes and intervention of judiciary

Higher courts routinely confront critical issues of constitutional principles, including scope of governmental power to take private properties for initiatives of larger public interest. In some cases, there are conflicts between two private parties on issues of physical demarcation, conduct of nuisance activities, altering existing landscape and more. Often the courts issue a consent decree. It can refer to judicial approval to a settlement reached between contesting parties (Ostow, 2008). This may or may not include government as one of the parties. Such an approach is often resorted to prevent consequential attacks on the land settlement (Sterk, 2011). Superior courts in the United States have traditionally, adjudicated the right of the government to acquire private property, consolidate it for redevelopment, by another profit making owner, all under the justification of 'blight' (Jacobs, 2010).

Not all the efforts to access land are clean, transparent or according to full compliance to the prevailing law. Clandestine attempts to affect zoning regulations, affecting change of land use, impacting on the infrastructure policies, influencing municipal finances to the advantage of real estate development and ensuring cordial relations with the key decision makers, are some of the tenets of these approaches. Benefit to the society only surface as part of the marketing strategy towards the last end of the production ring. The realm of real estate remains confined to upper and upper middle income beneficiaries at best. On numerical counts, the realtors produce numbers that are profitably

viable. They do not draw feasibility of projects from the net housing requirement at the cumulative level in the respective country (Bombay High Court, 2014).

The Coase Theorem, being an economic theory model, argues that under the ideal conditions parties having a dispute about a property can come up with an optimal solution, irrespective of the initial property distribution. In reality these perfect economic conditions do not exist, and Coase Theorem has further divisions of pure and impure models (Clinch, O'Neill, & Russell, 2008) and is better suited to explain the inefficiencies in the real estate market, rather than to resolve any disputes. The 'impure' Coasian solutions, it is argued, delivers community gains, if moderated directly or indirectly (Clinch, O'Neill, & Russell, 2008). This model has some applicability in the context of Pakistan, which is addressed in the findings section.

Realtors often access lands which are prohibited to be used for housing and real estate development purposes. Expropriation causes rise in land less people due to loss of agro-related livelihoods, sudden rise in land prices, loss of agricultural land and production, and negative impact on agro-employment. Environmental impacts due to such developments are also significant. Blockage and obstruction to flood waters and drainage possibilities of adjoining neighbourhoods decrease in ground water level, destruction of wetlands and bio-diversity, air and dust pollution, impacts on transportation and communication are some negative impacts (Akhtar & Hossain, 2011). It gives rise to conflict between regulatory institutions and realtors. As apartment living is becoming a common social trend in many large cities in the developing world, developers try to maximize the opportunities by acquiring land not permitted for such developments. In Dhaka Metropolitan Area, this is becoming very popular, as land is very expensive and majority of people cannot afford to access it for housing (Supreme Court of Bangladesh, 2009).

The land development case studies from the sub-continent inform that land acquisition, expropriation, disposal, agency to individual relations has many anomalies that require intervention by the public agencies. As mostly found, the agencies and public sector departments tend to favour the influential private enterprises more than the individuals. In many cases, the government functionaries tend to bend the rules to support the private enterprises in realizing their real estate ventures.

RESEARCH METHOD

The research uses the case study approach based on five case examples from Pakistan (Figure 1). The cases are selected as each brings into focus a particular approach adopted by the realtor to acquire land and develop a real estate venture. The Railway properties case deals with non-residential estate, while the Webb Ground, Lines Area example deals with illegal conversion of a playground for commercial purposes.

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The other three examples essentially comprise mixed use developments with emphasis on residential property units.

Acquisition of land in these case examples followed illegal approaches. Obtaining information for these cases was a difficult task as the promoters often resorted to threat and assault. Given the nature of this study, the authors used methods within the limitation. Relevant literature and cases from regional context provided good bases to understand the issue. Court proceedings and judgments acted fundamental documents to understand the whole process of the malpractices and the stakeholders involved. Project information from relevant government offices as well as archives of civil society organizations that extended support to affectees of projects; such as in Bahria Town (BT) and Webb Ground related communities. These cases have been widely reported and investigated, by the national newspapers; journalists were interviewed to have the depth of the cases and the Realpolitik involved. In the Webb Ground case, a column published in the local Newspaper DAWN on 16 June 2009, was converted into a legal petition.

Five focused groups were structured during 2018 and 2019. Focus groups for New Murree project case and the Railway properties case was organized online using zoom meeting software. In which the first one comprised of Punjab government officials, the affectees and journalists. While, the Railway properties focus group involved the Pakistan Railway officials and the representatives of the employees along with the senior official of the realtor involved. The other three focus groups took place in Karachi. Web Ground focus group involved NGO representatives who represented the community in the court, the community representatives and the journalists. The Scheme 33 focus group involved the government officials, journalists and the representative of the realtor. In Bahria Town Karachi (BTK) focus group, the effected villagers, journalists and the government officials formed the group. Due to nature of the cases it was not possible to involve certain stakeholders to avoid any possible threat.

The court judgments interviews, the focus group documents and the transcriptions were coded and themes were identified in connection with the literature reviews and the conclusions were drawn accordingly. Due to sensitive nature of the issue and the possible threat from the realtors or their associates; the realtors are comparatively less represented in the focus groups and the interviews.

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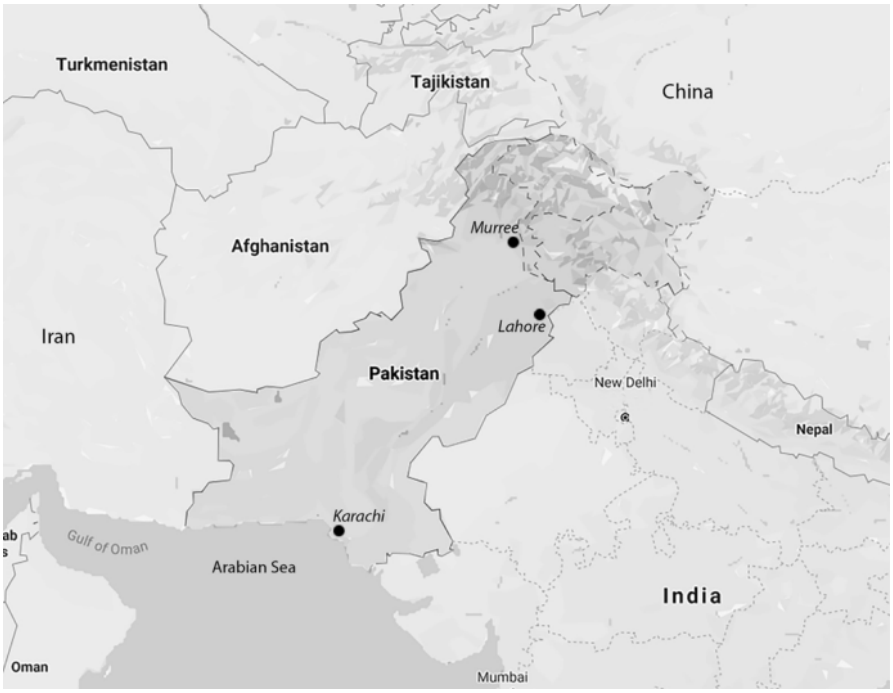

Figure 1. The location of the case study cities in Pakistan

EXPLANATION OF THE CASE STUDIES

Case Study 1: New Murree Development Project, Murree

Murree is a resort town in the northern part of the country, and has recently experienced unapproved development activities by some private developers. The Bahria Town (BT) is one such developer. When noticed, the Supreme Court of Pakistan (SCP) took suomoto notice in 2006-07. After seeking assurances from the concerned parties and the Punjab government that no illegal activities shall be done, the SCP disposed the matter at that time. But the BT began these activities again and invited investments from ordinary public. In the process, the realtors illegally laid claims to Shamlat-Deh (communally owned village lands). Although, in compliance of the SCP order, the Punjab Government announced the closure of the project in 2009, till date the BT real estate venture in the area is progressing unabated. This development, in addition to the enormous damage to the environment in the form of cutting down of forests, levelling of small hills and tampering with the natural topography of the area, has also acquired land belonging to local villagers (Supreme Court of Pakistan , 4th May 2018)

Case Study 2: Railway properties, Lahore

In Lahore, a Railways Golf Club was set up in 1911 to extend recreational facilities to the Railway employees. It stretched on a land tract measuring over one hundred and forty-one acres of land and included a golf course, club house, swimming pool and housing for the staff. In 2000, the government decided to offer the club on commercial basis to interested parties to finance, redesign, redevelop and manage its operations. A consortium was selected that began a redevelopment and renovation exercise in the same year. New membership at

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exorbitantly high rates was invited while the old memberships of railway staff were cancelled. The consortium generated about Pak Rupees 1 billion (US $ 6547467.00) as capital from these operations but defaulted on its mandatory payment. After lengthy deliberations and proceedings, the SCP cancelled the lease to the consortium and appointed a chartered accountancy firm as receiver of the process. The ownership was reverted back to the railways. It also ordered constituted an implementation bench of the court to oversee the execution of the judgment (Supreme Court of Pakistan, 2016). While the SCP orders were carried out, the original members belonging to Railway department were not allowed access the club premises by the interim management.

Case Study 3: Construction of a Super store on a Play Ground in a Low Income Settlement, Lines Area, Karachi

The Webb ground catered to children of an adjoining low income neighbourhood owned by the Karachi Metropolitan Corporation (KMC). In 2002, it was forcibly occupied by the military which passed its control to Army Welfare Trust (AWT), a military institution looking after affairs of soldiers' welfare. A former councillor filed a case in the High Court of Sindh. The court also invited a local NGO, Citizens for Better Environment, to become co-party in this case. A column, published in the local Newspaper on 16 June 2009, was converted into a petition and the Supreme Court began hearings. During the proceedings, it was found that the ownership of the said playground belonged to the city municipality. The Supreme Court declared that the sublease by AWT in favour of the commercial outfit was illegal (Supreme Court of Pakistan, 2009). It ordered the demolition of the super store within three months' period from the day of the judgment and restoration of the space as a playground as before. However, the structure is still intact due to non-implementation of the court order (Supreme Court of Pakistan, 2009).

Case Study 4: Scheme 33, Karachi

A twenty-acre parcel was carved out of land allocated for the construction of sewerage treatment plant for the entire neighbourhood in Karachi. The allottee was interested to subdivide the land and sell it in the form of residential plots. During court proceedings, a government functionary were charged for causing a damage of Pak Rupees 141.67 million and 95 million (US $ 927,600 and US $ 62,000) for the thirty and twenty acre parcels respectively. The matter was taken up by Ehtesab (Accountability) Bureau of the country. The High Court of Sindh ordered the cancellation of lease in 1999.

An appeal in the Supreme Court was filed in 1999 for reconsideration. This appeal was not allowed by the SCP which further ordered compliance with the High Court decision that included the removal of the lease entry from the land register of the government. In 2001, the government promulgated a law titled Sindh Urban Land (Cancellation of Allotment, Conversion and Exchanges Ordinance). As per this law, the matters of disputes related to land allotment and exchanges could be

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reviewed by a Land Allotment Committee. The complainant then approached this committee for consideration of his case. The members of the committee comprised government officers; its chairman was a retired high court judge. He objected to the inclusion of this case pointing out that the matter had already been deliberated and decided by the High and Supreme Courts. But the members prevailed by virtue of four to one majority. The committee decided to regularize the allotment of this land in the name of the complainant again in 2008. In 2009 the Supreme Court converted a newspaper story about this case into a constitutional petition and summoned the members of the said committee who had violated the SCP judgment as well as the complainant. The allotment was cancelled again in 2009 and contempt of court proceedings were initiated against the government functionaries. The complainant was later found pursuing his claims for the refund of the amount invested for purchasing the said land parcels (The Constitution of the Islamic Republic of Pakistan, 1973; Supreme Court of Pakistan, 11 September 2009)

Case Study 5: Bahria Town Karachi (BTK)

BTK spreads over forty thousand acres and is still expanding. It was launched in 2010. The process of acquisition of land was based on two parallel approaches. The BTK had acquired some barren land on the outskirts of the city which was not to be included in the scheme due to its locational incongruity. The BTK applied for exchanging this land with government land and thus applied for the same to Malir Development Authority (MDA). The other approach adopted was forced expropriation of land from various small to medium scale land owners. Much of this land which made the initial sixteen thousand acres was under cultivation, pastoral and livestock usage by the local indigenous communities. As the project had tacit support from the Government of Sindh, therefore the local police and other officials supported the BTK management in dispossessing the local land owners and occupants. Many orchards, agricultural fields and ancient heritage sites were destroyed as a consequence. Many petitions were filed in various courts of law and adjudicated during the intervening time. Several of them also landed at the SCP. One such petition by a public spirited citizen questioned the exchange of low value private land (owned by BTK) with a higher value government land (Supreme Court of Pakistan, 1st August 2016). The SCP declared the exchange of private land for government land illegal. However, in a subsequent order, the court agreed to a proposal by BTK to pay a penalty of Pak Rupees 460 billion (US $ 295,000,000) in seven years for adjusting the value of land. The SCP also formed an implementation bench to oversee the evolving situation and conduct of the developer.

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Table 1. Summarizes the case studies documented and analysed from Pakistan.

Project	Developer	Context of case study	Illegalities and High Handedness
Case Study 1: New Murree Development Project, Murree	Bahria Town	Murree is a resort town set in the forest covered hilly landscape in Rawalpindi district, north of Pakistan. Clandestine and unapproved development activities began many years ago by BT (BT) and other developers in the town.	This land was sub divided and illegally disposed to private developers, including BT.
Case Study 2: Railway properties, Lahore	M/S Mainland Hussain Pakistan Ltd (MHPL) and Unicon Consulting	Pakistan Railways (PR) is a federal department that owns large swathes of land and properties in all the four provinces of Pakistan.	Bids were invited from the interested parties and consortia through newspaper advertisements.
Case Study 3: Construction of a super market on a Play Ground in a Low Income Settlement, Lines Area, Karachi	Makro Super store: Located on a play ground	Webb Ground, in the south of Karachi, was a playground measuring 4.98 acres.	AWT sub leased it to a commercial company that began construction of a large scale super store in 2006.

STAKEHOLERS PERSPECTIVE

Five focused group discussions were held during 2018 and 2019 with government functionaries, staff of realtors, allottees, estate agents and civil society organizations/activists. A discussion brief was prepared and shared with the concerned outlining specific questions for each category of groups. Concise findings of each are given in this section.

Senior staff members of realtors

Seven members of the realtors attended this focus group discussion on 24 June 2019. Options of acquiring clean and encumbrance free land in Pakistan were found to be extremely limited. The realtors complained that both urban and sub urban lands had numerous challenges attached to them. For acquiring an urban land within the remit of cities, one was not sure whether the owners with whom the deals were made were the

only legal and rightful owners. Many instances of bogus ownership deeds or estrange family claimants and other type of legal contenders made acquisition of land from private parties a high risk enterprise. The regulatory agencies had a complicated set of rules and regulations that discourages the development of open ended and transparently managed real estate ventures. For instance, the density considerations, floor area ratios, allocation of spaces for public uses and documentation are issues which are mired by complications, deliberately created by functionaries of such agencies. The issues of acquiring permits and necessary approvals are only sorted out through an informal system of illegal payments to the influential functionaries. There is no other way to bypass the system. In respect to sub urban lands, powerful private owners, with enormous political clout, control the processes. In many cases, these land owners intend to become clandestine partners in real estate enterprises. But the terms and conditions that these land owners demand to be incorporated are impossible to accept. Influence in the procurement of construction material and services, close supervision of allotment processes and misreporting the project facts to government agencies and prospective investors are some mentions of illegal practices. Ordinary realtors, especially those who intend to keep the reporting and records straight, find it very difficult to accept such conditions. Many, however, succumb to such pressures. However, super influential realtors, like the BT Management, are able to seek partnership with the top political leaders of respective territory and acquire the demanded benefits and privileges, necessary to carry on with the enterprises. Due to their clout, quality of developed real estate units, brand popularity and the fact that they are able to keep the officialdom under control, the investors and buyers do come forward and invest without fearing losses on investments.

In rare situations, the courts take action on their own, mostly under the influence of media reports. However, the impacts of the court verdicts are temporary. When a verdict is announced, it creates uproar in the media and by some members of the civil society. But soon it is forgotten. If two crucial parties, namely the realtor and the political leadership, are aligned, the court verdicts only cause a temporary aberration in the overall real estate development process. Since the business stakes and scale of capital involved is very high, therefore the owners of real estate enterprises try and use every possible option to secure their enterprises. Unless the government does not create options of acquiring land through an open and transparent manner, like public auctions or joint development mechanisms (Mathews, Pai, Sebastian, & Chakraborty, 2018), these malpractices are likely to continue.

Allottees and beneficiaries of real estate enterprises

Twelve people in this category attended the focus group meeting on 30 September 2019. The participants identified several reasons for investing in respective real estate enterprises. Lack of comparable options of investment for life long savings, chances of value

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enhancement of invested capital, stable rental income, and flexibility to reside in the acquired property in case of need was some of the driving reasons. One participant, who was gainfully employed in Bahrain, informed that he had no possibility of investing his savings in other option while being away from Pakistan. Investment in properties is a suitable option as transactions, mostly through online banking options, can be done smoothly. Much of the follow up is provided by the realtor through online platform. Since the clients, like overseas workers, are a significant segment of investors, realtors treat them well and create facilitation mechanisms for helping them and extending service according to their limitations related to being away from the country.

The participants however agreed that the risks were enormous. The inappropriate ownership related issues, short comings in documentation, behind the scene dubious conduct of realtors, overall corruption conducted by the related government functionaries are important challenges. People weigh these risks and then make individual choices. They also review parallel options of investments, such as government securities, stock markets and banking institution schemes. However, the preference of real estate remains higher due to comparative advantages accrued in respect to returns. Fluctuating financial policies and inflation rates, limited understanding and non-familiarity with financial markets (including stocks and commodity markets) usually keep the investors away from these options (Payne, 2009; Payne, 2001).

The participants were sceptical on judiciary's role in the safeguard of their interests. They complained that judiciary always took notice of malpractices in real estate ventures after the projects were in advanced stage of implementation. As a consequence of verdicts, the realtors caused greater financial hardship for them. For instance, after BTK verdict of 04 May 2018, the realtor suddenly imposed a levy of thirty-five percent extra surcharges. In the case of grievances and disputes, allottees were not facilitated by regulating building control authority or any other department. The participants suggested that the SCP may consider taking steps to reform the system, beyond individual projects. A real estate market that functions according to open rules, regulations and transactions is in the interest of all, including the investors and some international practices can be learnt from (Hartmann & Spit, 2015; Mathews, Pai, Sebastian, & Chakraborty, 2018).

Government officers

Nine government officers related to MDA, Sindh Building Control Authority and Environmental Protection Agency participated on 08 October 2019. Most of them had undertaken management and regulatory tasks in respect to Webb Ground development, BTK and Scheme 33 venture. They unanimously informed that they carry out the roles and responsibilities assigned to them by their bosses, including the political leadership. They accepted that under the table dealing and financial corruption did exist in these ventures, but it took place at the

level of their bosses. They personally had no clue about it. The evidence of their 'innocence' lied in the fact that they faced many departmental inquiries, references by accountability institutions and cases in the courts. The officers agreed that the system of land supply for real estate development was deeply flawed and non-transparent. It was mainly kept like this because it helped maintain the status quo and personal clout of political leaders.

According to these officers, the general public – including the buyers and investors – are to blame for the non-transparency and malpractice. Since the people flock to invest even in improperly documented schemes or ventures with dubious credentials, the realtors get a boost. If people discouraged schemes where blatant malpractices are conducted, then some reform can be expected. They agreed that hundreds of indigenous settlers, livestock herders, farmers and their families were unjustly treated and evicted (in the case of BTK), but they merely obeyed the government orders. The officers informed that they faced enormous risk while working in such assignments. Often the officers had to face repercussions. The role of judiciary in correcting such ventures was very limited. They admitted that none of the city plans favoured utilization of sub urban pastoral or agricultural lands for real estate, but the courts could not do much, as the plans were not legally notified. The officers informed that almost all the real estate projects, large or small, had legal irregularities attached to them. But legal cases were instituted in a few instances only. The courts only relied on documentary evidences and not much of circumstantial evidences and processes. Even when an honest officer would reveal a piece of information under oath, his statement was viewed with scepticism. The officers were of the view that legal intervention was required to remove discretionary powers of political leaders in power. The clandestine clout at work to influence such actions was also required to be examined.

Affectees in real estate ventures

Fifteen people, who were direct affectees of BT development and the Super store in Lines Area, participated in the two focus groups on 22 December 2018 and 04 November 2019. These people complained about the methods adopted to evict them from the locations where they were settled and owned land. Residents of Malir who were evicted due to BT development informed that the government completely favoured the developer. They forced them to sell land at a pittance. When they opposed, fabrication of false charges, such as theft of livestock, mugging or theft of vehicles would be registered. Young members of the family would be arrested by police and then the agents of the realtors would come to negotiate with them. Most of the hapless farmers would buckle under such high handedness and sell the land under duress. Many of these people have lost their only source of livelihood. They complained that the government and elected representatives in their area refused to provide any solution to their problems. For instance, they had requested

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for tenancy rights on a temporary basis in an adjoining area to their lands. But the requested was rejected on the premise that since they had sold their lands on 'their own free will', the government has no provision to compensate them.

In the case of the Super store construction, the residents of the area complained that the local police and other government departments would come and harass them, assuming that the court case was filed at their instigation. Even after the SCP judgment, the structure of the Super store was not dismantled and thus no relief was extended. Children and other folks of the area to date have no park or playground access in the neighbourhood.

Both categories of affectees however acknowledged the active support of civil society organizations and print and electronic media (Ali, 2020; Ali, 2019; Anwar, 2014). The role of Orangi Pilot Project (OPP) and Perween Rahman (OPP's ex-director who was assassinated by unknown miscreants in 2013) was highlighted. Perween Rahman had begun a documentation exercise of village settlements where BT is built. She was actively lobbying with the government to ensure safeguard of the settlements. She vocally opposed any option leading to eviction of these settlers from locations of their livelihoods. She informed the villagers about the option of regularization of villages under the Sindh Goth Abad (Village Regularization) Act of 1987. This finding points towards the need for incorporation of such systems and supports as part of the larger formal theoretical frameworks.

The affectees were very critical of the role of SCP. They complained that the court verdict in the case of BT provided relief and protection to allottees and buyers of the property units, but did not extend any support to them. In the verdict, the court has been only overseeing the process of payment of penalty imposed upon BT management and related procedural issues. It has not looked into the issue of forced sales conducted by the realtor in making them virtually surrender their land rights. The affectees suggested that the Supreme Court may be requested to conduct investigation in the overall process of real estate development in Karachi, where their grievances may also be heard. But they also confessed that they have no resources of their own to hire lawyers and initiate this process.

DISCUSSION

As observed in the literature and case examples, real estate essentially comprises investments in properties for securing the capital, assets, freedom to dispose and relative profitability on sums invested over time. The realtors assign enormous attention to these factors while planning and developing enterprises. They understand that the type of exponential rise in profitability that general clientele expects can be seldom acquired through the transparent modes of conduct. Thus, the more regulated forms of investment options, such as REITs, were not adopted by any of the five case examples studies in this research. The

nature of relationship between the executing stakeholders was more of a mutually beneficial type. The dubious relationship between the BT and government bodies to acquire land in different locations is a case in point. By influencing the mechanism of processing the identification and disposal of land, significant strategic advantage was gained by the realtor.

The analysis of judicial intervention in five cases from Pakistan reveals that the judgments could cause only a partial reform in subject matters under litigation. With respect to acquisition land in New Murree, the court cancelled the allotment of communal lands. The Punjab government complied by officially closing the project in 2009, but the private realtor did not stop the highly dubious acquisition/usurpation of communal lands. On several subsequent occasions, the newspaper reports and locals apprised the SCP on the status, but seemingly court orders could not be effectively implemented. In the case of Webb Ground, the original verdict and subsequent judgment on the review petition ordered the playground to be restored back to its original status, but the government could not succeed in implementing the same. The area residents suffer from the non-utilitarian status of a strategically located amenity, meant for their collective wellbeing. Some of the mechanisms that can be implemented in the local context range from active models of land development (Hartmann & Spit, 2015) and implementation of various land pooling and transfer of development right models (Krabben & Jacobs, 2013). This can open up alternative investment options for local residents as well as investors, and safeguard their interests.

It is apparent that while court judgments caused a set of reliefs to many, they do not alter the on-going practices in land acquisition by realtors and other stakeholders. None of these judgments caused a policy alteration by respective agencies. Similarly the missing policies and laws for mitigating social impacts of real estate development could be promulgated. It appears that governments favour realtors more than the ordinary people in contested enterprise. Overt and covert benefits extended by the realtors to the political decision makers as well as functionaries are willingly accepted. Besides, the court judgments did not cause a clear policy alteration beyond the subject matter under review. Coase theorem (Clinch, O'Neill, & Russell, 2008) can be referred to here to come up with some solution to address the disputes and irregularities.

In each of the cases discussed, the government was not willing to uphold or safeguard the rights of original owners or occupants. Being vulnerable, politically weak and immobilized, such user groups become victim of insufficient protection by the governments as well as the court verdicts. These rights were most strongly violated in the case of BTK. An organized land acquisition strategy was unleashed which was augmented by forced evictions. State functionaries became supporter of the realtor, since the top political leadership was favouring the venture.

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Despite a representative governmental framework, the dispossessed could neither secure livelihoods nor obtain any relief from the court on the injustice done to them. With their case possessing limited legal merit, the option of legal contestation was weak. The judgment was able to obtain some remedy for the state exchequer by imposing a penalty for the monetary losses caused in the process. This judgment, which focused on the question whether the land grant institution was legally authorized to adjust state land in lieu of private land of lesser value, could not go beyond this matter. At the onset, there was no law that could enable the villagers claim the right to land and livelihood, except applying for regularization of villages through Sindh Goth Abad (Village Regularization) Act of 1987. A model based on greater community involvement and public private partnership (Caron, 2018; Mandelker, 2017) if implemented can safeguard interests of the poorer sections of the society.

The safeguard of third party interest was reasonably safeguarded by court verdicts in all the concerned cases discussed in this paper. In the BTK case, the court ordered that the rights and investments of the allottees shall be protected. It was also observed after announcement of the verdict that the BT administration did not expressly cancel any allotment (Zaman & Ali, 2017; Zaman & Ali, 2009). The investors continued to make transactions despite the restrictions imposed by the court in other operational respects. Probably the clientele was prepared to take the calculated risk after observing that the judgment did not undo the enterprise and that the court was intending to find a reconciliatory solution in favour of the allottees. However, the court could not make the BT administration comply with the orders in the New Murree Project. New allotments and investments were accepted by the realtor despite a clear ban after the verdict. While legally the situation for those investors may sound precarious, the reality is otherwise. There is no credible evidence to suggest that investors in any scheme were denied access to land or property once they were given documentation by the realtor. In the other two cases, the investors faced tremendous losses. In the case of super store in Karachi, the new dispute between the investor and AWT evolved, which obviously caused hardship for the investor. In the case of Railway Club, the losses to the consortium were tremendous. Similarly, the buyer of parcels of land in Scheme 33 lost his investment, as the court did not advise the government to make immediate returns. But since the amount paid was far less than the actual value and the investor retained the possession of the land during the intervening period, it is found that he may have benefited rather than faced any financial hardship.

CONLCUSION

In the Pakistani context, at the onset, the real estate ventures, especially the large scale examples, appear to be marriages of convenience between realtors and government officials. They do not seem to be

equal opportunity enterprises. In many instances they become tools to jeopardize the public interest where courts intervene to correct the course. The judgments create a perception that the wrongs committed in respect to land acquisition and other stages of land use development can be set right by the SCP. In addition, it is often assumed that these judgments shall cause a precedent effect to set the future actions on an appropriate course. We find that the nexus between powerful realtors and facilitating elements within the government machinery continue to generate new forms of mutually beneficial relationships. None of the judgments, reviewed in this paper, caused the government to change or revise its policy or practice of land disposal, allotment and allocation. This research points towards the requirement for a larger framework that addresses the conflicts that arise in real estate dealing, and the possibilities of learning from internationally established models and directions (Clinch, O'Neill, & Russell, 2008; Hartmann & Spit, 2015; Harvey, 2010; Krabben & Jacobs, 2013; Mandelker, Fall 2017).

This is so that in resource starved contexts like Pakistan, the governments exercise the privilege of land grant as a political tool to expand their authority or extend direct benefits to the selected realtors. The plight and issues of the vulnerable remain at the least priority. These hapless masses face the scourge of resourcelessness at every instant, judicial forum being one of them. Filing litigation, legal follow up and sustaining the effort requires resources which are absolutely scant with this segment of the society.

The accounts included in this study have sufficiently established that the courts verdicts have a contextual connection. In the Pakistani context, the SCP does not seem to possess trust on the government functionaries. Therefore, in many cases it passed verdicts to institute implementation benches to directly supervise implementation and oversee the progress. The courts do not have the power to alter the laws nor create new laws. A glaring legal short fall experienced in these examples is the possibility of fresh legal safeguard for the project affected persons as was the case in Karachi examples. The desire of realtors to possess access to a transparent and open process of land acquisition remains a remote possibility given the jealously guarded status of land in the priorities of governments.

CONFLICT OF INTEREST

No conflict of interest was declared by the authors.

FINANCIAL DISCLOSURE

The authors declared that this study has received no financial support.

ETHICS COMMITTEE APPROVAL

Ethics committee approval was not required for this article.

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Resume

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Genotype Syntactic Study of Vernacular Houses in Biskra City

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Abstract

Purpose

This paper provides an analysis of the vernacular houses of the city of Biskra, in the north-eastern Algerian Sahara. The aim is to examine the underlying genotype of the spatial configuration of the city's vernacular house plans and to consider the parameters that influence the domestic arrangement and phenotypic aspects of the house layout.

Design/Methodology/Approach

The investigation relied on space syntax method, by using j-graph (justified graph) analysis known as Gamma analysis to examine the functional spaces of a series of fifteen vernacular houses from three neighbourhoods (Bab Dareb, Mcid and Guaddach). And by using A-graph software to calculate syntactic properties such as MD, by obtaining RA, BDF and SLR, of the houses' spatial configurations, to detect similarities and differences in the sample. Moreover, to calculate the integration value (RRA) of each space of the same house to compare with those of others houses' space to determine the structure mode of the domestic interior.

Findings

The results suggest that there is an organising principle of spatial configuration as there are similarities between the socio-spatial patterns of vernacular houses in the city of Biskra, despite the disparate houses' interior spatial configuration.

Research Limitations/Implications

Most of the houses were in poor condition, which made the survey difficult. The present did not rely focus on people's use of internal space .e. behaviour mapping to detect the actual function of each space. Moreover, had this study taken houses with extremely different layouts and morphologies, and from distant times, would be a better case study to examine the undertaken topic.

Originality/Value

This study sheds light on the vernacular houses of the city of Biskra that has been extending since the Ottoman period to highlight the main underlying characteristics (genotype) using the theory of the syntax of space. These houses have a symbolic value and are considered as the architectural heritage of the city.

Keywords: *Justified graph, privacy, space syntax, spatial configuration, the vernacular houses.*

INTRODUCTION

Vernacular architecture refers to traditional buildings that have been built using locally available materials and resources and that correspond to the climate and the basic expression of a community's cultural heritage. It has been accepted as a regional character for the society to which it belongs. Moreover, it is an authentic product built by people who are not experts in a specific place through knowledge shared over time. The study of vernacular architecture has become the study of the social and cultural impact of a specific place, and the architectural language of the people (Brown & Maudlin, 2011).

Different studies have presented vernacular and modern houses as opposing architectures. Karim (1993) examined vernacular houses in the northern region of Algeria to identify the main features that can be used for the design of new houses, and searched for common aspects that can provide new models for modern housing. Bellal (2007) studied traditional M'Zabit houses by analysing the spatial configuration that is expressed through social events and studied the spatial interface between visitors and inhabitants. Widiastuti (2018) analysed the vernacular courtyard house in Kerala, and identified the main features using the topological method.

This study focuses on vernacular houses in the city of Biskra that represent the intellectual knowledge of the local community (Var, 2019) and to identify any significant correlation between the spatial configuration of the different houses. Three objectives are stated: to examine spatial organisation, to study social boundaries and to identify similarities in spatial layout. A comparative analysis of a sample of vernacular houses was carried out to uncover genotypic consistencies and underlying characteristics of the spatial configuration of the different phenotypes. Comparative analysis is an effective method for understanding the characteristics of the socio-spatial arrangements of these house types.

In addition, the theory of spatial syntax was used by applying the justified plan graph (JPG) method and mathematical calculations. The study examines the vernacular houses of the Ottoman period in the city of Biskra within the seven historical villages: M'cid, Bab Darb, Bab El Fath, Ras El Guerria, Korra, GueddachaandMedjniche. These seven villages, which are located in the southern part of the present city, still exist as neighbourhoods with most of the vernacular houses preserved. Three of these neighbourhoods were selected as case studies in the present paper.

THE VERNACULAR HOUSES IN BISKRA CITY

The vernacular housing in Biskra is characterised by its rural character and its perfect integration within the palm grove in the form of dispersed groupings (Figure 1). It has always tried to respond to various

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factors such as climate, religion, socio-cultural factors and the tradition of its community of builders (Saouli, 1989).

Figure 1. Picture showing the integration of vernacular houses inside their context. (Africa | "*Rue dans la vieille ville" - Biskra* || Vintage photographic print. ca. 1900)

It is worth noting that the vernacular houses of Biskra city constitute an architectural heritage, and in particular they are sustainable constructions adapted to the climatic and environmental context. This fact is best manifested in the building materials and structural elements such as the “rozna” which is the opening in the ceiling of the central space, or the hall called “wasteddar” which can be manually operated (opened/closed) to regulate zenithal light and ventilation according to the daily and seasonal comfort requirement (Figure 2B). The spatial configuration of the vernacular houses was motivated by the existence of particular morphological features.

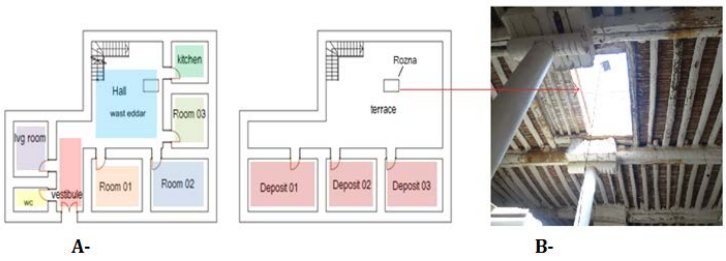

Figure 2. The spatial configuration of a vernacularhouse (A- spatial organization of veernacularhouse;B- picture shows the rozna) (Authors,2020)

The spatial organisation consists of three basic spaces: the hall (*wasteddar*), the vestibule (*sguifa*), and the room (*bitt*). The *wasteddar* is the most important feature of the spatial arrangement of vernacular houses.It is where daily activities take place: cooking, eating, watching TV, napping and resting. It is also where the family gathering could take place both during the day and at night (Adad &Zerouala, 2002). The *wasteddar* is a covered space, considered the pivot of movement and distribution in the house, thus, the space through which the whole house is articulated. It is a space of regulation par excellence. According to the in-situ survey, today the functions of the *wasteddar* are reduced due to the addition of new spaces such as the kitchen, living room, guest room and bedrooms. This change refers to the evolution of social life and the opening up to other cultures.

A second important space is the vestibule (*sguifa*) which gives access to the house and is considered as a transitional and filtering space between the outer and inner space. This space also ensures the privacy of the inhabitants, especially the women. It acts as a screen preventing direct view of the interior of the house, thus allowing the door to be left open at all times during the day (Sriti, 2012). The rooms (*bitt*) are multifunctional spaces for a number of activities: sleeping (napping),

resting, eating, studying, similar to Ottoman houses. Additional spaces include the bathroom (*hamam*), toilet (*rmaya*) and stable (*couri*).

SPACE SYNTAX: THEORY AND METHOD

This study focuses on the functional space analysis of the spatial configuration of a series of sample houses from the Ottoman period in the city of Biskra to discover the underlying genotype and examine whether cultural characteristics affected the spatial organisation of these vernacular houses (Vrusho & Yunitsyna, 2016). The syntactic analysis conducted in this study consists of a comparative analysis of a sample of vernacular houses by describing the convex dimension, and examining the interaction between cultural characteristics and spatial organisation using the method of spatial syntax. The latter was developed by Hillier and Hanson (1984), identifying interior syntactic analysis as Gamma Analysis.

The analysis of the Justified Plan

Graph (JPG) is a technique representative of spatial configuration (Ostwald, 2011). The J-graph allows demonstrating the configurational properties of house plans, and provides a graphical and mathematical model to analyse the spatial configuration of buildings. It is a permeability structure where each functional space of the system is identified in terms of its relationship to every other space, showing the relational logic of the parts to the whole (Bellal, 2007). Each node in the graph refers to the functional or habitable spaces and the edge that links the spaces represents the connection between them.

In this work, the graph was used to represent the relationship between spaces in terms of permeability and access. This numerical method allowed illustrating house plans in the form of graphs. First, it focused on the abstraction of house plans into graphs and explored their configurational properties. Then, it relied on the AGRAPH software to carry out the different parameters considered in this analysis: the mean depth (MD), the real relative asymmetry (RRA), the base different factor (BDF), the space link= ratio (SLR) and the degree of spaceness.

The mean depth (MD) is used to distinguish how integrated or separated spaces are from each other. It also indicates how many steps one has to take to reach a specific space from the original space (the root) (Hillier & Hanson, 1987). The real relative asymmetry (RRA) indicates the permeability of a system in quantitative terms, and is obtained by dividing the relative asymmetry (RA) of that node or graph by the given value K (the number of nodes). The base different factor (BDF) is used to provide a measure of the degree of differentiation between spaces in terms of integration, and quantifies the spread or degree of configurational differentiation between integration values. Hanson (1998: 30-31) reported that "*the closer to 0 the difference factor, the more differentiated and structured the space; the closer to 1, the more homogenized the spaces or labels, to a point where all have equal*

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integration values and hence no configurational differences exist between them".

The space link ratio (SLR) is used to assess the distributedness and non-distributedness properties of each space and the layout of the house. If there is only one non-intersecting route from one space to another in a system, it is said to be a non-distributed "a tree-like structure"; if there is more than one non-intersecting route for any two spaces in the system, it is called a distributed system. The degree of spaceness is useful in characterising the type of spaces in the system. Hillier (1996) differentiated four topological spaces: a-type, b-type, c-type and d-type. Using these parameters, this study aims to understand the underlying organisation and cultural characteristics that formed the layout of the vernacular houses, and to determine whether there is a cultural pattern (the genotype).

CASE STUDY PRESENTATION

The selected case studies are located in the old city. There are seven villages scattered to the south of the city which still exist today as neighbourhoods and still preserve most of their vernacular houses. The selection of houses was based on a survey of fifteen houses in three districts as the best preserved (Figure 3). Each house was given a code to facilitate the analysis: "HV" refers to a vernacular house. There are seven houses in Mcid: Hv01, Hv02, Hv03, Hv04, Hv06, Hv14 and Hv15; four houses in Gueddacha: Hv05, Hv07, Hv11 and Hv12; and four houses in the Bab Dareb district: Hv08, Hv09, Hv10, Hv13. The selection criteria of these houses are based on their historical, temporal (date of construction), and architectural (structure, building materials, and architectural appearance) value where the residential fabric has adapted to its context.

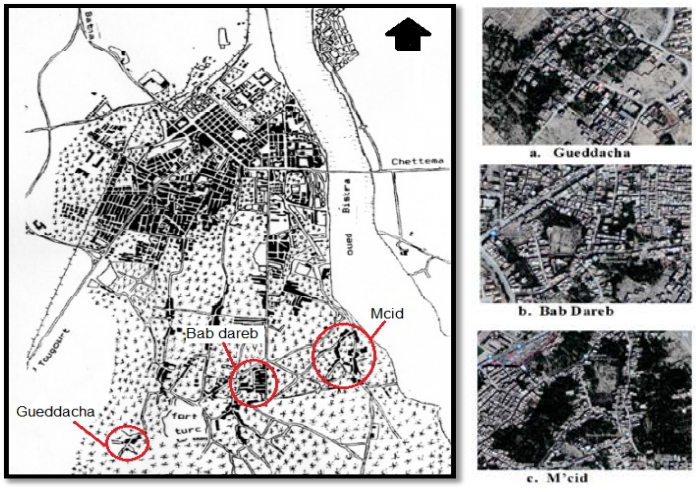

Figure 3. The three neighbourhoods.

ANALYTICAL PROCEDURES

This study aims to identify the underlying genotype and to highlight the similarities and differences of a sample of houses in the city of Biskra. The justified graph analysis was used to specify the structural models

based on the syntactic data (Guney & Wineman, 2008). The justified graphs of these houses were embedded and analysed both by considering the exterior as a root and by excluding it. This methodology was adopted to examine different syntactic properties such as integration values (RA and RRA), depth and BDF. This syntactic data of the spatial pattern was analysed quantitatively using the A-graph program as a tool (McLane, 2013). The programme focuses on the conversion of house plans into graphs, in which the nodes represent the functional spaces and the lines represent the connection between the spaces.

These graphs were drawn according to the architectural plans of the houses, starting from the exterior (the root), and aligning the graph of all functional spaces according to their depth and distance from each other. Thus, although each node represents a functional space, several authors (Markus 1993; Hanson 1998; Dovey 1999) have chosen to consider the 'L-shaped' space as a single node (Ostwald, 2011). Whether the nature of the connection between spaces is a door or an opening, it is represented by a line. It only means that the connection exists. To discover the underlying characteristics (the genotype) a syntactic analysis was performed. The following steps were followed in this study:

a) First, the J-graphs were drawn for each of the fifteen houses using the exterior as a root to indicate the permeability sequence of the constituent spaces from the entrance to the interior of the house. The analysis of the spatial configuration focuses on the functional spaces with and without their exteriors.
b) Secondly, the graph measurement includes the mathematical calculations of the spatial configurations by analysing the different syntactic properties such as MD, by obtaining RA and BDF using the A-graph software, and by calculating RRA manually. The objective of this phase is to identify possible recurrences in the sample.
c) Thirdly, the integration values were calculated, using the A-graph program for each space of each house in the sample and comparing the integration value of each space with the other spaces of the same house. This allows the structuring mode of the domestic interior of the houses studied to be determined, while the classification of these integration values leads to a better understanding of the morphology of the spatial configuration for exploring the genotype in the sample.
d) Finally, the genotype groups were highlighted by using the space link ratio (SPL) indicator and the degree of spaceness.

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CONFIGURATIONAL ANALYSIS AND GENOTYPE EXPLORATION

A quantitative analysis was conducted using the spatial syntax method for the spatial configuration of the vernacular houses. The fifteen house plans were analysed with their graphs justified. Figure 4 shows the house plans. In this analysis, each functional space in the spatial organisation is treated as a cell, and is indicated by a circle, and the relationship between the cells is indicated by a line that refers to the transition (Erman, 2017). The graphs in Figure 4 have a consistent resemblance, and are deep from the original space. They were created using the exterior as a root and represent a tree-like structure (arborescent). The graphs have a symmetrical order in general and tend to lack in distributedness. Three graphs from the sample suggest a degree of permeability that is manifested by the presence of rings in the spatial configuration. This abstraction of the graphs distinguishes between the living space, the transition space and the other constituent spaces of the system.

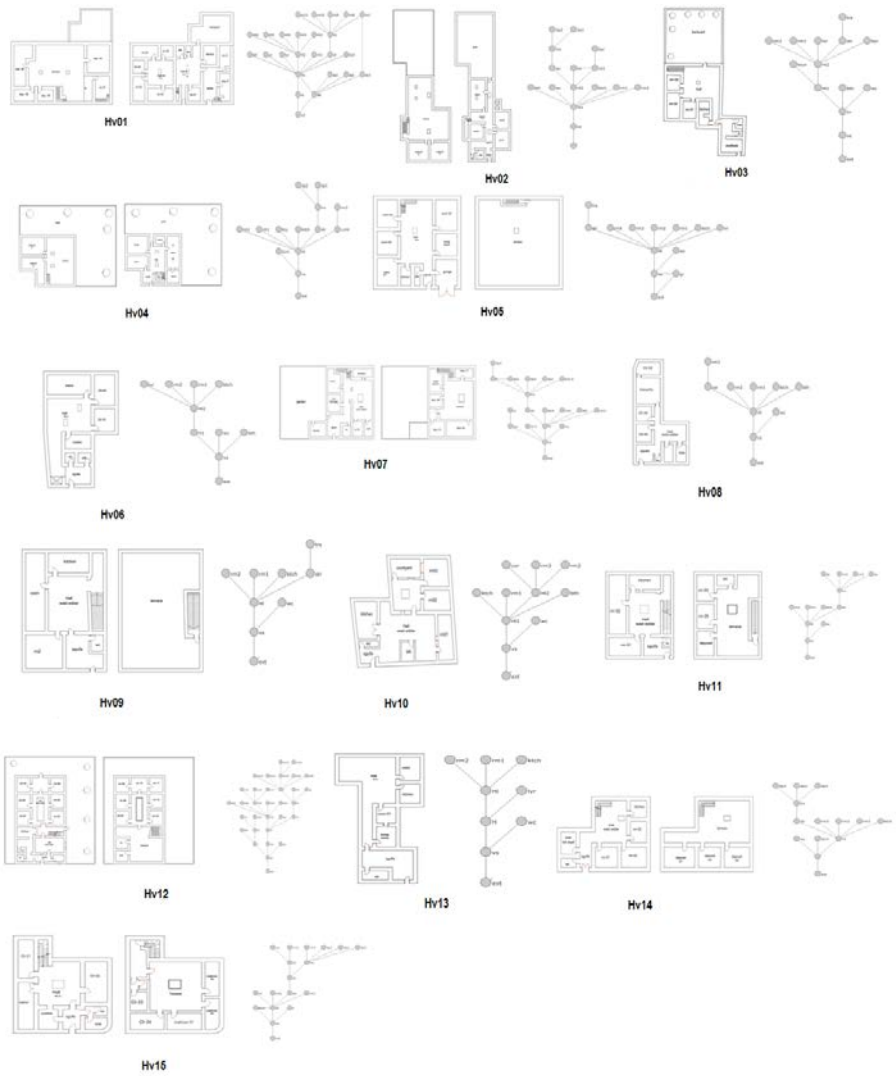

Fig 4. The house plans and their justified graphs.

The spaces are classified by their relative depth starting from the root (exterior) space. In the first depth we observe that the vestibule (*sguifa*) is the shallowest space and the most important space in the composition of the spatial arrangement in vernacular houses. It is the topological b-type space. The a-type space has the highest degree in the entire sample and is suitable for occupation where there is no movement of passage, unlike c- and d-type spaces which have the lowest degree. The quantitative analysis was performed using the A-graph program with the following parameters: RRA, MD and BDF. These parameters were analysed using the exterior as a root and excluding it to understand the relationship between inhabitants - inhabitants and inhabitants - visitors. The data listed in Table 1 refers to the graphs in Figure 4.

Table 1**:** The syntactic data for sample of houses: MD: mean depth, SLR: space link ratio, BDF: base different factor (Authors,2021)

House N°	SLR	MD	Integration (RRA) (with exterior)			BDF with ext	Integration (RRA) (without exterior)			BDF with -out ext
			min	mean	max		min	mean	max	
Hv01	1.08	3.03	0.36	0.89	1.17	0.88	0.36	0.89	1.17	0.86
Hv02	1.06	2.95	0.53	1.11	1.74	0.55	0.50	1.10	1.74	0.51
Hv03	1.00	2.84	0.57	1.15	1.82	0.45	0.49	1.10	0.59	0.41
Hv04	1.00	2.71	0.38	1.06	1.44	0.51	0.38	1.08	1.64	0.46
Hv05	1.09	2.12	0.22	0.84	1.13	0.42	0.18	0.87	1.27	0.37
Hv06	1.00	2.48	0.63	1.21	1.54	0.26	0.56	1.25	1.80	0.18
Hv07	1.05	3.21	0.65	1.13	1.67	0.67	0.59	1.15	1.77	0.62
Hv08	1.00	2.22	0.27	0.99	1.54	0.32	0.22	1.00	1.57	0.27
Hv09	1.00	2.22	0.33	1.10	1.23	0.59	0.29	1.12	1.74	0.18
Hv10	1.00	2.40	0.37	1.05	1.43	0.37	0.36	1.05	1.27	0.28
Hv11	1.00	2.82	0.60	1.20	1.59	0.44	0.63	1.20	1.79	0.35
Hv12	1.00	4.71	0.76	1.42	2.10	0.95	0.77	1.43	1.87	0.93
Hv13	1.00	2.38	0.56	1.25	1.69	0.19	0.58	1.27	2.03	0.07
Hv14	1.00	2.80	0.48	1.12	1.54	0.51	0.49	1.15	1.54	0.46
Hv15	1.05	3.37	0.71	1.25	1.61	0.65	0.68	1.25	1.74	0.60
Total	-	2.81	0.49	1.11	1.54	0.51	0.47	1.12	1.45	0.43

The depth: represents the number of spaces we have to pass to move from one particular space to another in the system (Mustafa & Sanusi 2010). The total mean depth of all the systems is 2.81, which signifies that the system is shallow from the exterior. House Hv12 has the highest mean depth value (4.71). The mean depth refers to the increase in the number of spaces that constitute the system (31 spaces) and the decrease in the number of steps that need to be taken to reach a particular space. As shown by J-graph, the rooms are the deepest spaces in the spatial arrangement and the transitional spaces such as the vestibule (*sguifa*) and halls are the shallowest spaces from the root. House Hv5 has the lowest mean depth value (2.12) and contains 10 spaces; it is shallow from the exterior, and has the lowest number of steps to move around the house. However, the number of spaces is not proportional to the mean depth, while houses Hv3 and Hv4 have an equal number of spaces 14, with mean depths of 2.84 and 2.71, respectively. House Hv1 has a mean depth of 3.03 and 25 spaces; house Hv7 has a mean depth of 3.21 and 19 spaces. From these results, it can

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be noted that the houses are deep from the exterior, which indicates the position of the internal spaces from the exterior world and the public's point of view.

The integration value (RRA): refers to how connected and closed a space is to all other different types of spaces. In other words, it describes the extent to which the space is accessible from all spaces in the system. The integration values give a quantitative indication of the permeability of the system (Guney & Wineman, 2008) and the degree of overall integration of the building. The lower the integration value and closer to 0, the more integrated the system is and the more connected the spaces are to each other in the system. Thus, the higher value of integration which tends towards 1 and above means the segregation of the system. Table 1 lists the integration values (RRA) of all houses. There are two integration values presented in the Table 1: one with the exterior being part of the system and the other when it is not. The purpose of using the two integration values (RRA) with and without the exterior is to see how the system has treated the exterior and its significance on the entire house configuration.

The data show that the integration values (RRA) for the entire sample are 1.11 when the exterior is included, and 1.13 when it is not. Therefore, the values indicate that the sample is more segregated. The house Hv11 has an equal integration value with and without the exterior of 1.20. It is noteworthy that when the exterior is included, the houses Hv2, Hv3, Hv4, Hv5, Hv6, Hv7, Hv9, Hv10, Hv11, Hv12, Hv13, Hv14, Hv15 become more segregated with values of 1.11, 1. 15, 1.06, 1.21, 1.13, 1.10, 1.05, 1.20, 1.42, 1.25, 1.12, 1.25 respectively. In this case, the houses become more closed, are described as introverted houses (Guney & Wineman, 2008). And the houses Hv1, Hv5, Hv8, become more integrated with values of 0.89, 0.84, 0.99. The most integrated house is Hv5 (0.84) with exterior (0.87 when the exterior is not included). And the most segregated house is Hv12 with an integration value of 1.42 (1.43 without exterior). Thus, it can be noted that when the system is more segregated, the houses tend to lack permeability and are less accessible, in addition to controlling the need for privacy to regulate interpersonal interactions.

The base different factor (BDF): is used to provide a measure of the degree of differentiation between the spaces in terms of integration (Mustafa, 2016). When the value of BDF tends towards 0, it indicates a strong differentiation and the system needs to be more structured. When the value tends towards 1, it means that there is a small difference between the spaces. Table 1 provides the basic syntactic data for each h

ouse. In the sample, the lowest BDF is in house Hv13 with a value of 0.19 and then in house Hv6 with a value of 0.26, which indicates strong differentiation and structuring of these two houses. Houses Hv1, Hv12 have the highest BDF values (0.88 and 0.95, respectively), which indicate weak differences. The other houses have a mean value that

varies between 0.32 and 0.67. It should be noted that the sample of houses in general has strong functional differences between the constituent spaces of the interior spaces.

From the analysis of these parameters, a careful observation of the data in Table 1 reveals certain similarities in the spatial configuration of the sample. Hillier and Hanson (1987) stated that a cultural pattern can exist if a configurational consistency occurs (Boutabba et al., 2020). At this stage, we are not in a position to talk about the genotype, but only about the way in which the layout of the houses is structured. To define the genotype, other syntactic parameters are highlighted in this study, expressed by the order of integration. The domestic interior of the house layout was analysed; each space in each house was compared to other spaces in the same house in the sample according to its degree of integration (RRA). This ordering could provide a better understanding of the morphology of the spatial configuration. If this ordering remains in a consistent order across a sample, then there is evidence of a cultural pattern (genotype). Table 2 presents the order of integration of the houses.

Table 2 presents the ranking order of the integration values (relative asymmetry RA) of all the interior "functional spaces" in each house. The ranking order, from the most integrated space to the most separated space, shows that the hall (Hl) is the most integrated space in every house in the entire sample, except for houses Hv12 where the intermediate space (I) is the most integrated space, and house Hv13 where the corridor (H) is the most integrated space. The order of integration shows that the hall (Hl), the vestibule (V), the staircase (str) and the terrace (trs) are in the first order in all houses, while they are considered as transitional spaces of the topological b-type space. The vestibule is the space that connects directly to the exterior; it is the filter between the external and internal domestic space, and it is connected directly to the hall (*wasteddar*) or to a corridor in some cases. The hall provides access to all the spaces in the house and is considered the most integrated space in all but two of the houses in the sample. The bedrooms, bathroom, toilet, storage spaces are the most separated spaces in the whole sample which all belong to the topological a-type space.

Table 2: The order of integration of living function each of house (Authors, 2021)

N°	RA: mean	Houses	Order of integration (with exterior)
01	0.17	Hv01	Hl1<Hl2=str=stb<vs<wc=bth=rm1=ktch=byr=trs=str2<ext=rm7<rm3=rm2=rm4=rm5=rm6=dp1=dp2<rm9=rm8=rm10=rm11
02	0.27	Hv02	Hl1=Hl2<str<Hl3<lvr<ktch=rm1=wc=bth=rm2<trs<byr<ext<dp1=dp2
03	0.30	Hv03	Hl1<Hl2<In<ktch=lvr=rm1=byr=rm2<vs<bth<trs<ext
04	0.28	Hv04	Hl<str<vs<lvr<ktch=byr=rm1=rm2<trs<grm=ext<rm3<dp1=dp2

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05	0.30	Hv05	Hl<vs<rm2=rm1=rm3=rm4=ktch=lvr<gr=ext<wc
06	0.25	Hv06	Hl=Hl2<vs<ktch=rm1=rm2=lvr<ext=bth=wc
07	0.34	Hv07	Hl<str<vs<trs<rm2=ktch=rm1=bth<byr=I<ext=wc=grm =dp3<dp2=dp1=kch tr<cr=dp4
08	0.24	Hv08	Hl<vs<cor<rm1=ktch=bth=rm2<ext=wc<rm3
09	0.39	Hv09	Hl<vs<str<rm1=ktch=rm2<ext<trs
10	0.30	Hv10	Hl<Hl2<vs<ktch=bth=rm1<rm2=rm3=cor<wc=ext
11	0.31	Hv11	Hl<str<trs<vs<rm1=ktch=rm2<dp=rm4=rm3=wc2<wc= ext
12	0.33	Hv12	I2<str<Hl1=Hl2<trs<vs=byr<h<rm3<rm2=rm4=rm1=r m5<bth=dp<I<ext=dp1=rm10<rm6=rm5=rm7=rm9=r m11=rm8=rm12<I3=bth<rm14=rm13<ktch=wc
13	0.29	Hv13	H<Hl<vs<lvr<rm1=ktch=rm2<wc=ext
14	0.37	Hv14	Hl<str<I<trs<rm2=rm3=rm1=ktch<ext=grm=wc<dp1=d p2=dp3
15	0.26	Hv15	Hl=str<I2<trs<I3<vs<ktch<rm2=lvr=rm1<rm4=dp1=dp 2=dp3<rm3=wc<ext

The results in Table 2 show a clear recurrence in the mode of spatial structuring as most of the houses are structured around the hall (*wasteddar*) in the sample; this is the genotype, except for Hv12 which is structured around the intermediate space (I) and the house Hv13 is structured around the corridor (H). Moreover, the results demonstrate the existence of underlying characteristics in the spatial pattern of the sample, as Hillier and Hanson (1987) state: "*the cultural pattern exists*". Recurrence in syntactic properties may be an indication of genotype.

DEFINITION OF GENOTYPE GROUPS USING THE DEGREE OF SPACENESS AND THE SPACE LINK RATIO

The degree of spaceness: the JPG technique allows the type of space in the system to be categorised. Hillier (1996) distinguished four topological spaces: a-type, which has one link, b-type, which connects to two or more spaces, c-type, which lies on a ring and has more than one connection, and d-type, which lies on at least two rings and has more than two connections. Private (bedrooms), social (living room) and service (kitchen and bathrooms) spaces are a-type spaces; transition spaces (hall, corridor, staircase) are b-type spaces. The graphs in Figure 4 show a tree structure characterised by the existence of topological a-type space, which is the appropriate space for occupancy, and topological b-type spaces, which are transition spaces, suggesting that there is no mobility choice in the system. Table 3 presents the calculation of the degree of a-ness, b-ness, c-ness and d-ness. They give an insight into the use of space in the spatial configuration.

From these results, it can be noticed that a-type spaces represent the highest percentage in the whole sample (63%). This type includes each of the private, social and service spaces such as bedrooms, kitchen, bathroom, storage, and the living space where daily activities take place. The a-type space creates segregation as a result of the increase in depth. While the transition area such as halls, corridors, vestibules (*sguifa*),

terrace, and stairs are the transitional b-type spaces represent 30% of the sample suggesting that there is no choice of movement to and from this space. These are pass-through spaces, while all houses have an average percentage of b-type space. The c-type spaces represent 20% of the sample and fall in a ring suggesting a choice of movement around the house as in houses Hv1, Hv2, Hv5, Hv7, Hv15. The d-type spaces have the lowest degree (8%) of the sample offer alternative of movement when moving around the house as in the case of house Hv1.

Table 3: Degree of space-ness indicator of the space type (Authors,2021)

Houses	The degree of spaceness (space type)			
	a-ness	b-ness	c-ness	d-ness
Hv_1	0.66	0.04	0.24	0.08
Hv_2	0.53	0.28	0.18	0.00
Hv_3	0.61	0.41	0.00	0.00
Hv_4	0.61	0.33	0.00	0.00
Hv_5	0.70	0.11	0.27	0.00
Hv_6	0.66	0.37	0.00	0.00
Hv_7	0.61	0.27	0.15	0.00
Hv_8	0.66	0.37	0.00	0.00
Hv_9	0.62	0.42	0.00	0.00
Hv_{10}	0.70	0.33	0.00	0.00
Hv_{11}	0.66	0.36	0.00	0.00
Hv_{12}	0.64	0.30	0.00	0.00
Hv_{13}	0.62	0.42	0.00	0.00
Hv_{14}	0.69	0.33	0.00	0.00
Hv_{15}	0.58	0.25	0.16	0.00
Total	0.63	0.30	0.20	0.08

According to the data of the space-ness indicator of the sample in Table 3, the a-type space has the highest degree in all houses (63%), while the d-type has the lowest degree (8%). House Hv1 is the only house in the sample that has all four topological spaces with the following values: a-ness 0.66, b-ness 0.04, c-ness 0.24, d-ness 0.08. Four houses have three topological spaces (a-, b-, and c-ness): Hv2, Hv5, Hv7, Hv15 with the following values: a-ness 0.53, 0.70, 0.61, 0.58, respectively; b-ness 0.28, 0.11 0.27, 0.25, respectively; c-ness 0.18, 0.27, 0.15, 0.26, respectively. Ten houses have two topological spaces (a and b-ness): Hv3, Hv4, Hv6, Hv8, Hv9, Hv10, Hv11, Hv12, Hv13, Hv14, with the values: a-ness 0.61, 0.61, 0.66, 0.62 0.70, 0.66, 0.64, respectively; b-ness 0.41, 0.33, 0.37, 0.37, 0.42, 0.33, 0.36, 0.30, 0.42
, 0.33, respectively. Thus, in houses characterised by the high value of a-type spaces, there is no "through" circulation, and in b-type spaces which are transition spaces open directly onto a-type space. The results reveal the presence of a-type and b-type spaces in 100% of the sample, which refer to private, social and service spaces. The private and social spaces represent the separate spaces in the system such as bedrooms, halls, living room and guest room. There is no penetration into these spaces which provide a high degree of control due to their nature as spaces for specific functions such as sleeping, resting and eating.

The space link ratio (SLR): this indicator is used to assess the distributedness and non-distributedness properties of each space and

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the arrangement of houses; if there is only one non-intersecting route from one space to another in a system, it is called a non-distribution "tree-like structure". If there is more than one non-intersecting route for any two spaces in the system, it is called a distributed system. According to the data, ten houses Hv3, Hv4, Hv6, Hv8, Hv9, Hv10, Hv11, Hv12, Hv13 and Hv14 of the entire sample have a value of 1.00, which refers to non-distributedness, while the system offers a guided path with no alternative movement. The houses Hv1, Hv2, Hv5, Hv7 and Hv15 have values of 1.08, 1.06, 1.09, 1.05, 1.05 respectively. The results indicate that these houses have a distributedness system. Thus, the system gives an alternative of movement and circulation within the house. The distributedness reflects the existence of rings in the systems, and more than one intersecting path from the root to other spaces in the system which indicates the flexibility of movement.

Based on the graphs, three houses, Hv2, Hv7 and Hv15, have internal rings that are shaped around the transitional spaces of the c-type space which are "through spaces". House Hv1 has two rings, one external and one internal. House Hv5 has an external ring, shaped around the vestibule, exterior, stable and garage, providing alternative access from the exterior. In general, the J-graphs in the sample (Figure4) describe a symmetrical configuration and have arborescent visual configurations “tree-like structures”, which are deep, and define a hierarchical control within the house. The graphs have a guided path from the exterior (root space) from the point of view of the "visitor", relative to the first space (vestibule) entered from the exterior to the guest room (receiving space), unlike the inhabitants who used alternative paths to move around the house. Hillier and Hanson (1984) argued that there are two types of social relationships detected in J-graphs; firstly, the relationship between inhabitants (kinship relationships), and secondly the relationship between inhabitants and visitors.

By analysing the degree of space-ness and the space link ratio (SLR) of the sample, it can be noted that the results are consistent. Two groups of genotypes are identified; the dominant group is composed of ten houses and the minor group is composed of five houses (Table 4). The results are listed in Table 4, where a clear recurrence is noticed in both groups. The dominant group I shows a tree structure with no alternative routes offering a degree of control within the houses, while the minor group II shows a ring-shaped spatial configuration that offers alternative movement within a part of the house. The different base factor was calculated for each house to check the strength and homogeneity of the groups to report the genotype. The first group I shares a significant recurrence and shows a BDF value fluctuating between 0.19 and 0.59 for the houses Hv3, Hv4, Hv6, Hv8, Hv9, Hv10, Hv11, Hv13 and Hv14. These results show a strong functional differentiation of the house layouts. The house Hv12 shows a small difference. The minor group II shows that the house layouts have more than one circulation alternative and a strong functional differentiation (Boutabba et al., 2020). The analysis of the

layout of the houses suggests that there are two types of houses identified in the sample, with two underlying functional spatial genotypes in evidence.

Table 4: Identification of genotype groups using SLR and BDF (Authors,2021)

a- The dominant genotype I

Houses	SLR	BDF
Hv_3	1.00	0.45
Hv_4	1.00	0.51
Hv_6	1.00	0.26
Hv_8	1.00	0.32
Hv_9	1.00	0.59
Hv_{10}	1.00	0.37
Hv_{11}	1.00	0.44
Hv_{12}	1.00	0.95
Hv_{13}	1.00	0.19
Hv_{14}	1.00	0.51

b- The minor genotype II

Houses	SLR	BDF
Hv_1	1.08	0.88
Hv_2	1.06	0.55
Hv_5	1.09	0.42
Hv_7	1.05	0.67
Hv_{15}	1.05	0.65

DISCUSSION AND CONCLUSION

This study examined the underlying characteristics of spatial organisation by comparing the functional spaces of fifteen vernacular houses located in the city of Biskra, north-eastern Algerian Sahara. The method of justified graph analysis allowed to identify their patterning. Regarding to the analysis of the different syntactic properties, the house plans share common characteristics; the spatial organisation of the houses is structured around transition spaces such as the hall (*wasteddar*) and the corridor. The *wasteddar* is the main central space of the vernacular house; it is a b-type topological space where most of the daily domestic activities take place; in terms of integration values, it is considered the most integrated space in the house plans. The vestibule (*sguifa*) is located at depth1 in all houses, it is shallow from the root space (exterior). Moreover, it is one of the specific spaces that characterize the vernacular house in Biskracity. It is the boundary between the exterior space and the interior space that provide visual privacy inside the house. The *sguifa* is the point of entry of visitors into the house, while access is regulated by socio-cultural rules. The bedrooms are the most segregated spaces, they are located at the end of the graphs; they are suitable for inhabitants who tend towards private use. It should be noted that the guest room is shallow from the exterior because it is specific for strangers.

Observation of the sample graphs shows a strong similarity between spatial configurations, while the results of the in-depth analysis show that the deeper one goes into the structure, the more private the spaces become, such as private spaces (bedrooms, storage spaces) and service spaces (kitchen, bathroom), while the transitional spaces (hall, vestibule, corridors) are the most integrated spaces in the houses, which provide a degree of control within the house (Table 2). House layouts become more segregated when the exterior is included in the analysis (1.11). However, for houses with weak relationships with the exterior

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space and classified as 'introverted houses', the exterior is always on the segregated side, when integration values are considered with the exterior.

The degree of integration of each space of a house from the sample is compared to the other spaces in the same house. The results show that the ranking order of the spaces in all houses is in a consistent order, and it can be said that a cultural pattern exists across the sample. Furthermore, the recurrence of certain structural characteristics (such as RRA, MD, BDF) in this sample is a strong indication of genotype. Therefore, the low BDF values of all houses refer to a strong functional differentiation of the house layout and indicate the strength of social relations. The hierarchy of spatial organisation of functional spaces in the houses shows that the inhabitants tend to favour privacy. From the space link ratio and spaceness that are used to refine the genotype, two groups are determined (Table 4). The dominant genotype I has a tree-like configuration and a non-distributedness within the system, while the minor genotype II has a ring structure and a distributedness system that provides an alternative pathway within the system. Comparison of the BDF values of the two genotypes indicates that both groups have a high BDF, so the configuration tends to favour functional differentiation of spaces. It is important at this point to state that there are two genotypes.

The findings of this research indicate that the J-graphs of the case study houses are similar to each other and share the same basic characteristics of the configurational functions described as "genotypical signature". They structure the relationships between the residences, and control the boundaries between the internal spaces and the external world. Social and cultural factors are reflected in the spatial configuration of the sample, while there are two types of social relations, the first being the relationship between the inhabitants themselves and between the inhabitants and strangers. In conclusion, vernacular houses are regulated and controlled by socio-cultural factors, such as “intimacy”, which is considered a vital and sacred rule to preserve family members. The quantitative approach used in this study assessed this characteristic in different spatial arrangements of houses. However, houses with extremely different layouts and morphologies, and from distant times, would be better cases to examine the topic undertaken by this study.

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CONFLICT OF INTEREST

No conflict of interest was declared by the authors.

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In this research, the necessary permissions were obtained from the relevant participants (individuals, institutions, and organizations) during the survey and in-depth interviews.

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Resume

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Indoor Thermal Comfort in Modern Mosque of Tropical Climate

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Abstract

Purpose

The requirement of indoor thermal comfort in building is crucial, including the religious building such as mosque, which accommodates high occupancy level due to the congregational prayer. With this condition, the application of air conditioning system in a mosque is common, especially the modern mosque in hot climate where the layout plan is more complex compared to the vernacular mosque. Hence, the aim of this study is to evaluate whether the modern mosque design is able to provide the required indoor thermal comfort condition in tropical climate.

Design/Methodology/Approach

The National University of Malaysia's mosque was selected for the study. Two research methodologies were conducted concurrently, which were the field measurement and the questionnaire survey. The purpose of conducting these two methods was to compare the indoor thermal condition with the actual thermal sensation and satisfaction of the users. Both methods had been executed for four days, and there were 120 respondents who had participated in the survey.

Findings

The findings indicated that most users felt neutral thermal sensation only during the morning hours which was at the indoor operative temperature range of 28.5 °C to 30.1 °C. Meanwhile in the afternoon and late afternoon hours, where the indoor operative temperature was more than 30 °C, majority of them felt slightly warm. Despite that, they still voted for neutral or satisfied feeling during the afternoon and the late afternoon hours.

Research Limitations/Implications

The limitations in the study were the field measurement duration which was four days only and the location of the measuring tool which was at the prayer hall of the first floor level.

Originality/Value

The findings of this study can be used as a guidance in providing a modern mosque design that has good response to the tropical climate. This study also helps to embark other investigations in the future by using other methodologies such as numerical simulation and experiment.

Keywords: *Mosque, thermal comfort, tropical climate, energy saving, building environment*

INTRODUCTION

Mosque is one of the religious buildings which is actively used by Muslims in executing the daily prayers. The mosque designs are originally various, depending on the climatic condition where they are situated, as well as the cultural influence (Atmaca & Gedik, 2020). In the hot arid climate, the vernacular mosque is normally rectangular shape, with a flat roof design (Azmi & Ibrahim, 2020). Meanwhile, in the Southeast Asia region, where the climatic condition is mainly tropical, the vernacular mosque normally has tiered sloping roof with large overhang. It's layout plan is usually formed by rectangular or square shape, with veranda all around (Ahmad, 2015). Despite the various climatic conditions which result in variety approaches of mosque designs, there is one common approach all around the world, where there is a large prayer area or hall that is oriented towards the *Qiblah* (the *Ka'bah's* direction that is located in *Makkah*). Hence, the vernacular mosque is normally simple and straightforward, with a good climate responsive design.

On the contrary, the design of modern mosque usually has global influence. The modern mosque layout plan is normally more complex than the vernacular mosque. It usually encompasses of many floor levels and additional spaces other than the prayer hall. This is due to the accommodation of activities other than prayer such as religious classes, meeting and social gathering. Though many modern mosques still remain the rectangular shape for the prayer hall, the roof configuration is normally dominated by dome shape instead of flat or tiered sloping roof. Due to the variations in the modern mosque designs, a question arises whether such design variations address the indoor thermal comfort, especially at the prayer hall.

ANTECEDENTS

Mosque is one of the religious buildings which is actively used by Muslims in executing prayers. This section discusses on the previous studies related to the thermal comfort in tropical climate, as well as focusing on the indoor thermal comfort of mosque.

Thermal Comfort in Tropical Climate

Tropical climate is the climate that confines within the tropical region, which the latitude line is between the Tropic of Cancer (23.5°N latitude) and the Tropic of Capricorn (23.5°S latitude). Among the characters of tropical climate are the mean monthly temperature is more than 18 °C, the seasonal variation in temperature is modest where the variation mainly occurs in rainfall and irradiance, and the daily range of maximum and minimum temperature normally exceeds the monthly mean range. In the tropical climate, the seasons are generally determined by the rainfall (Schaik & Pfannes, 2005). Examples of countries that experience tropical climate are Mexico, Columbia, Ecuador, Brazil, Malaysia, Thailand, Indonesia and Singapore.

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There are many previous studies that discussed on the thermal comfort in tropical climate. Nevertheless, the studies are still considered insufficient when compared to the increasing percentage of people who live in the tropical climate. It is foreseen that in 2050, approximately 50% of the world population will live in the countries that experience tropical climate (Rodriguez & D'Alessandro, 2019). The thermal comfort studies in the tropical climate focus on many aspects as factors that influence the thermal comfort inside a building are various such as the orientation, ventilation, material properties, space utilization and incorporation of active and passive strategies (Latha et al., 2015). Among the strategies that aid to achieve thermal comfort in tropical climate are applying building materials that have low thermal diffusivity, thermal conductivity and absorptivity, finishing the external surfaces with light colour and reflective paint (Latha et al., 2015; Farhan et al., 2021; Jayasinghe et al., 2003), using appropriate roof insulation material (Amir et al., 2019), providing shading at the window (Latha et al., 2015; Tjie et al., 2020), as well as applying appropriate façade design such as optimum window-to-wall ratio and façade insulation (Tong et al., 2021).

There are three types of thermal comfort models namely the static model, the adaptive model and the hybrid model. The static model is developed based on the human heat balance, which considers the heat exchange between the human body and the surrounding environment. The examples of static model are Standard Effective Temperature (SET) and Predicted Mean Vote (PMV). The adaptive model is different from the static model where this model believes that when discomfort occurs, people have the ability to adapt themselves to the environment in restoring the comfort. The adaptation includes the adjustment in the behavior, psychology and physiology aspects. Meanwhile, the hybrid model is the combination of the static and adaptive models. The example of this model is Adaptive Predictive Average Vote (aPMV) (Kiki et al., 2020). Nevertheless, it is important to note that whichever comfort models adopt in the studies, the individual differences must be put into consideration. The examples of individual differences are the gender, age, clothing and activity (Wang et al., 2018).

All these models have been used in the thermal comfort studies of tropical climate. Those studies can be categorized into two namely the outdoor thermal comfort and the indoor thermal comfort. Das et al. (2020) investigated the outdoor thermal comfort of eight sites in the region of tropical climate using Local Climatic Zones (LCZs) approach. Xue and Lau (2016) examined the comfort and health of urban open spaces in Singapore and Hong Kong. The study indicated that controlling the geometry of the urban canopy layout would be effective in achieving outdoor thermal comfort. In addition, Hoseini et al. (2019) also emphasized that vegetation and shading elements able to improve the outdoor thermal comfort in the tropical climate of Malaysia. To date, the studies of indoor thermal comfort in the tropical climate have outnumbered the outdoor thermal comfort studies. Among the studies

are Mallick (1996), Wong et al. (2002), Wijewardanea and Jayasinghe (2008), Guevara et al. (2021), Chaiyapinunt and Khamporn (2021) and many others.

Wijewardanea and Jayasinghe (2008) indicated that people in the tropical climate who performed light factory works could tolerate the temperature of 30 °C. This temperature could be increased up to 34 °C with the presence of higher air velocity which was 0.6 m/s. The great tolerance to high temperature by people in tropical climate was also agreed by Mallick (1996) and Wong et al. (2002). Mallick (1996) investigated the indoor thermal comfort of occupants in Bangladesh's urban housing, while Wong et al. (2002) examined the thermal comfort in Singapore's public housing. Wong et al. (2002) also added that people won't be passive when they were in an uncomfortable environment as they would take adaptive measures to restore their comfort. Among their actions were adjusting the clothes, changing the activities, bathing and many others.

On the contrary, Guevara et al. (2021) derived lower neutral temperature for the thermal comfort of students in the university classrooms that were located in the three cities of Equador. The derived neutral temperatures were 21.8 °C for highland region, 26.3 °C for coastal region and 26.9 °C for rainforest region. The study also found that students who already adapted to the warm environment were sensitive to the air movement. The slight change in the air movement caused different thermal comfort sensation to them. Nevertheless, the study also summarized that the students preferred colder environment to warmer one, despites the differences of the regions. Chaiyapinunt and Khamporn (2021) investigated the thermal comfort of people in tropical climate who were sitting near the glass windows. The study found that the thermal discomfort did not rely on the distance of people from the window, but it was determined by the magnitude and direction of the solar incidence on the people.

Indoor Thermal Comfort of Mosque

The utilization frequency of a mosque is different from other building typologies, as it occupies high capacity of users at certain hours due to the congregational prayers. In Islam, there are five times of prayers a day, and a weekly *Jumuah* prayer (a prayer that is executed in the midday of Friday) which are conducted congregationally. Hence, it is pivotal to ensure the thermal comfort condition inside a mosque is achieved (Atmaca and Gedik, 2020; Manaf et al., 2020; Yüksel et al., 2020; Azmi and Ibrahim, 2020). Due to this necessity, there are many mosques nowadays that incorporate cooling or heating systems (depending on the climate) at the prayer halls to enhance the indoor thermal comfort condition. This action has definitely caused the increase of energy usage, thus resulting in many other negative impacts to the environment and economical aspects (Azmi & Ibrahim, 2020).

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There are many parameters that affect the indoor thermal performance of a mosque, namely the site surrounding, orientation, form and shape, apertures and building materials. The uniqueness of mosque compared to the other building typologies is that it is normally designed to be symmetrical, and oriented towards the *Qiblah* direction (as aforementioned), regardless the sun path and the site condition (Azmi & Ibrahim, 2020). In addition, the principles of congregational prayer also influence the shape of the mosque, particularly the prayer hall. This area is normally rectangular shape and designed to be barrier-free (Azmi & Kandar, 2019).

Achieving an indoor thermal comfort via passive design in the tropical climate is a challenge. This is due to the climatic condition that has constantly high air temperature and relative humidity throughout the year. The vernacular architecture of tropical climate has indicated on certain criteria to be fulfilled in achieving a good climate responsive design. Among the criteria are the minimization of wall exposure to the direct solar radiation via the incorporation of large roof overhang, the utilization of low thermal capacity materials such as bamboo and timber, and the provision of abundant openings in allowing good air flow. Nevertheless, these criteria are less considered in the modern mosque design due to the global influence.

Therefore, the objective of this study is to investigate the selected modern mosque, and analyze whether the design addresses the indoor thermal comfort condition of the users. The findings from this study is useful to embark other investigations in relation to the indoor thermal comfort of modern mosque design. The study focuses on the prayer hall as it is the area that serves the main purpose of a mosque. Though there are already many previous studies on indoor thermal comfort of mosques in various climates (Abdullah et al., 2016; Munir et al., 2020; Al-ajmi, 2010; Al-Homoud et al., 2009; Atmaca and Gedik, 2020; Hussin et al., 2015; Manaf et al., 2020; Saeed, 1996; Yüksel et al., 2020; Yusoff, 2020a), the empirical investigation related to the naturally ventilated modern mosque in tropical climatic condition is still lacking. Azmi and Ibrahim (2020) who conducted a review on the thermal performance of mosque also stated that the studies within the tropical climate are still insufficient.

Yusoff (2020a) and Yusoff (2020b) had conducted studies on the thermal comfort, as well as the natural ventilation of a mosque located in the tropical climate of Malaysia. However, the investigations were executed on a vernacular mosque instead of a modern mosque. Meanwhile, Munir et al. (2020) compared the thermal sensation and satisfaction of people who used the timber and concrete mosques in tropical climate. Nonetheless, the actual indoor thermal condition of the mosques had not been measured. Hussin et al. (2015) investigated the reliability of PMV thermal comfort model at a modern mosque in the tropical climate of Malaysia. However, the investigation was specified to an indoor condition that applied air-conditioning system. Similarly, Al-Hamoud et al. (2009) also investigated thermal comfort condition in air-conditioned mosque

that is located in the eastern region of Saudi Arabia, where the climate is hot and humid. There are also other few studies that investigated thermal comfort of mosques in hot and humid climate, but there is no empirical finding presented. The examples are the studies by Abdullah et al. (2016), who focused on developing a theoretical framework, and Manaf et al. (2020) who provided discussion based on literature studies.

The study presented in this paper is considered as an additional knowledge to the related field, especially for the tropical climate. The findings of this study able to assist the mosque designers to produce a modern mosque design that provides a comfortable indoor thermal environment, as well as having a good response to the tropical climate. The scope of the study is the indoor thermal comfort at the prayer hall of a modern mosque in Malaysia. The selected case study for the modern mosque is National University of Malaysia (UKM)'s mosque. However, there are limitations in the study which are the field measurement duration and the location of the measuring tool. The field measurement was executed for four days only due to the limitation in the availability of the measuring tool. Meanwhile, the location of the measuring tool was at the prayer hall of the first floor level instead of ground floor level. The first floor level was chosen due to the consideration of minimizing the interruption to the congregational prayers, which are usually executed at the ground floor prayer hall. Though such limitations occurred, the findings of this study are still reliable and valuable for the additional knowledge in this field. In addition, this study is an initial stage that will embark other investigations in the future by using other methodologies such as numerical simulation and experiment.

MATERIAL AND METHODS

There are two stages conducted in this study which the first stage involves the understanding of the UKM's mosque design via the document analyses and observation. Literature studies were conducted on the documents related to the mosque such as the vernacular and modern mosque designs and characteristics, the standards and regulations, as well as information regarding the UKM's mosque. Meanwhile, the layout plans of the UKM's mosque were obtained from the UKM's Infrastructure Office. The observation of the UKM's mosque design was also executed to enhance further the understanding of the information derived from the document analyses. Meanwhile, the second stage involves the field measurement and the questionnaire survey in investigating the indoor thermal comfort condition inside the mosque. The purpose of field measurement is to record the environmental condition of the indoor spaces of the mosque, while the questionnaire survey is essential to derive the thermal comfort sensation and satisfaction of the users. The output from these two stages were compared and analyzed in determining whether the design of UKM's mosque addresses the indoor thermal comfort for the tropical climate of

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Malaysia. The summary of methods conducted in this study is depicted in Figure 1.

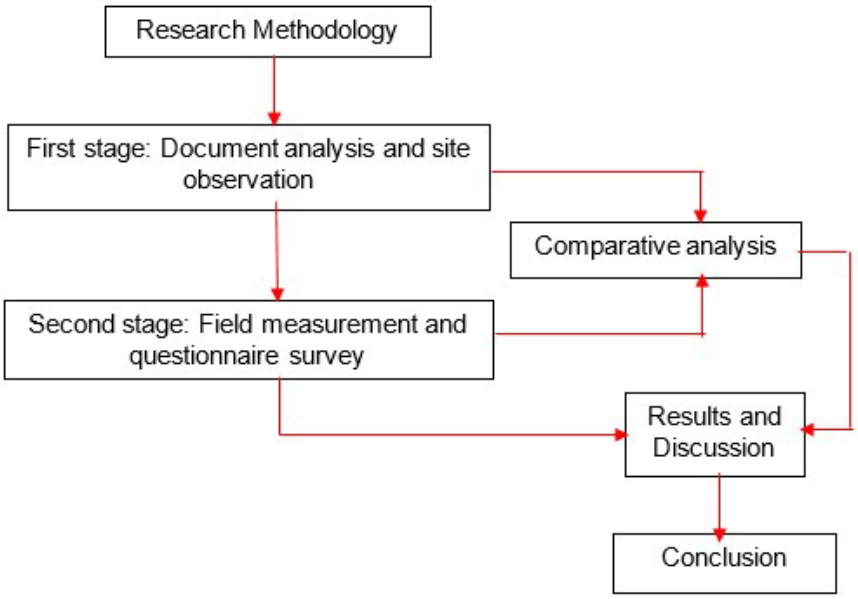

Figure 1. The methods conducted in the study.

The field measurement and the questionnaire survey were conducted concurrently for four days in April 2019, from 9 am till 4 pm. These two methods had to be conducted simultaneously in comparing the indoor environmental data with the thermal sensation and satisfaction felt by the users. Therefore, it helps to understand the thermal comfort range for the mosque users in the tropical climate, as well as whether the design of the selected mosque provides the required indoor thermal comfort condition. The short duration for the investigation is due to the limitation in the availability of the measuring tool. For this initial investigation, the study also focuses on the daytime only. The evaluation of indoor thermal condition during the nighttime, as well as throughout the year will be conducted in the future research.

Selected Building for Field Measurement: National University of Malaysia's Mosque

The modern mosque selected for this study is a high institution mosque, belonged to the National University of Malaysia (UKM). Though it is belonged to an institution, the mosque is also used by the community within its proximity due to its location, which is adjacent to the main road. UKM was developed in 1970, where the architectural approach of its buildings during the early years was in line with the architectural movement for the period of 1950s to 1970s in Malaysia. During this period, two architectural design principles dominated namely the functionalist-regionalism and organic-regionalism. The UKM's buildings were designed to follow the principle of functionalism, where it was initially employed by Le Corbusier who also emphasized on the expression of materials, particularly the concrete. This principle believes

in the functionalist and aesthetic architecture machine, where building is considered as a device that serves as a climate filter to produce a comfortable indoor environment for the human activities (Rasdi & Mursib, 2004).

This principle is also applicable to the UKM's mosque which was constructed in 1979. Hence, the mosque was selected due to its modern design, where the architectural approach was influenced by the global movement during the period of its construction. Similar to the other UKM's buildings during the early development, the mosque showcases the bare building materials such as concrete and brick. In addition, the mosque design is also dominated by angular geometric shapes, and its facades are also in monochrome colour (Figure 2). These design approaches are synonym with the brutalist architecture characteristics. In addition, the mosque also features variations of egg crate concrete screens in its design, which serve as a tropical adaptation, besides providing a modern aesthetic look. The mosque also has verandas all around, which resemble the vernacular mosque design. With those design approaches, the UKM's mosque is expected to have a good response to the tropical climate of Malaysia, and consequently providing a comfortable indoor thermal environment. However, the actual performance of the mosque with regards to its architectural approach, is still need to be evaluated. Hence, investigation was executed on the UKM's mosque with the intention to examine whether the design implemented is able to achieve the required comfortable indoor thermal environment.

Figure 2. The National University of Malaysia's mosque.

The mosque, which is situated at the main entrance of UKM, was built on a land plot area of 2 hectares. There are six gazebos and approximately 300 car parks that surround the mosque. The basic layout plan of the mosque is rectangular shape. There are verandahs and minarets at the three sides of its facades. It consists of three storeys, with the total gross floor area of approximately 25,713 square meter. With that breadth, the mosque is able to accommodate 5000 people at one time. The ground floor encompasses a prayer hall, two ablution areas (male and female ablution areas), two toilets (male and female toilets), an administration

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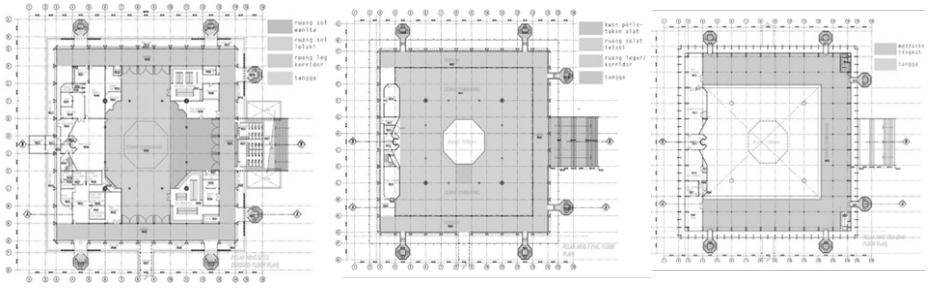
office, three seminar rooms, a meeting room, a room for *imam* (a person who leads the prayer) and a mortuary (Figure 3a). The first floor also consists of a prayer hall, a resource centre and a guest room (Figure 3b), while the second floor, which is the top most floor accommodates a female prayer hall, a studio room, and two ablution areas (Figure 3c). From Figure 3, it can be seen that the centre of the prayer hall at the ground floor area has the height of triple volume, and it is covered by a dome. The prayer areas at the ground, first and second floor levels are shown in Figure 4



(a) (b) (c)

Figure 3. The floor plans of the (a) ground floor level, (b) first floor level, and (c) second floor level. The grey colour indicates the prayer areas.

(a) (b)

Figure 4. The prayer areas at the (a) ground floor level, (b) first and second floor levels.

Though the ground and first floor prayer areas are surrounded by verandas, it is found from the observation that the penetration of daylight is greater at the first floor level. This is due to the presence of glass walls all around, as well as the fixed glass clerestory windows at the dome which allow the daylight penetration. The void beneath the dome area also allows the daylight that enters via the clerestory windows to reach every floor level (Figure 5). However, the daylight amount at the ground floor is lesser than the first floor due to greater distance between the ground floor and the clerestory windows compared to the first floor. In addition, the size of the void at the ground floor is also smaller compared to the first floor level. The ventilation mode applied at the UKM's mosque is hybrid ventilation, which uses the natural ventilation and the mechanical fans. At the first floor level, there are decorative openings placed on top of the glass walls which allow for natural cross ventilation to occur. In addition, there are also glass sliding doors which can be opened to allow for air exchange between the indoor and outdoor (Figure 5).

(a) (b)

Figure 5. The prayer areas at the (a) ground floor level, (b) first and second floor levels.

As aforementioned, there are verandas that surround the prayer areas. Besides being as pathways, the verandas at the ground and first floor levels also function in preventing the penetration of direct solar radiation and rainwater into the prayer areas, especially during the downpour (Figure 6). In the tropical climate, this approach is common for buildings that have good climate responsive design, due to the presence of high solar radiation and precipitation throughout the year.

(a) (b)

Figure 6. The verandas at (a) the ground floor level, and (b) the first floor level.

Field Measurement

The field measurement was conducted using Delta Log 10, which is capable of recording the data of air temperature, mean radiant temperature, relative humidity and air velocity. Due to the availability of only one Delta Log 10 at the time of measurement, the best location was selected by following the recommendation in ANSI/ASHRAE Standard 55-2017 (ASHRAE, 2017) for the thermal comfort measurement. In addition, the placement of the measuring tool also took into consideration the possibility of having the least interruption to the users' activities especially the congregational prayers. With those considerations, the first floor prayer hall was selected instead of the ground and second floor levels. Nevertheless, the measuring tool was placed at the area near to the void which connects all the three floors. The first floor prayer hall was also selected due to the possibility of switching off the mechanical fans during the measurement time, which was impossible to do that for the ground floor area. The main concern of the mosque administration officers during the measurement was the interruption to the users' activities especially those who were conducting the prayers. Hence, the measurement was executed with the possibility of avoiding the disturbance to the users' activities as much as possible.

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The measurement accuracy of Delta Log 10 is ± 2.5 % for the relative humidity, ± 0.1 °C for the mean radiant temperature, ± 0.1 °C for the air temperature and ± 0.05 m/s for the air velocity. Before conducting the field measurement, the Delta Log 10 was calibrated in ensuring the reliability of the data recorded. The calibration was executed by comparing its reading with the other similar measuring tool within the same indoor environmental condition. The deviation percentages between both measuring tools were calculated and compared.

During the field measurement, the sensors of Delta Log 10 were placed at the height of 1.1 meter from the floor level. This height is recommended by ASHRAE (2017) for both, the seated and standing positions, which are appropriate for the positions of human activities in the mosque. The Delta Log 10 was also placed as close as possible to the centre of the prayer hall, as the exact location of the centre point was hard to achieve due to the presence of void (Figure 7). The data was measured and recorded at the interval of 10 minutes, from 9 am to 4 pm. The outdoor environmental data is also essential in evaluating the indoor thermal comfort, as the mosque is naturally ventilated. The outdoor data was derived from the weather station that was located at the roof top of the Faculty of Engineering and Built Environment's building. The faculty's building is also located within the area of UKM, which is approximately 2.2 km from the UKM's mosque.

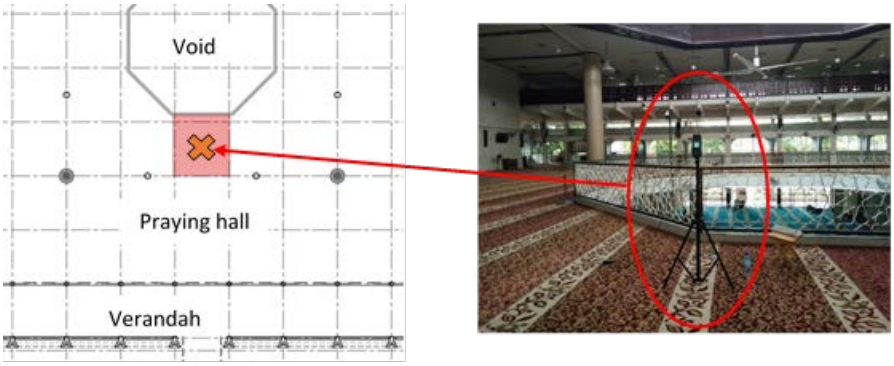

Figure 7. The location of the Delta Log 10 at the prayer hall of the first floor level.

Questionnaire Survey

The questionnaire survey was conducted concurrently with the field measurement. The survey forms were distributed to 120 respondents throughout the four days of survey. The survey form encompassed of three sections. The first section was specifically for the usage of the researcher in recording the survey time and date of each respondent. The second section documented the personal data of the respondent such as the gender, age, height, weight, nationality, user category, frequency of usage and attire. Meanwhile, the third section examined the thermal sensation, thermal satisfaction and desired thermal condition of the respondents. The thermal sensation and desired thermal condition of the respondents were evaluated using the ASHRAE thermal sensation scale (1: cold, 2: cool, 3: slightly cool, 4: neutral, 5: slightly warm, 6: warm, 7:

hot) (ASHRAE, 2017). Meanwhile, for the investigation of the respondents' satisfaction, the 7-likert scale (1: very dissatisfied, 2: dissatisfied, 3: slightly dissatisfied, 4: neutral, 5: slightly satisfied, 6: satisfied, 7: very satisfied) was utilized.

The analyses on the respondents' personal data indicated that 66% of the users were male, while female users were around 34% only. This is a normal situation as in Islam, the Muslim males are more encouraged to perform the prayer at the mosque compared to Muslim females. Regarding the age group, majority of the respondents were between 13 to 39 years old. This age group was also in accordance with the user category of the survey that indicated on 73% of student category. This reflects the location of the mosque which is within the institution. Meanwhile, for the height and weight criteria, most respondents were within 161 to 170 cm and 40 to 60 kg, respectively. Most of the activities conducted in the mosque were the sedentary activities such as seated and standing, which the metabolic rates were within the range of 1.0 to 1.2 MET (ASHRAE, 2017). Meanwhile, for the users' attires, most of the male respondents wore either long sleeve or short sleeve shirt with trousers, while the female respondents wore long dress or 'baju kurung' (a Malay traditional garment) with head cover. Hence, the clothing values for the respondents were within the range of 0.57 to 1 clo (ASHRAE, 2017).

RESULTS AND DISCUSSION

In this section, the outdoor and indoor environmental data were tabulated in table form, while the users' thermal sensation and satisfaction results were presented in graphs.

Outdoor and Indoor Environmental Data

Tables 1 and 2 tabulates the hourly average outdoor and indoor environmental data of UKM's mosque for the period of four days in April 2019.

Table 1. The hourly average outdoor environmental data

Time	Hourly Average Outdoor Air Temperature, T_o (deg C)	Hourly Average Outdoor Wind Velocity, V_o (m/s)	Hourly Average Outdoor Relative Humidity, RH (%)
9 am	27.6	0.49	94
10 am	29.8	0.89	85
11 am	32.2	1.08	76
12 pm	33.0	1.18	70
1 pm	33.5	1.27	67
2 pm	33.7	1.39	66
3 pm	33.1	1.66	68
4 pm	33.6	1.64	71

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Table 2. The hourly average indoor environmental data

Time	Hourly Average Indoor Air Temperature, T_a (deg C)	Hourly Average Indoor Mean Radiant Temperature, T_{mrt} (deg C)	Hourly Average Indoor Air Velocity, V_a (m/s)	Hourly Average Indoor Relative Humidity, RH (%)
9 am	28.2	28.8	0.14	81
10 am	29.0	29.2	0.10	77
11 am	30.0	30.1	0.14	71
12 pm	30.6	30.8	0.16	64
1 pm	31.3	31.5	0.17	60
2 pm	31.9	31.9	0.28	59
3 pm	32.1	32	0.35	59
4 pm	32.3	32.1	0.32	59

The operative indoor air temperature (T_{op}) was used in comparing with the thermal comfort sensation felt by the users. The T_{op} data was utilized instead of air temperature (T_a) due to the justification that the thermal condition felt by the users were influenced by both parameters, the air temperature and the mean radiant temperature. The T_{op} data of Table 3 were derived from the Equation 1, as recommended by (ASHRAE, 2017):

$$T_{op} = A\,T_a + (1 - A)\,T_{mrt} \qquad \text{(Equation 1)}$$

From the equation, the symbol T_{op} represents the indoor operative temperature, T_a denotes the indoor air temperature, T_{mrt} symbolizes the mean radiant temperature, while A indicates the value as a function of the average air speed, which was referred to the value recommended in ANSI/ASHRAE Standard 55 (ASHRAE, 2017).

Table 3. The hourly average indoor operative temperature (T_{op})

Time	Hourly Average Indoor Operative Temperature, T_{op} (deg C)
9 am	28.5
10 am	29.1
11 am	30.1
12 pm	30.7
1 pm	31.4
2 pm	31.9
3 pm	32.1
4 pm	32.2

The hourly average indoor operative temperature was plotted against the predicted indoor comfort temperature (refer to Figure 8) using the Equation 2, which was developed by Toe and Kubota (Toe & Kubota, 2013).

$$T_c = 13.8 + 0.57\,T_o \qquad \text{(Equation 2)}$$

The equation was developed according to the principle of adaptive thermal comfort (ATC). ATC model is more appropriate for the naturally ventilated building compared to the Predicted Mean Vote (PMV) model due to the constantly changing environment (He, Liu, Kvan, & Peng, 2017). Moreover, the ATC model has also been used to evaluate thermal comfort in tropical climate by many previous studies (López-Pérez et al.,

2019). The ATC equation is simple and user-friendly where the main influencing parameter to the indoor comfort temperature is the outdoor air temperature, which is represented by T_o (Carlucci, Bai, de Dear, & Yang, 2018). T_c is the predicted indoor comfort temperature, while value 0.57 is the slope of the function, and 13.8 is the value of y-intercept. The value of 0.57 is proportional to the adaptation degree to the tropical climatic condition. The values of 0.57 and 13.8 recommended by Toe and Kubota (2013) were derived from the tropical climate database of ASHRAE RP-884.

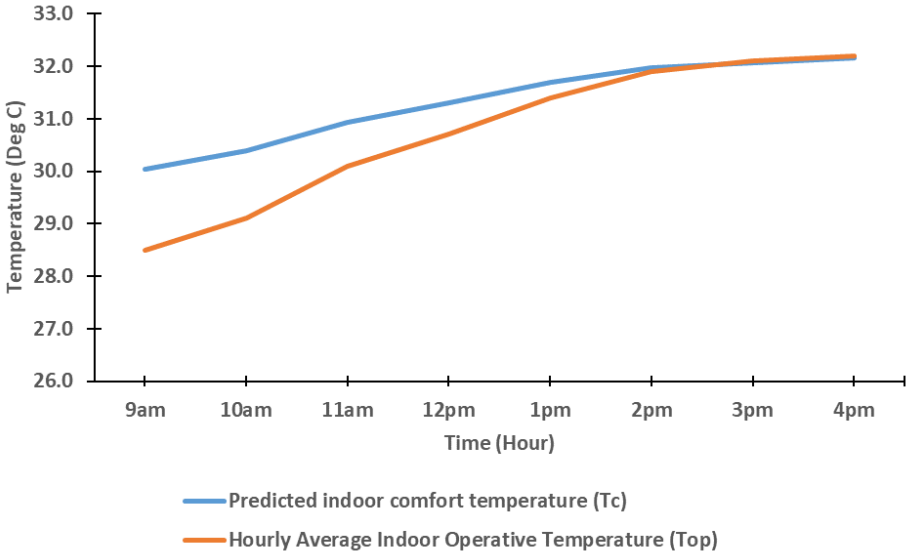

Figure 8. The hourly average indoor operative temperature (T_{op}) against the predicted indoor comfort temperature (T_c).

From Figure 8, the T_{op} at the prayer hall was lower than the T_c from 9 am until 2 pm, while at 3 pm and 4 pm, both temperatures were similar. The results indicate on positive indoor thermal comfort condition at the investigated area. Nevertheless, the filed measurement results need to be compared with the questionnaire survey results to confirm this finding, which this is elaborated in the next section.

Thermal Sensation and Satisfaction of Users

The thermal sensation and satisfaction of the prayer hall users were derived from the questionnaire survey. Figure 9 depicts the thermal sensation felt by the respondents during the survey. The results indicate that the respondents felt either neutral or slightly cool during the morning hours, while at noon, the thermal sensations were various, from cool to slightly warm. Nevertheless, the slightly warm dominated compared to the other thermal sensations for the afternoon hours. Meanwhile, during the late afternoon hours, which were from 2 pm to 4 pm, the respondents felt neutral to hot, and majority of them felt slightly warm. Figure 9 also shows that the respondents' thermal sensation votes were in agreement with the indoor operative temperature which indicated increment from morning to late afternoon. In addition, the tolerance of respondents towards the indoor operative temperature

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were various, where there were respondents who still felt cool and slightly cool though the operative temperature was more than 30 °C. This is also in correspondence with the study by Caetano et al. (2017) who found that people in tropical climate have great tolerance to the high air temperature.

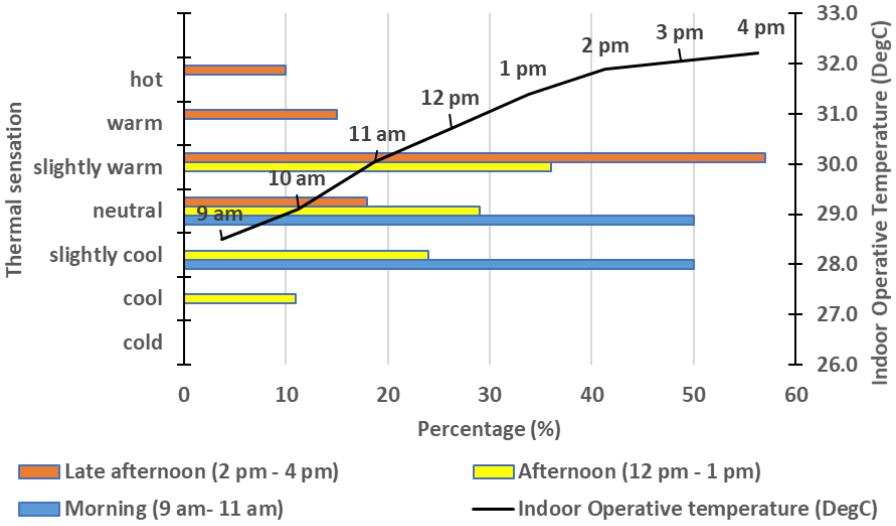

Figure 9. The thermal sensation of the users

The respondents' thermal satisfactions towards the indoor operative temperature were depicted in Figure 10. The results indicate that during the morning hours where the indoor operative temperature was 28.5 °C to 30.1 °C, the respondents' thermal satisfactions were within the range of neutral to satisfied. However, the satisfaction feeling was slightly changed during the afternoon hours where there were respondents who felt slightly dissatisfied. Nevertheless, majority of them still felt satisfied with the indoor operative temperature at noon. Meanwhile, the thermal satisfactions of the respondents were various during the late afternoon hours, which range from very dissatisfied to very satisfied. However, most of them felt neutral, which was neither satisfied nor dissatisfied, with the indoor operative temperature. Hence, in comparison to Figure 9, it shows that though many respondents felt slightly warm and above thermal sensation, they still can tolerate it as majority voted for neutral thermal satisfaction. Even, the respondents who opted for slightly satisfied to very satisfied votes were more compared to the votes of slightly dissatisfied to very dissatisfied.

Investigation was also conducted on the desired thermal sensation by the respondents (Figure 11). It is found that many respondents wanted to be in a slightly cooler indoor condition during the morning and afternoon hours though the thermal sensations during the survey were already indicated slightly cool and neutral. Meanwhile, majority desired to have a cooler environment during the late afternoon hours due to the slightly warm condition during the survey. Hence, the results show that though

in general majority felt satisfied with the indoor operative temperature, they still wished to have a cooler indoor environment.

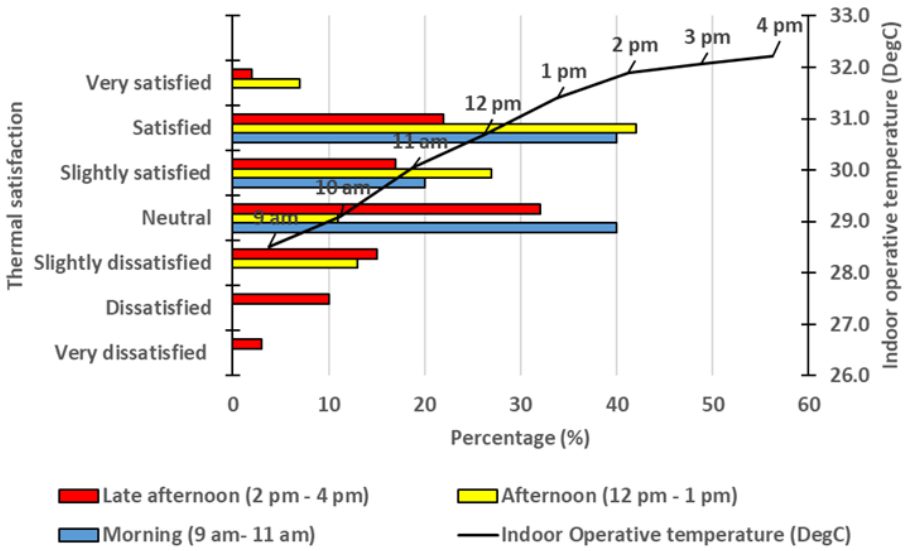

Figure 10. The thermal satisfaction of the users

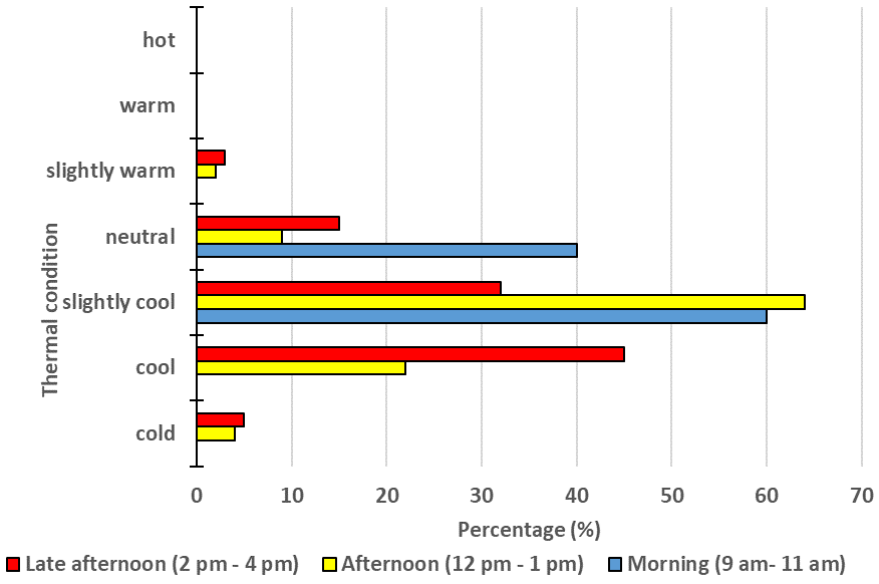

Figure 11. The desired thermal condition of the

Based on the results depicted in Figure 9, it is found that most respondents felt slightly warm during afternoon and late afternoon hours. This is in contrast to the results in Figure 8 where the hourly average indoor operative temperature was found to be within the predicted indoor comfort temperature. Nevertheless, the respondents still voted for neutral and satisfied thermal sensations (Figure 10), though if given option, they wanted a cooler indoor thermal condition (Figure 11).

The results of the study also indicate that most respondents felt neutral at the T_{op} range of 28.5 °C to 30.1 °C, which was during the morning hours. The finding is in agreement with the previous studies, which indicated

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that the thermal comfort range for tropical climate was between 26 °C to 30.4 °C. This range was summarized from the study by Hwang et al. (2006) who indicated 27.4 °C to 28.8 °C, López-Pérez et al. (2019) who recommended 26.9 ± 1.3 °C, Djamila et al. (2013) who stated 30.2 ± 0.2 °C and Daghigh (2015) who suggested 26 °C to 28.9 °C. Nevertheless, during the afternoon and late afternoon hours, where the T_{op} was more than 30 °C (30.7 °C to 32.2 °C), there were still respondents who felt neutral.

The warm thermal sensation during the afternoon and late afternoon hours is due to the utilization of high thermal mass materials such as concrete and bricks. In contrast to the vernacular mosque in Southeast Asia which utilizes timber, the high thermal mass material is able to store more heat, which later is released into the indoor area. However, for the modern mosque which normally has high volume area, the usage of timber as main building material may not be practical. Hence, the combination of high and low thermal mass materials might be an option in improving the indoor thermal condition (Azmi & Ibrahim, 2020).

In addition, the indoor thermal condition of the UKM's mosque becomes discomfort throughout the day due to the presence of fixed glass clerestory windows at the dome area. Though these windows allow the daylight penetration, there is also heat received from the direct solar radiation especially when the sun altitude is high. Moreover, the fixed glass clerestory windows at the dome also prohibit the stack effect ventilation to occur. The provision of openings at the dome area may enhance the natural ventilation by allowing the stack effect ventilation to occur, and consequently improve the indoor thermal condition (Faghih and Bahadori, 2011; Gagliano et al., 2012).

Nevertheless, the enhancement of indoor air velocity inside the mosque may also improve the indoor thermal comfort. The data recorded during the measurement indicated the air velocity values of lower than 0.5 m/s at all times. Based on the findings from the previous studies, it is found that the thermal comfort range can be escalated with the increase of air velocity (Cândido et al., 2011; López-Pérez et al., 2019). The recommended air velocity for the thermal comfort in tropical climate is within the range of 0.13 ± 0.04 m/s for neutral temperature of 26.9 ± 1.3 °C (López-Pérez et al., 2019), 0.4 m/s for 24 °C to 27 °C, 0.41 m/s to 0.8 m/s for 27 °C to 29 °C, and more than 0.81 m/s for 29 °C to 31 °C (Cândido et al.,2011). Hence, the recorded indoor air velocity at the prayer hall is insufficient to achieve thermal comfort due to the T_{op} values of more than 28 °C.

CONCLUSION

In summary, though the comparison between the indoor operative temperature and the predicted indoor comfort temperature indicated that the mosque's prayer hall was within a comfort indoor environment, the respondents felt neutral thermal sensation during the morning hours only. Nevertheless, majority of the respondents still voted for neutral or

satisfied feeling despite the slightly warm thermal sensation during the afternoon and late afternoon hours. This shows that people in tropical climate, especially in naturally ventilated building, can still tolerate the slightly warm indoor thermal condition. However, if given option, they would require for a cooler indoor environment.

The design of National University of Malaysia's mosque has certain characters that have good response to the tropical climate of Malaysia such as verandas that reduce the penetration of direct solar radiation and rainwater into the prayer halls. The application of glass walls all around, which allow ample permeability of daylight into the prayer halls, is also acceptable due to the presence of verandas. In addition, there are also abundant openings all around that allow for natural cross ventilation to occur. However, the increase of indoor operative temperature throughout the day might be due to the application of high thermal mass materials such as concrete and brick. Though the usage of low thermal mass materials such as timber and bamboo are more appropriate for tropical climate, they are less practical for a high volume mosque, with many floor levels.

Improvement should also be made to the design by providing openings at the dome area, in allowing the stack effect ventilation to occur. Nevertheless, consideration should also be made in preventing the rainwater to penetrate through the openings due to the high precipitation in tropical climate. In addition, innovation should also be made to the current openings in achieving higher indoor air velocity, which can enhance the indoor thermal comfort. Basically, the design of the mosque should be improved to achieve the indoor thermal comfort in tropical climate, especially during the afternoon and late afternoon hours.

This study provides guidance in designing a modern mosque in tropical climate that is able to provide indoor thermal comfort for the users. Nevertheless, this study shouldn't be stopped here as there are many other potential aspects to be explored in the future research related to the indoor thermal comfort of mosque. Such potential studies are the effect of various roof configurations to the indoor thermal comfort, the ratio of prayer hall area to the height, the mosque building materials and many others.

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CONFLICT OF INTEREST

No conflict of interest was declared by the authors.

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FINANCIAL DISCLOSURE

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ETHICS COMMITTEE APPROVAL

Ethics committee approval is not required for this article.

LEGAL PUBLIC/PRIVATE PERMISSIONS

In this research, the necessary permissions were obtained from the management of National University of Malaysia's mosque for the field measurement, and the respondents who participated in the questionnaire survey.

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Resume

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Perceptual Evaluation of Traditional Turkish House Façade

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Abstract

Purpose

This study aimed to make a comparative evaluation of the differences between the original façade (original) and the modified façade of the traditional Turkish Houses (collected from Afyonkarahisar city) based on perception.

Design/Methodology/Approach

In line with this purpose, digital images of eight sets of original and modified street silhouettes with gray color scales have been produced on the computer. Two different groups consisting of 80 people (architect and non-architect group) have evaluated the prepared images by the semantic differentiation scale consisting of the adjective pairs. The main hypothesis of the study is "The original façade would be more preferred than the modified façade". Also, gender, architect and non-architect group comparisons were made in the evaluations, too.

Findings

The results have shown that the participants liked the original traditional Turkish House façade more. The tidy/untidy and proportional/non-proportional adjective pairs have had the biggest difference in this evaluation. In another result, male participants have evaluated the traditional Turkish House façade views liked more for all dependent variables except for familiar / unfamiliar and qualified / unqualified adjective pairs compared to female participants. In addition, non-architects have liked more than architects the façade views of traditional Turkish Houses for adjective pairs that are beautiful / ugly, not impressive / unimpressive and interesting / uninteresting. On the other hand the architects have liked more than non-architects the façade view of traditional Turkish Houses for the proportional / non-proportional adjective pair.

Research Limitations/Implications

This study has been conducted only for Turkish Houses collected from Afyonkarahisar city. In addition, only architects and non-architects group attended for evaluation of the surveys.

Social/Practical Implications

According to the most important finding obtained from the study, the fact that the original state is observed in the restoration of traditional Turkish Houses has caused people liked it more. Similarly, it has been observed that the organization of windows, solid-void relationship ratio, repetitions, horizontal and vertical structural elements (beams etc.) in the Turkish house façade characteristic will have a positive effect on perception.

Originality/Value

With this study, for the first time in the literature, the evaluation of holistic (comprehensive) street silhouettes was made based on a single façade layout.

Keywords: *Traditional Turkish House, Façade, Perception, Street silhouette, Modified, Profession.*

INTRODUCTION

In architecture, the façade means the main face of the entrance to the building and it varies in details according to the society and culture that live in. Another definition of façade; is the surface where the building has a dialogue with the urban space and its surroundings. Façade is also the interface between the building, space and the urban space. Bauer (1965), Le Corbusier (1965), Arnheim (1977), Venturi (1977), Klotz (1988), Frampton (1992), Krier (1992) and Şenyiğit and Altan (2011) reported that city users rather understand the façade by a formal composition and they mentioned that it constitutes the language of a city in terms of the meanings they carry. According to Krier (1992), façade is one of the important architectural elements that have a communication capacity with not only the interior space and the inhabitants of the building, but also its surrounding environment. Rasmussen (1962) states in her study that the buildings will be evaluated with their external appearance. The perception comes into play in expressing the façade of the city users. Human is a perception, cognition and behavior mechanism (Rapoport, 1977; Arslan, 2010). Perception, cognition and behavior are central to the human - environmental experience. Perception, in the simplest sense, is to have information from an environment through stimulation.

In scientific studies carried out in this field, it is reported that the levels of "likes" and "satisfaction" are increased if the physical environmental conditions in the architectural spaces are arranged according to the wishes and needs of the users. In these studies, it is stated that the architectural form of the space, the shape and color of the lighting, the layout of the furniture and fittings, and the density of human and furniture may have a positive / negative effect on the perception of the physical environmental conditions (Yamaner, 2001; Aydıntan, 2001; Küller et al., 2006; Yıldırım et al. 2007a; Yıldırım et al. 2007b). On the other hand, some studies have suggested that the physical and psycho-social needs of people may differ according to their demographic characteristics such as age, gender and education (Ayyıldız, 2000; Başkaya et al., 2003, 2005; Yıldırım, 2005; Yıldırım et al. 2007b). Besides the perception of the interior space, in many studies different researchers (Gifford et al., 2000, 2002; Akalın et al., 2009, 2010; Şenyiğit, 2010; Zülkadiroğlu, 2013) have evaluated the effects of the differences between the user characteristics on the perception of the façade, in recent years.

Dependent variables such as likes, complexity, preferences and impressiveness were used more in the studies on the perception of the building façade and interior space. In some of the studies (Berlyne, 1974; Imamoglu, 2000; Herzog and Shier, 2000 and Stamps, 2003), the façade complexity and other parameter relations such as impressiveness or liking (pleasantness) were tested over the building visuals, while in other studies (Wohlwill, 1968, 1975; Kaplan et al., 1972; Berlyne, 1974, 1977; Crozier, 1974; Nasar, 1983; Devlin and

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Nasar, 1989; Akalın et al., 2009), the relationship between the variables of complexity and preference was questioned. In addition, in the study of Şenyiğit (2010), she developed a different approach to the formal and semantic expression of street façades formed by buildings designed in an adjacent order.

Façade; a reflection of the building's function is an indication of the cultural situation of the building at the time when it was built. Façades are historical scenes where the cultural change of societies can be observed with a different interpretation. Therefore, it is especially important to preserve the facades of historical buildings and to restore them as true to their originals as possible. Thus, the social and cultural sustainability of the buildings is ensured.

Different countries have their own architectural buildings and trends that show periodic differences. For Turkey, the concept of a traditional Turkish House has an important place in terms of architecture. The façades applied in traditional Turkish houses have a very unique structure. There is a direct relationship between the plan schemes of the houses and their façade arrangements. The projection shapes on the façade are especially composed of large inner spaces on the second floor. However, although it changes depending on the climatic conditions, there is a direct proportion between the number of windows and the size of the space they belong to in generally hot climates. The land structure and geographical features of the region where Turkish Houses are located are extremely influential in the number of floors and locations. Generally, the houses facing the landscape are built southward as far as the residential area allows. In some terrestrial areas, courtyard and large garden applications are not encountered, while some examples are quite small, but side or backyard applications are encountered. Façade projections are generally smooth, parallel to the façade. The main façades of the buildings are facing the road and are formed in the width of the parcel border. Generally, two and three-story application is dominant in traditional Turkish houses (Eldem, 1954; Hacıbaloğlu, 1989 and Küçükerman, 1996). Due to the slope of the land, some buildings can be accessed from both the ground floor and the second floor level located at the upper level. The ground floor of the buildings is mostly reserved for service spaces. In addition, there are examples whose ground floor is entirely used for commercial purposes. The most characteristic element of the façade arrangement is the projections. It is quite common for Turkish Houses that are built adjacent to the road axle to have smooth façades and miter projections. In façade projections, wooden floor beams are extended from the ceiling of the ground floor towards the road axle. In façade arrangements, a plain and simple application usually draws attention. The horizontal and vertical wooden belts at the corners of the main mass and projections are the most important aesthetic element in plastered and whitewashed façades. On the lower edges of the projections, also in the same plane with the floor separations on straight façades, there are horizontal

wooden belts at the floor level and pillars emphasizing the corners. The most important visual effect in the façade layout is the window types and shutter or lattice (truss) applications. It is seen that the ½ aspect ratio is used in windows in traditional applications and the rectangular window type, where guillotine type window joinery is common and widely preferred. On the traditional Turkish House façades, the entrance, eaves overhang, window and door designs of the houses, the timber beams (ridge plates) that determine the floors, cihannüma (roof top floor), angle braces, the wrought iron and timber cages in the windows are the remarkable elements that activate the façade. The golden ratio rectangular windows and bay window arranged according to the principle of spaced repetition in the traditional Turkish House are the most characteristic features. In the façade layout, wide canopies draw attention according to the climate type of the region. Generally, part or all of the second floors of Turkish Houses form a cantilever. The simplest and most common form of projection is the closed overhangs that are extended over the main entrance located in the middle of the façade.

It was stated in the International Council of Monuments and Sites (ICOMOS) in (2013), that the architectural heritage of Turkish houses, is one of the most important components of cultural heritage. This International Council emphasizes the importance of revealing aesthetic and cultural values without damaging the qualities that make up the originality and identity of this architectural design. Therefore, Turkish houses are needed to be protected, covering a wide period both with their interior features and façade details. There are many scientific researches in the literature with functional and aesthetic values, suitable for the human size, with its interior fittings, which can be obtained with information about the lifestyle of the society with its plan schemes concerning traditional Turkish Houses (Eldem, 1954; Hacıbaloğlu, 1989; Küçükerman, 1996; Bektaş, 1996; Burkut, 1998; Göker, 2009; Dursun, 2012; Göğebakan, 2015 and Özel, 2019). In addition to the functional features of the traditional Turkish House, some studies have also carried out on the original façade details (Baran & Yıldırım, 2008; Divleli, 2008; Ürer, 2013 and Gümüş, 2019). However, according to authors' knowledge although there are some studies about perceptional evaluation of buildings façades, there are limited scientific studies in the literature regarding the façade arrangements of historical patterns in Turkish House.

1.1. Previous Empirical Findings

The value represented by the façades can be changed or be perceived differently by the user. Many factors are important in the perception of the building facade. In Arsheim's book "The Dynamics of Architectural Form" (1977), one of the main sources on this subject; he says that the viewer's perception and cultural background are important in reading the building façade as a visual text. Similarly Kevin Lynch's book "The

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Image of the City" gives alseo some clues on the perception of urban elements on an upper scale with emphasizing the human-environment interaction.

Façades have physical, sociological and / or psychological representations. Imamoğlu (2000) mentioned these effects of building façades and stated that the memorable part of the building is the façade. The building façade often reflects the real identity of the building. Huxtable (2004), Hayashi (2004), Kong and Yeoh (2004) Hui (2007) emphasized the importance of the building façade especially in urban perception. Similarly, studies on the effects of building façade appearance on perceptual evaluations were made (Robbins and Langton, 1999; Gifford et al., 2000; Brown and Gifford, 2001). Mehrabian and Russell (1974), Russell et al. (1981) and Gifford et al. (2000) determined in their studies that observer preferences were changed with building façades. It has been reported in the literature that the architectural style of the buildings (Nasar, 1989; Stamps III, 1991; Karaman, 1985 and Hui, 2007, Akalin et al., 2009, Atalan, 2016; Sochocka and Anter, 2017; Montero-Parajo et al., 2017; Ilbeigi et al., 2017 and 2019), the color of the buildings and the using materials on façades (Gifford et al., 2000, Karaman, 1985; Hui, 2007) are effective in the perceptional evaluations.

The researchers used different cognitive properties in the studies where the façade and the spaces were evaluated depending on perception. For example; Imamoglu (2000) (Beauty, Pleasantness, Likeability, Complexity, Ornamentation and Familiarity), Gifford et al. (2000) (Clarity, Complexity, Friendliness Meaningfulness, Ruggedness and Originality), Akalin et al. (2009) (Preference, Complexity and Impression), Ghomeishi et al. (2012) (Complexity, Friendliness and Sociability), Malekinezhad et al. (2013) (Pleasant and Arousal), Arslan and Yıldırım (2017) and Ozkan (2017) (Complexity, Preference and Impressiveness), Groat (2013); Kaplan et al. (1972); Herzog and Shier (2000); Stamps (2003) Bornstein and Berlyne (2006); (Complexity and Pleasure) and Vartanian et al. (2013) (Beauty and Pleasantness) have benefited from such concepts. According to the content of the study to be conducted, the researchers make comments on the statistically meaningful ones at the end of the study by choosing from the cognitive properties in the literature.

In the evaluations, comparisons are made with social factors such as gender and profession. One of the most important social factors affecting the results in perception-based façade evaluation studies was the professional experience of the participants. A great deal of research was conducted on this subject, especially comparing architects and non-architects. The first studies on this were conducted by Hershberger (1969) and Mehrabian and Russell (1974). In other studies conducted in the literature, evaluations of architects and non-architects were examined depending on different perceptual parameters. Looking at

these studies in general, it is seen that an architect's evaluation is more critical than non-architect groups.

In the researches, it is determined that the gender factor is effective at least as much as the professional factor in behavioral differences. Kim et al. (2013) stated that female's satisfaction levels are lower than male's according to environmental factors. In studies on building façade visuals, Imamoğlu (2000), Akalın et al. (2009) obtained a similar result in female's perception of façades with different levels of complexity. These researchers state that female are more critical than male. In the studies conducted by Dube and Morgan (1996), Yıldırım et al. (2011, 2014, 2015) and Ayalp et al. (2016, 2017), it was observed that the first negative emotions were determinative in the evaluations of female and the first positive emotions were more determinant in the evaluations of male.

Imamoglu (1979a and 1979b), Krampen et al. (1979) and Imamoglu (2000) studied the perceptual evaluations of traditional house façades. In his study, Imamoğlu (2000) determined the differences between the evaluations from the architects and non-architects participants, on selected in two sets of traditional and modern Turkish house façade. Many of the important works in the literature (Wohlwill, 1968, 1975; Kaplan et. al., 1972; Crozier, 1974; Berlyne, 1974, 1977; Berlyne, 1974; Nasar, 1983; Devlin and Nasar, 1989; Herzog and Shier, 2000; Stamps, 2003 and Akalın et al., 2009) are on contemporary building façades.

The historical and traditional buildings that form the identity of the cities are located in the memory of the city user, primarily with their façades. Therefore, the role of the façade in defining urban spaces is also important. Changing the purpose of use and requirements over time requires rearrangements of façades. Façade arrangements of traditional Turkish Houses are often a subject of criticism. Feilden (1982), Hersek (1989), Özsoy (2009) and David and Fort (2019) made evaluations of façade renovations having deficiencies on historical and traditional houses.

It is also an important parameter whether the users experience the space or the façade in advance, especially according to the research made on the perception of space and façade. Arnheim (2009) states that traces that are similar to each other in memory touch each other through strengthening, weakening, and exchanging. According to Arnheim, the visual knowledge acquired in the past does not only help to recognize the nature of an object or action emerging from the field of vision, but also assigns a place to the present object within the system of things that make up our worldview. As Arnheim stated, the visual knowledge gained in the past allows us to comment on the objects that we see and make sense of. Erdogan et al. (2013) in their studies, also made evaluations on a group of users who experienced the place too.

In many previous perceptional evaluation studies in the literature, digital image (Yildirim et al., 2014 and 2019), and Virtual Reality (VR) technology (Wallet et al., 2013) have been used. Yildirim et al. (2019)

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have mentioned that virtual reality (VR) applications give satisfactory results and also can be achieved cheaper than real environment (RE) scenarios. Similarly, several studies have demonstrated an effective transfer of skills and/or spatial knowledge from virtual to real environments (virtual/real transfer), indicating that the spatial knowledge acquired in virtual environments is very similar to that acquired in real environments (Wolbers and Hegarty, 2010, Kuliga, et al. 2015, Bozdag, 2018). Digital images have also been widely used on façade perception studies instead of real images. (Erdoğan ve ark. 2013, Akalın et al. 2009).

1.2. Research Considerations

The current study aims to contribute to the above-mentioned literature by exploring the effects of changes occurring in traditional Turkish House façades over time on the perceptual evaluations of the participants. It is expected that there would be differences between the initial (original) states of the façades and the evaluations of the modified states. An additional objective of the present study is to examine the role of gender and profession as important independent variables affecting participants' perception. In this context, the hypotheses constructed within the scope of the research are as follows;

H_1: *There are important differences between the perceptual evaluations of the participants regarding the original or modified façades of traditional Turkish Houses.*

H_2: *There are significant differences between the evaluations of male and female participants for each dependent variable.*

H_3: *There are significant differences between the evaluations of architect and non-architects participants for each dependent variable.*

This study aimed to determined statistically reliable information from perceptional evaluation of the street silhouettes of Turkish Houses. It is very important to determine how Turkish Houses having original façade designs are perceived by society with the façade change. Moving from this point, the street façades located in the historical city pattern of Afyonkarahisar Province, where traditional Turkish Houses are located, have been evaluated by groups of architects and non-architects. In the evaluations, a comparative analysis was performed on the altered (existing or modified) and original street façades which have been prepared by authors. The prepared images have evaluated by two different groups consisting of 80 people by the semantic differentiation scale consisting of the adjective pairs. The comparison sets of the bipolar adjective pairs were chosen among the most commonly used and having statistically significant results in the perception based evaluation studies in the literature. With the data obtained, it was given some recommendations regarding the arrangement of the façade in the historical pattern.

2. METHODS

2.1. Research Environment

In the study, comparative evaluations of original and the modified of traditional Turkish House façades conducted on the street silhouettes in the historical city pattern. The historical city center of Afyonkarahisar province, which has a very old historical heritage, was chosen for the evaluations. Traditional Turkish houses one of the examples of architectural design that reveals the Turkish identity in Anatolia, varies according to the geographical position. Afyonkarahisar is located in the inner western Anatolian part of Turkey. It has the characteristic features of continental climate due to its geography. Summers are very short and winters are quite long. For this reason, most of daily life is passed indoors. Open courtyard culture has not been formed in traditional houses in these regions. The façade arrangements of the Afyonkarahisar Houses examined include "Cihannüma". Although this section, which is away from daily use, gives the houses a monumental appearance even if it is independent from the ground floor. This monumentality is important in terms of adding aesthetic value to the façade of the building. The sofa and rooms' projections in Afyonkarahisar Houses add aesthetic value to the façade.

Most of the historical mansions, houses, and mosques built in Afyonkarahisar in the early 1900s and before were affected by the great Afyonkarahisar fortress fire that broke out in August 1902 and lasted for more than two days. After the fire, the neighborhoods had been re - constructed. 500 Afyonkarahisar Houses that survived from that day till today have determined and the restoration and façade arrangement of these buildings have started in 2017. In Figure 1, street pictures from Afyonkarahisar province were given after related restoration works.

Figure 1. Traditional Afyonkarahisar Houses (after restoration) (web page-2)

In this study, firstly, eight street silhouettes were determined from these restorated neighborhoods. The restorated (or modified) façade drawings of the determined street silhouettes have been reached from the Mostar Architecture office. From these modified drawings which are prepared in the AutoCAD (2018), some technical arrangements have done such as eaves, window and door designs, angle braces and other carrier elements etc. for creating original Afyonkarahisar House façades.

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For the participants to perceive the images better, prepared the original and modified drawings those were transferred to the Photoshop (2018) and was colored on the gray scale and the color and material were excluded from the research. The digital pictures of the eight sets of original and modified street silhouettes given in Figure 2 prepared were evaluated with the help of the semantic differentiation scale consisting of the adjective pairs given below.

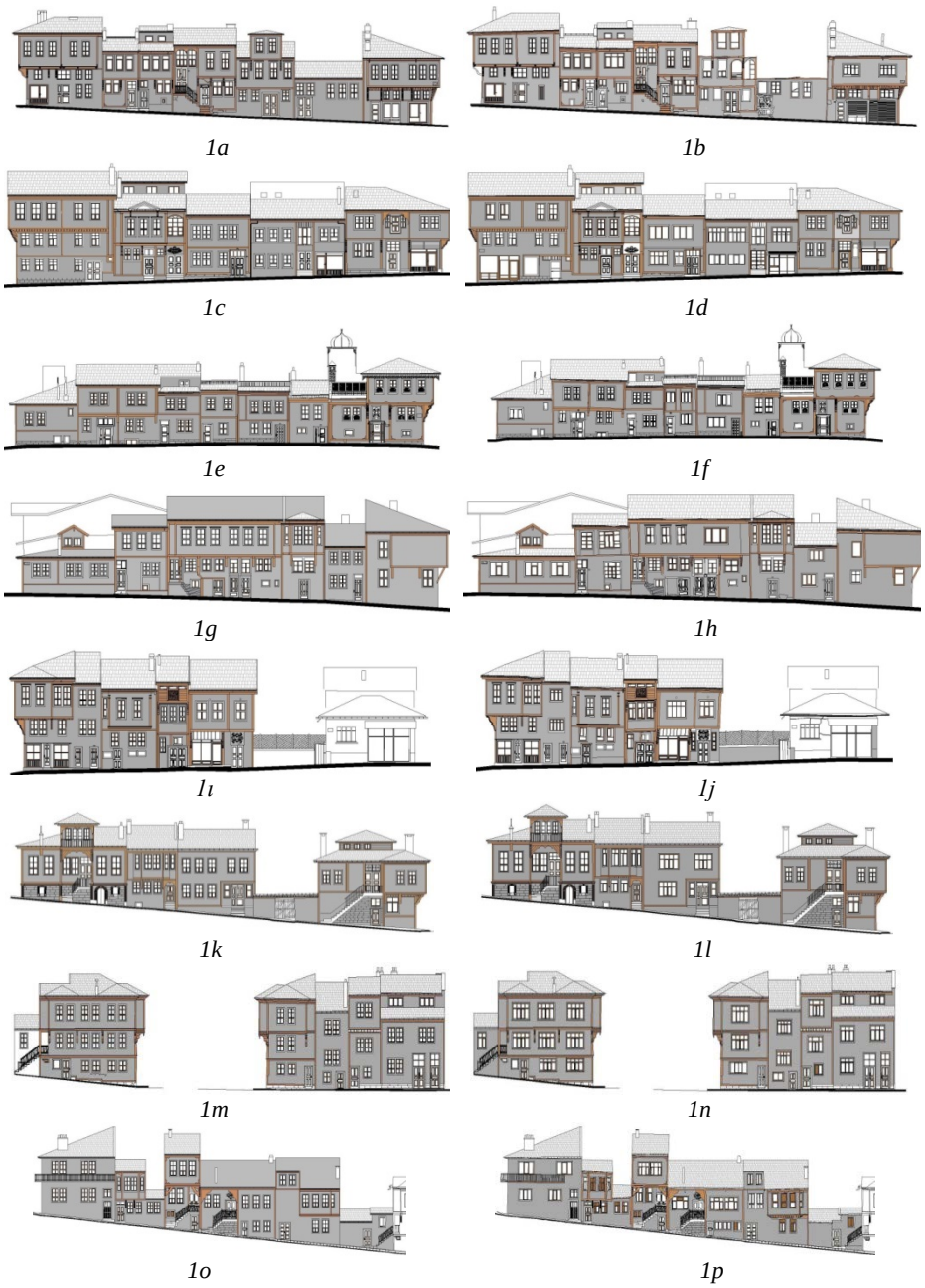

Figure 2. Original and modified digital façade views of the traditional Turkish Houses

2.2 Design of the Survey and Procedure

The first part of the research questionnaire used includes general information such as gender and profession of the participants. In the second part, there is a semantic differentiation scale that measures the

perceptual evaluations of the participants about the original and modified façade views of traditional Turkish Houses in Afyonkarahisar. These façade images were evaluated by the participants. In the evaluation, total of ten bi-polar adjective pairs with semantic differential scales from 1 to 5 have been used. In this scale 1 and 5 represents beautiful (positive) polar and ugly (negative) polar, respectively. The selected bi-polar adjective pairs are beautiful / ugly, simple / complex, impressive / unimpressive, tidy / untidy, interesting / uninteresting, typical / untypical, proportional / non-proportional, sincere / formal, qualified / unqualified, familiar / unfamiliar. The semantic differential scales have been used previously by different researchers (Berlyne (1974 and 1975), Imamoglu (1975), McAndrew (1993) and Yildirim *et al.* (2007a, 2007b; 2011a, 2011b; 2015)**.**

In this study, the data of the original and modified façade views of traditional Turkish Houses were taken from survey results on façades views of eight streets. Drawings of eight street silhouettes where traditional Turkish Houses located are given in Figure 2. These street silhouettes façades were drawn in AUTOCAD (2018) on lateral A4 size (210-297 mm^2), good quality paper. While the right side of the paper represented the modified houses' façade, other set of drawings represented the original traditional Turkish Houses' façade. The data of this study were obtained from the perceptual evaluations of the participants regarding the digital images of the original and modified façade drawings of traditional Turkish Houses.

The participants were not familiar with Afyonkarahisar traditional Turkish houses façades. In other words, the participants were not acquainted with this place. Thus the effect of the independent variable of whether the participants recognize the façades and buildings was neglected in this study. Erdoğan *et al.*, (2013) evaluated the similar situation as a parameter in their studies on historical fronts.

2.3 Participants

80 participants (42 were architecture and 38 were civil engineering students in final semester in bachelor degree, respectively) were selected from undergraduate students from the Architecture and Civil Engineering Department of Necmettin Erbakan University in Konya. Each group had a similar diverse distribution by gender: 46,5% of the participants were male, 53,5% were female. The mean age of the participants was 22.

The detailed digital pictures of the traditional Turkish Houses were shown to participants on data projection. Before the application of survey, the general information about the survey has been given all participants, briefly. After that, survey questions were asked for answering by all participants looking at street façades in survey forms. Research data were obtained from two different groups by face-to-face meetings in 2020. The research was conducted at two different

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meetings during the weekdays. It took the participants approximately twenty minutes to complete each of the questionnaires.

2.4 Data Collection

The evaluations of the façade views of the traditional Turkish Houses by participants were accepted as "dependent variables" (depicted in Tables 1, 2, 3 and 4), whereas, the façade views of the traditional Turkish Houses on participants' gender and professions were accepted as "independent variables."

After conducting reliability tests of the data obtained with the Cronbach's alpha method (Table 1), the means and standard deviations values were determined. Afterward, to examine the effect of differences in the original and modified façade views, gender and professions variables on the perceptual evaluations of the traditional Turkish Houses, the appropriate techniques of the One-Way Analysis of Variance (ANOVA) were used. The significant means of the variance obtained from all participants data were depicted by using comparative graphs.

3. EVALUATION OF RESEARCH FINDINGS

This study aimed to determine the effects of original and modified façade views of the traditional Turkish Houses in Afyonkarahisar on the perceptual evaluations of the participants. The reliability of dependent variables, including participants' perceptual evaluations of the traditional Turkish Houses façade views, was tested using the Cronbach's alpha test and has been given in Table 1. Accordingly, the reliability coefficient for the semantic differential scale of ten bipolar adjectives was 0.86. Previously conducted studies (e.g., Cronbach, 1951; Panayides, 2013) have stated that the alpha reliability coefficients for all items can be accepted as "reliable" when it is above 0.70. Accordingly, the Cronbach's alpha coefficient obtained in the current study was above this specified value. As a result, the semantic differential scale was found to be reliable.

Table 1. Reliability test results of the dependent variables

Dependent Variables	Items Reliability	Scale Reliability
Beautiful / Ugly	0.835	0.86
Simple / Complex	0.849	
Impressive / Unimpressive	0.834	
Tidy / Untidy	0.838	
Interesting / Uninteresting	0.862	
Typical / Untypical	0.849	
Proportional / Non-proportional	0.844	
Sincere / Formal	0.842	
Qualified / Unqualified	0.837	
Familiar / Unfamiliar	0.872	

Note: Item reliability and scale reliability were provided for each dependent variable.

In this section, the differences between the perceptual evaluations of the participants about the original and modified façade views of the

traditional Turkish Houses in Afyonkarahisar were conducted by using statistical methods. The mean and standard deviation values and ANOVA results of the data were given in Table 2, respectively.

Table 2. Mean and standard deviation values and ANOVA results of the original and modified façade views of the traditional Turkish Houses

Dependent Variables	**Traditional Turkish House Façade Views**				**ANOVA Results**		
	Original Façade		Modified Façade				
	M	SD	M	SD	**F**	**df**	**Sig.**
Beautiful / Ugly	2.38[a]	1.03	3.11	1.13	144.065	1	0.000*
Simple / Complex	2.62	1.07	3.26	1.15	105.998	1	0.000*
Impressive / Unimpressive	2.61	1.04	3.24	1.15	103.981	1	0.000*
Tidy / Untidy	2.33	1.09	3.44	1.20	299.926	1	0.000*
Interesting / Uninteresting	2.92	1.02	3.21	1.14	22.363	1	0.000*
Typical / Untypical	2.43	0.95	2.75	1.07	32.099	1	0.000*
Proportional / Non-proportional	2.30	1.13	3.40	1.17	290.844	1	0.000*
Sincere / Formal	2.23	0.96	2.67	1.16	53.596	1	0.000*
Qualified / Unqualified	2.39	0.94	3.07	1.06	145.984	1	0.000*
Familiar / Unfamiliar	2.34	1.04	2.58	1.07	16.584	1	0.000*

***Notes**: * p<0.001 level is significant. M: Mean value, SD: Standard deviation, F: F value, df: Degree of freedom. a: Means of the variables listed between 1-5 (large numbers are negative responses)*

According to the values given in Table 2, statistically significant differences were found at the level of p<0.001 between the participants' perceptual evaluations of the original and modified façade views of the traditional Turkish Houses. It was determined that original façade views were perceived more positively than modified façade views by the participants. The differences between the participants' perceptual evaluations of the original and modified façade views of the traditional Turkish Houses were found to be statistically significant at the level of p<0.001 for beautiful / ugly (sig.=0.000), simple / complex (sig.=0.000), impressive / unimpressive (sig.=0.000), tidy / untidy (sig.=0.000), interesting / uninteresting (sig.=0.000), typical / untypical (sig.=0.000), proportional / non-proportional (sig.=0.000), sincere / formal (sig.=0.000), qualified / unqualified (sig.=0.000) and familiar / unfamiliar (sig.=0.000) dependent variables. The graphical descriptions of these analyses results were depicted in Figure 3.

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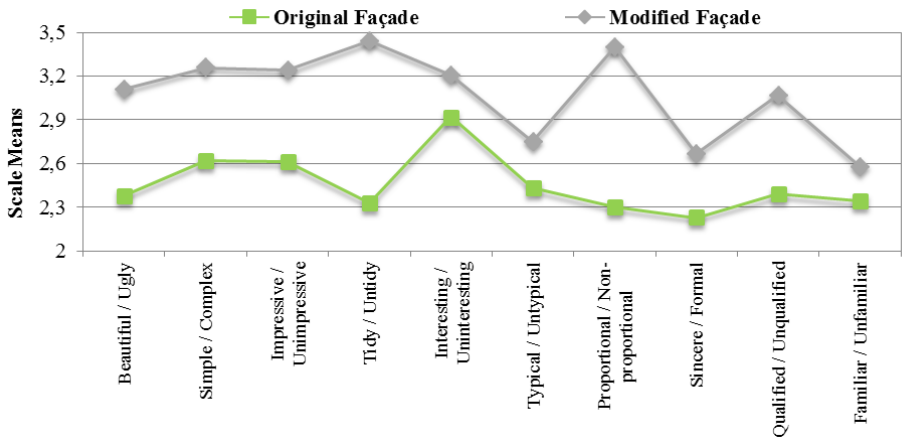

Figure 3. Effect of the original and modified façade views on the dependent variables

***Note**: Means of the variables listed between 1-5 (large numbers are negative responses).*

The effects of the original façade views on the participants' perceptual evaluations have been shown in Figure 3. It was observed that while the modified façade views had the highest values (negative value) for each of the dependent variables, the original façade views had the lowest values (positive value). When the average values of adjective pairs given in Figure 3 are analysed, it is seen that the differences between tidy / untidy and proportional / non-proportional adjective pairs are dominant. These results showed that the original façade views are perceived more positively than the modified façade views and also supported the hypothesis of H_1. However, no other study was found in the literature to compare this hypothesis.

The differences between evaluations of the façade views of the traditional Turkish Houses according to participants' gender (female and male) were determined by using the statistical parameters and ANOVA results which were given in Table 3.

Table 3. Mean and standard deviation values and ANOVA results of participants' evaluations according to gender

Dependent Variables	Participants' Gender				ANOVA Results		
	Female		Male				
	M	SD	M	SD	F	df	Sig.
Beautiful / Ugly	2.79[a]	1.16	2.71	1.13	1.445	1	0.230[is]
Simple / Complex	3.09	1.20	2.81	1.10	18.263	1	0.000*
Impressive / Unimpressive	3.04	1.17	2.83	1.11	10.779	1	0.001*
Tidy / Untidy	2.95	1.33	2.83	1.22	2.799	1	0.095**
Interesting / Uninteresting	3.09	1.16	3.05	1.03	0.373	1	0.541[is]
Typical / Untypical	2.61	1.06	2.57	0.99	0.331	1	0.565[is]
Proportional / Non-proportional	2.88	1.35	2.82	1.21	0.791	1	0.374[is]
Sincere / Formal	2.50	1.17	2.41	1.01	2.163	1	0.142[is]
Qualified / Unqualified	2.72	1.13	2.74	1.00	0.109	1	0.742[is]
Familiar / Unfamiliar	2.32	1.05	2.59	1.06	21.053	1	0.000*

***Notes**: * p<0.05 and ** p<0.10 levels are significant. is: p<0.05 is insignificant. M: Mean value, SD: Standard deviation, F: F value, df: Degree of freedom. a: Means of the variables listed between 1-5 (large numbers are negative responses).*

The results given in Table 3 showed important differences between the façade views evaluations of the traditional Turkish Houses according to participants' gender. Males have more positively than females of the evaluation of façade views of the traditional Turkish Houses. The ANOVA test was performed to determine whether there was a statistically significant difference between the participants' perceptual evaluations according to gender at the levels of $p<0.05$ and $p<0.10$. Consequently, among the perceptual evaluations of the participants according to their gender, for simple / complex (sig.=0.000), impressive / unimpressive (sig.=0.001), tidy / untidy (sig.=0.095) and familiar / unfamiliar (sig.=0.000) dependent variables, statistically significant differences were found at the levels of $p<0.05$ and $p<0.10$. No statistically significant difference was found at the level of $p<0.05$ for other dependent variables. From these mean values, it is seen that females are more familiar with the façade views of the traditional Turkish Houses than males. These results have been given by graphs in Figure 4.

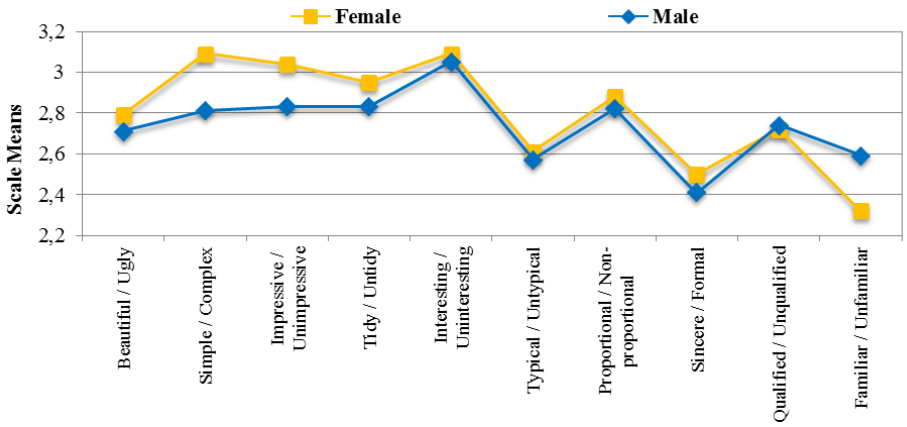

Figure 4. The effect of participants' gender on dependent variables

***Note**: Means of the variables listed between 1-5 (large numbers are negative responses).*

As seen in Figure 4, males have the lowest values (positive value) for all other dependent variables except familiar / unfamiliar and qualified / unqualified adjective pairs. These findings partially support the second hypothesis (H_2), similarly with Imamoğlu (2000), Akalın et al. (2009), Kim et al. (2013), Yildirim et al. (2014, 2015) and Ayalp et al. (2016, 2017).

In this study, the differences between evaluations of the façade views of the traditional Turkish Houses according to the participants' professions (architect and non-architects) were also determined with another analysis. The evaluation differences between participants' professions on the façade views of the traditional Turkish Houses were obtained by statistical parameters and ANOVA results. These results were also given in Table 4, respectively.

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Table 4. Mean and standard deviation values and ANOVA results of participants' evaluations according to professions

Dependent Variables	Participants' Professions				ANOVA Results		
	Architect		Non-Architects				
	M	SD	M	SD	F	df	Sig.
Beautiful / Ugly	2.90[a]	1.02	2.57	1.24	26.862	1	0.000*
Simple / Complex	2.92	1.15	2.95	1.17	0.173	1	0.678[is]
Impressive / Unimpressive	3.10	1.06	2.73	1.20	33.647	1	0.000*
Tidy / Untidy	2.91	1.28	2.85	1.27	0.683	1	0.409[is]
Interesting / Uninteresting	3.18	1.07	2.94	1.10	14.725	1	0.000*
Typical / Untypical	2.60	1.03	2.56	1.02	0.280	1	0.597[is]
Proportional / Non-proportional	2.78	1.27	2.92	1.28	3.920	1	0.048*
Sincere / Formal	2.47	1.01	2.42	1.17	0.525	1	0.469[is]
Qualified / Unqualified	2.76	1.05	2.70	1.07	1.240	1	0.266[is]
Familiar / Unfamiliar	2.45	1.04	2.48	1.09	0.171	1	0.680[is]

***Notes**: * p<0.05 level is significant. is: p<0.05 is insignificant. M: Mean value, SD: Standard deviation, F: F value, df: Degree of freedom. a: Means of the variables listed between 1-5 (large numbers are negative responses).*

The results given in Table 4 showed important differences between the perceptual evaluations of the façade views of the traditional Turkish Houses according to the participants' professions (architect and non-architects). It was found that non-architects perceive the façade views of the traditional Turkish Houses more positively than architects for beautiful / ugly, impressive / unimpressive and interesting / uninteresting adjective pairs. On the other hand, architects evaluate the proportional / non-proportional adjective couple more positively.

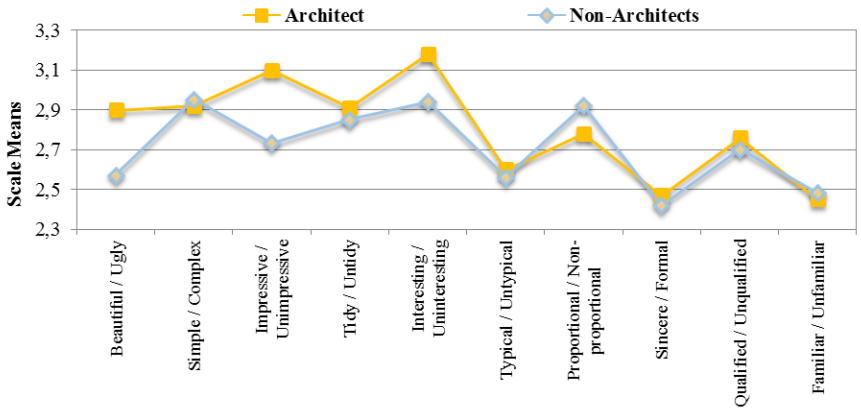

Figure 5. The effect of participants' professions on dependent variables

Note: Means of the variables listed between 1-5 (large numbers are negative responses)

The ANOVA test was performed to determine whether there was a statistically significant difference between the participants' perceptual evaluations according to professions at the level of p<0.05. Consequently, among the perceptual evaluations of the participants according to their professions, for beautiful / ugly (sig.=0.000), impressive / unimpressive (sig.=0.000), interesting / uninteresting (sig.=0.000) and proportional / non-proportional (sig.=0.048) dependent variables, statistically significant differences were found at the level of p<0.05. No statistically significant difference was found at

the level of $p<0.05$ for other dependent variables. These results have been depicted by graphs in Figure 5.

According to the Figure 5, non-architects have the lowest values (positive value) for seven dependent variables. However, there is a statistically significant difference between the four adjective pairs. Therefore, the third hypothesis of this research has been partially supported (H_3). The common conclusion in the studies conducted in the literature (Hershberger and Cass, 1974; Groat, 1982; Devlin and Nasar, 1989; Nasar, 1989; Devlin, 1990; Wilson and Canter, 1990; Stamps, 1991; Hubbard, 1994; Purcell, 1995; Wilson, 1996, Imamoğlu 2000, Akalın et al. 2009, Gifford et al. (2000, 2002)) is that the evaluation of architects is more critical than other groups.

4. DISCUSSION AND CONCLUSION

The aim of this study is to make a comparative evaluation of the differences between the original façade and the modified façade of the traditional Turkish Houses based on perception. In line with this purpose, digital images of eight sets of original and modified street silhouettes with gray color scales were produced on the computer. Two different groups consisting of 80 people (architect and non-architect group) have evaluated the prepared images by the semantic differentiation scale consisting of the adjective pairs. The results obtained from this study are given below, respectively.

According to the results obtained, the main hypothesis (H_1) that "*There are important differences between the perceptual evaluations of the participants regarding the original or modified façades of traditional Turkish Houses.*" has been confirmed. The biggest differences in these evaluations were in the tidy / untidy and proportional / non-proportional adjective pairs. While the other adjective pairs that were queried varied closely, they were in the familiar / unfamiliar adjective pair with the least difference value. Since there is no study on modified traditional house façades in the literature, discussion directly with the main hypothesis has not been conducted. On the other hand Imamoğlu (2000) and Akalin et al. (2009) in their researches took the opinions of architect and non-architect participants over the old and new façades. In the results of these studies, it has been determined that ratio of liking and impressiveness increases as the complexity decreases over the simple / complex, impressive / not impressive and beautiful / ugly adjective pairs. In this study, different from the existing literature, tidy / untidy and proportional / non-proportional adjective pairs came to the fore in evaluating stage. The reason for this can be explained by the design principles and criteria that strengthen the visual perception in the traditional Turkish House façade layout. For example;

1. Arrangement of many building elements such as windows, doors and timber beams to repeat at certain intervals on the façade,
2. Existing of the timber beams that allow easy reading of the number and heights of the floors and story height;

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3. More mass and balanced arrangement of traditional building façades in terms of solid-void relationships and façade articulation,
4. Repeating metal railing decorations which are arranged with the combination of basic geometries,
5. The continuity of similar form and style in all the houses on the streets.

With this study, for the first time in the literature, the evaluation of holistic (comprehensive) street silhouettes was based on a single façade layout. As a result of the evaluation, it was seen that tidy / untidy and proportional / non-proportional adjective pairs are more prominent than others.

As mentioned in H_2 hypothesis, there have been important differences between the perceptual evaluations of the façade views of the traditional Turkish Houses according to participants' gender (female and male). It was found that males perceive more positively the façade views of the traditional Turkish Houses than females. From these average values, it is seen that females are more familiar with the façade views of the traditional Turkish Houses than males. Males have the lowest values (positive value) for all other dependent variables except familiar / unfamiliar and qualified / unqualified adjective pairs. These all findings partially support the second hypothesis (H_2). According to environmental factors, female's satisfaction levels are lower than male's. This issue mentioned by Imamoğlu (2000), Akalın *et al.* (2009) and Kim *et al.* (2013) in the literature. These researchers also state that; females are more critical than males especially different level of complexity at the house façade. Similar results were obtained in different perception based studies conducted by Yildirim *et al*. (2014 and 2015), Ayalp *et al*. (2016 and 2017). Also results obtained by this study supported the statement as "Female's satisfaction judgments were largely influenced by their initial negative emotions, whereas male's satisfaction judgments depended on their first positive emotions, suggesting a primacy effect for both genders" in the literature.

It is seen that the evaluations of the façade views of the traditional Turkish Houses showed important differences according to the participants' professions (architect and non-architects). It was found that non-architects perceive the façade views of the traditional Turkish Houses more positively than architects for beautiful / ugly, impressive / unimpressive and interesting / uninteresting adjective pairs. On the other hand, it is seen that architects evaluate the proportional / non-proportional adjective couple more positively. This statement can be explained as architecture students have been taken Architectural History and Restoration Courses within the architectural education. According to Gifford (1997), a special education is also an essential personal difference in the environmental perception. Delvin and Naser (2010) and Yazdanfar et al. (2015) also achieved similar results. According to the results, visual literacy has a direct connection with the

individuals' perception. Non-architects have the lowest values (positive value) for selected seven dependent variables. However, there is a statistically significant difference between the four adjective pairs. Therefore, the third hypothesis of this research has been partially supported. According to the literature (Hershberger and Cass, 1974; Groat, 1982; Devlin and Nasar, 1989; Nasar, 1989; Devlin, 1990; Wilson and Canter, 1990; Stamps, 1991; Hubbard, 1994; Purcell, 1995; Wilson, 1996; Imamoğlu, 2000; Gifford *et al.,* 2000, 2002; Gifford *et al*., 2000; Akalın *et al*. 2009; Llinares *et al*., 2011; Malekinezhad *et al.,* 2013; Ghomeishi and Jusan, 2013; Boumová and Zdráhalová, 2016; Arslan *et al.,* 2018; Llinares and Iñarra, 2014; Ilbeigi *et al.,* 2019) there is a common consensus on architects have the lowest perceptional evaluation for dependent variables.

In this study, special attention was paid to the fact that the participants had not experienced to the streets where Afyonkarahisar houses were built on. Thus, the parameter (familiar) that Arnheim (2009) expressed has disabled. Vice versa, if it had not been neglected, this situation should have been taken into account in the analysis.

5. MANAGERIAL IMPLICATIONS AND FUTURE RESEARCH

A comparative analysis was carried out on the original and modified states of the street façades of traditional Turkish Houses, which draw attention with their unique designs. With the study; a comparative analysis was carried out on the originally and modified street façades of traditional Turkish Houses. The results obtained in this research showed that the original and modified façade have statistically significant effects on the participants' perceptual evaluations of the façade view. It has been determined that gender is an important social factor in the perception of the façade and that architectural education has an effect in the perception of the façade. The related studies can be enlarged/developed in future as;

1. In the evaluation of traditional Turkish House façades, the effect of material texture and different color usage on perception can be evaluated.
2. The effectiveness of projections, mass articulations and oriels, which are important parts of traditional dwelling, can be investigated.
3. The results obtained from Turkish house from different regions and having different properties collected can be generalized.
4. Evaluation can be made with different age groups.
5. In order to fully confirm the H_2 hypothesis, it is thought that architecture education can be compared with the first year and last year student groups.
6. The evaluation of those who familiar or not familiar to the place can be compared. Similarly, the fact that the participants have never seen the traditional Turkish house (outside of

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Turkey if possible) may be a parameter that may affect the result.

The paper is about the perceptual evaluation of some traditional historic Street silhouettes in Turkey based on a set of predefined dual comparisons by a group of participants consisting of architects and non-architects. According to the most important finding obtained from the study, the fact that the original state is observed in the restoration of traditional Turkish Houses has caused people to be liked more. Similarly, it has been observed that the organization of windows, solid-void relationship ratio, repetitions, horizontal and vertical structural elements (beams etc.) in the Turkish house façade characteristic will have a positive effect on perception. It can be predicted that the studies that associate the perception of people with the façades of the buildings will increase in the following years. In this context, the effect of the façade material, the amount of void and other factors on perception can be measured. In addition, multiple regression analysis can be performed by matching perceptual data with the data obtained from mathematical modeling on the façade.

CONFLICT OF INTEREST

We have no conflict of interest to declare.

FINANCIAL DISCLOSURE

The authors declared that this study has received no financial support.

ETHICS COMMITTEE APPROVAL

Ethics committee approval was not required for this article.

LEGAL PUBLIC/PRIVATE PERMISSIONS

In this research, the necessary permissions were obtained from the relevant participants (individuals, institutions and organizations) during the survey, in-depth interview, focus group interview, observation or experiment.

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https://twitter.com/AfyonValiligi/status/1155343669463003137/photo/1)

Resume

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Research Article

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Resilient Urban Form: A Case Study on Denizli, Gaziantep and Muğla

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Abstract

Purpose

This study identifies whether the hierarchy, development type, and city size have a crucial effect on resilience in ecological terms. Is there a desirable optimum urban form for resilience? The study aims to answer this question by comparing different types of macroform and density of some selected cities in Turkey.

Design/Methodology/Approach

Denizli, Muğla, and Gaziantep provinces are selected according to the comparability of their population size and urban forms in relation to the greenhouse gas emissions of each city. A retrospective causal comparison method was used in the study. Using the Corine Land Cover Classes program, the change of the artificial surfaces and the city structure between 1990 and 2018 were mapped and detailed graphics were created.

Findings

Findings show that greenhouse gas (GHG) emissions originating from road transport in Muğla, which has a multi-centered form, were the highest. The surprising result is that Gaziantep has lower GHG emission rate than Denizli although its population is twice the latter. The emission rates of the housing and services sectors were compared with the household size. Gaziantep having the largest household size has the lowest emission rate in this sector. The paper suggests that a hierarchical urban system structure is essential for the resilience of the city to be able to organize itself more effectively, adapt to external changes faster, and create a stronger and more complex structure. City size is an important criterion for low infrastructure cost, efficient use of resources, and capacity to access capital of all kinds. Yet, this criterion may differ in the resilience of the city depending on several factors such as population, area size, and distribution of various urban functions. The development type, on the other hand, is highly effective on GHG emissions as the monocentric cities generate fewer emissions than the polycentric cities.

Research Limitations/Implications

The GHG reports created for the case areas consisted of different years and different analysis units. This limits the sectors to which cities can be compared.

Originality/Value

This article is a detailed and original study in terms of evaluating the resilience of Turkish cities with different morphologies.

Keywords: *Urban resilience, urban forms, hierarchy, city size, development type*

INTRODUCTION

Cities as socio-ecological systems are faced with various stress factors such as climate change, population growth, and depletion of resources. New solutions are constantly being sought for these inevitable threats. Among many studies on this subject, sustainability, risk management, and resilience are the most discussed themes. However, these themes are not completely different from each other. The studies on a sustainable environment also include the results of resilience (Yalçıner Ercoşkun, 2012). So why has the shift from sustainability to resilience been increasing in recent years? The concept of resilience, from a perspective accepting that the world is at risk; offers quick solutions against vulnerabilities and uncertainties with adaptation and flexibility steps (Hoffman, 2014).

As levels of urbanization increased, global carbon emissions from the combustion of fossil fuels increased by almost fivefold between 1950 and 2005 (Mayer, et al., 2017). Cities account for 60% to 80% of energy consumption and 70% of anthropogenic greenhouse gas emissions (UN-Habitat, 2016). Greenhouse gas emissions are strongly linked to the energy use and waste produced by a city (Seto, et al., 2014). In an effective fight against climate change, an increase in the urbanization level can be considered as an opportunity in a way.

According to the Intergovernmental Panel on Climate Change (IPCC), urban concentrations on almost all continents will be subject to a temperature increase more than 1.5°C above pre-industrial temperature by 2050 (Revi, et al., 2014). The frequency of extreme weather events is also expected to rise, thereby increasing the risk of morbidity and mortality (Rosenzweig et al., 2015). Over the 80% of urbanized areas are under threat of natural disasters. Also, 89% of cities are economically vulnerable to at least one natural disaster (UNHabitat, 2016).

Considering all these facts, it becomes essential to formulate policies to build resilient cities. However, there is still no comprehensive evaluation system. This study aims to find the relations between urban form and resilience. This relation has been examined through the sectoral distribution of carbon dioxide emissions in three cities. Denizli, Gaziantep and Muğla provinces are the case areas and the research was conducted at macro level. In the following headings, the sectoral distribution of carbon dioxide emissions in these cities were evaluated over the categories of hierarchy, development type and city size. These sectors are categorized as road transport, housing and service buildings, and waste.

RESILIENT CONCEPT

The term of resilience originated in the field of ecology in the 1970s, and is defined as the capacity of a system, when faced with disturbance or disruption and maintain or recover its functions (ARUP, 2014). Recently, the concept of resilience has gained a remarkable importance in several disciplines. Actually, the increasing interest on resilience concept derives

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from the systemic and interlocking risk such as economic instability, climate change, and recently Covid-19 and health crisis (Scott, 2021).
The notion is based on the idea that uncertainty is inevitable and thus impossible to plan for every outcome (Ajibade, 2017). Instead, resilient systems through the capacity for self-determination (Folke, 2006) or social learning are likely to respond to changing conditions, even if that change is unpredictable.

Resilience in Urban Studies

Especially in the last decade, urban resilience has gained recognition and been located in global development plans. Urban resilience play a key role on the COP21 Paris Agreement on Climate Change, the Sendai Framework on Disaster Risk Reduction, and the New Urban Agenda, related to climate change, natural disaster, and urban development. Also, it is included in UN Agenda 2030 as one of its 17 Sustainable Development Goals (SDGs) (UN, 2015).
The concept of resilience can be used for cities with a complex structure that is constantly changing and adapting to conditions. In consequence of several debates in urban literature, the term of "urban resilience" is defined as the ability to maintain, adapt or transform the urban system that constitutes all socio-ecological and socio-technical networks in the face of uncertainty and change (Pickett et al., 2004; Brand and Jax, 2007; Meerow, Newell and Stults, 2016; Altun and Tezer, 2019). Salat and Bourdic give some examples from the disastrous experience of cities and define urban resilience as; " The capacity to survive disasters and even to rise out of its ashes, like Lisbon after the 1755 earthquake, London after the Great Fire in 1666, Kyoto after the fires in the Middle Ages, Tokyo after the 1923 earthquake, is what we call urban resilience – a complex concept related to the permanence of a memory at once social, symbolic and material". Also they criticise the modern city structures as they are more fragile because of disordered uniformity of their urban fabric, the lack of hierarchical structure, environmental impact of the construction, inefficient use of resources, and higher exposure to risks (Salat and Bourdic, 2012, p. 56-57).

Debates on Urban Resilience Theory

Resilience theory is mainly divided into two parts; equilibrium approach and evolutionary approach.
Equilibrium resilience generally refers to engineering disciplines. This approach suggests that a resilient system absorbs or accommodates the shocks and disturbance but does not change the system (Holling, 1973). The goal is to bounce back to the pre-disaster state in a rapid fashion. On the other hand, the normality of absorbing or accommodating the disturbance without any change in the system is questioned by academic circles. In such a case, there is a possibility that the normal system poses a risk (Davidson, 2010).

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Evolutionary approach, contrary to equilibrium- based one, rejects to turn back to the normal and highlights the adaptation, reform, and transformation processes. This approach emerges from evolutionary economic geography discipline. The main emphasis in this theme is that development can occur in multiple pathways, not just a single path. In short, the important point in this approach is that social systems adapt to change or transform the system by developing alternative ways (Davidson, 2010).

This approach also introduces threshold ideas where a change in a variable can drive the system to a tipping point and cause the situation to change. This reorganization is a phase of what is known as the "adaptive cycle", a term used to show how complex systems go through stages of growth, expansion, collapse, and regeneration (Folke et al., 2010). These adaptive cycles can be nested by interacting between scales which is a dynamic known as "panarchy".

There are some critiques about evolutionary based approach in literature. Scott maintains that transitions do not always bring about positive outcomes. Moreover, he emphasizes the necessity of finding out which local/regional interest prevents the transition (Scott, 2021).

Urban resilience researchers have developed the idea of tradeoffs to show that maintaining resilience in one area can be at the expense of another (Bahadur & Tanner, 2014). Such is the case where preventive infrastructure is deployed to protect economically valuable urban cores from flooding at the expense of surrounding low-income settlements (Marks and Lebel, 2016). While accepting the issues of equality and trade-off, examining the contextual factors that create situations of inequality, in other words, the political economy of urban resilience is a weakness of the literature (Béné et al., 2018).

Another weakness of the resilience literature is its neglect towards “vulnerability”. Faulkner et al. propose a model that highlights the relationship between vulnerability and resilience in order to analyze how a place responds to shocks and crises (2020). In this model, the key components are exposure (pre-existing attributes), sensitivity (negative response), capacity of response (pre-existing attributes), and adaptive capacity (positive response). The holistic vulnerability – resilience model presents the posibility of a region as both vulnerable and resilient at the same time. Additionally, it elucidates the reason why some places are affected from exogenous shocks less while others appear more vulnerable. The components of exposure and capacity of response may reflect the characteristics of historic cycles of shocks. Most recent shocks, on the other hand, are analyzed by the components of sensitivity and adaptive capacity. Identifying pre-shock trajectories and determining what circumstances lead to these trajectories is important for assessing the resilience/vulnerability of the region. This is a progresive model because it handles the urban system both negative and positive responses, does not ignore the vulnerability, and offers a comprehensive method.

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Resilient Urban Form and Indicators at Macro Scale

Urban patterns in cities are components that affect city life in social, economic and ecological dimensions for decades or even centuries. For this reason, urban form is of great importance for a resilient city. There are some studies about desirable urban form and its relation with energy consumption. These show that desirable urban form consume 50-60% less energy than the others (Salat and Bourdic, 2012).

Urban form is a spatial model that shapes by human activities in space and time (Sharifi, 2019). Such activities result in the formation and transformation of various physical elements. Analyzing urban form can be done in three different and interconnected scales: macro, meso, and micro levels (Fang, Wang and Li, 2015).

Resilient urban form can be defined as a system nested in a network of interconnected spatial and socio-ecological systems characterized by evolutionary spatio-temporal dynamics, and as socio-economic and environmental conditions whose integrity, habitability, and functionality are constantly changing (Sharifi and Yamagata, 2018).

The prominent indicators of resilient urban form at macro scale in literature can be listed as follows; hierarchy, city size, and development type.

Hierarchy: A hierarchical order can be found in many natural and social systems and it is necessary for urban resilience. In a hierarchical urban system structure, an inverse force formation is observed in the connection between the size and frequency of urban factors and features (Sharifi, 2019). According to Salat (2017), scale-free cities (in contrast to mono-scale) supported by a hierarchical structure are more resilient than mono-scale structures. Such a hierarchy of scale allows the city to organize itself and adapt more quickly to external changes (Salat, 2017). In cities having hierarchical structure, small-scale components gradually evolve and connect to the upper scales and create a complex and powerful form. However, there are concerns about weakening this form due to rapid urbanization, rent and speculation in Turkish cities.

Additionally, the relation between modularity and connectivity is also important. The balance between them may differ for each region. In some cases, it may be better to strengthen existing center-to-center links in one region for resiliency, while strengthening the relative autonomy of each center in another region. (Allan et al. 2013).

City size: Population and surface area are the two elements that determine city size. However, the link between surface area and population may not always be strong. The relation between a city's size and resiliency can vary. At first glance, larger cities are likely to be exposed to potential risks with more people than others. This is likely for cities without plans and preparedness for action. On the other hand, there are discussions that large-scale cities are more resilient in terms of economies of scale and efficient use of resources. Cities in Europe are examples of this situation. They resist economic crises more and recover faster. The reasons are listed as the lower infrastructure costs, the

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efficient use of resources, and their capacity to access natural and physical capital (Louf and Barthelemy, 2014). However, this economic prosperity and endurance may have been gained by ignoring environmental resilience.

Studies have revealed conflicting results on the relationship between city size, energy consumption, and CO2 emissions. Studies conducted in England show that a big city structure causes low energy consumption in transportation, while studies conducted in India have shown that there is a direct relation between city size and energy consumption. The studies conducted in the United States of America have yielded results in the same direction as the UK (Sharifi, 2019). In a study on 30 metropolitan cities in China, it was determined that as the urban area grows, CO2 emissions also increase (Fang et al. 2015). On the other hand, the simulation analysis conducted by Larson and Yezer (2015) examined the relationship between the increase in city size and income level. Accordingly, if the city size grows in consequence of the increase in the income level, the energy consumption - city size relation remains the same. However, while the income level is constant and city size continuous to develop (under some situations such high density, small housing units, high housing rents, short distance to work), energy saving is achieved. Thus, the criteria that clarify whether the expansion of the urban area will benefit the environment are the urban growth model and the distribution of urban activities (Lee and Lee, 2014). In this respect, mixed land use and comprehensive transportation strategies are the tools to prevent the increasing city size from resulting in urban sprawl and automobile addiction (Louf and Barthelemy, 2014).

Development Type is one of the elements of determining the resilience of a city. In this respect, compactness is the subject of this title. To determine the compactness, density analysis is required. Many studies show that compact forms provide convenience in terms of resilience to hazards, as many facilities are accessible. However, development types such as compactness and poly-centric urban forms are not sufficient alone for the urban resilience. Modularity and connectivity are also important. Each center should have internal integrity that can meet the needs in times of crisis and afterward, and should keep strong connections with other centers (Allan et al., 2013).

In a case study in Australia, it has been shown that regions with high density and diversity in the built environment have a positive effect on post-disaster recovery capacity. On the other hand, in areas outside the urban area, it has been observed that the most important factor for disaster resilience is the level of income rather than the built environment and density. In these regions, land use mix and building type diversity have a weak effect on recovery. However, the recovery process in low-population with the high-income suburbs was not as rapid as medium-density with middle-income suburbs (e.g. Balmoral, Bulimba, Paddington). (Alizadeh, Irajifar, & Sipe, 2016). So, there is a sensitive line between density and income level. If the income level rises too high and

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the density decreases, resilience may decrease. If the density rises too high and the income level decreases, the region may be getting fragile. Therefore, keeping the two sides balanced is an important and difficult task.

A study conducted in Alberta, Canada showed that mixed-use settlements has the potential to significantly reduce daily car-oriented travel (Hachem, 2016). Accordingly, greenhouse gas emission rates from transportation are lower. For residential neighborhoods, the effect of distance from the central business district (CBD) is very important. The greenhouse gas emission rate of a settlement 30 km from the CBD is 40% higher than the place located 5 km away from the CBD.

RESEARCH METHOD

A retrospective causal comparison method was used in the study. In order to analyze the resilience of the city on a macro scale, Sharifi argues that 5 indicators must be evaluated (2019). These are scale hierarchy, city size, development type, degree of clustering, and landscape/habitat connectivity. In this study, the first three indicators were evaluated due to collected data. Three different Turkish cities were determined as study areas. These cities show similarities and differences that can be compared with each other in terms of hierarchical structure, city size, and development type. Greenhouse gas inventory reports of these cities prepared previously according to the IPCC criteria were used. The report years were considered for using the data throughout the study. Cities were compared based on their carbon dioxide equivalent consumption (CO_2e) in the transportation, residential and service buildings and waste sectors. Thus, the resiliency of urban forms could be evaluated depending on their vulnerability. Graphics were produced for the comparison. During the study, additional analyzes were made in order to interpret some of the results. Income level, average household size and socio-economic development levels of the districts were considered (SEGE, 2013; 2019). Data about income level was deemed necessary to find the relationship between arbitrary choices in the transportation sector and the change in CO_2e amount. Data on average household size was required to reveal the relation between population density and CO_2e. The datum of socio-economic development level of provinces and districts was needed to examine the hierarchical structure.

Using the Corine Land Cover Classes, the change of the artificial surfaces (classes of industrial commercial and transport units, mine, dump and construction sites, artificial, non-agricultural vegetated areas) and city structure between 1990 and 2018 were mapped in ArcGIS, and detailed graphics were created. The effect of these differences on urban resilience was measured according to these classes.

CASE STUDY ON DENIZLI, GAZIANTEP AND MUĞLA

According to the report of UNFCCC (2020) about “National greenhouse gas inventory data for the period 1990 – 2018”, Turkey ranks 1st among

Annex I parties with an increase of 160.6 % GHG emissions. New Zealand is the second with an increase of 57.2%. This disturbing table shows that the need for emergency regulations in climate policy in Turkey. This study can be an important resource for understanding current problems in cities and generating solutions.

As shown in Table 1, these three cities have been selected because the resilience indicators of them have similarities and differences. Gaziantep has a monocentric urban form and its population is 1.931.836 (2015, report year). Denizli has a monocentric urban form and its population is 993.442 (2016, report year). Muğla has a polycentric-linear urban form and its population: 866.665 (2013, report year). Gaziantep and Denizli show similar development type. However, Gaziantep's population is approximately twice of Denizli. Thus, comparison of these two cities will show the impact on the carbon emissions of the population. While Denizli and Muğla have approximately the same population, urban forms differ. Thus, the relationship of urban forms with GHG can be measured. Since Gaziantep and Muğla differ in terms of both population and city form, the effect of two different variables on GHG can be observed (Figure 1).

Table 1. Comparison of Provinces (TURKSTAT, 2021a) (This table created by the authors)

Indicator	Denizli	Gaziantep	Muğla
Scale of Hierarchy	Very large and very small size districts	Very large and very small size districts	Medium size districts
Development Type	Monocentric	Monocentric	Polycentric
City Size (Population)	993.442	1.931.836	866.665

Table 2 shows that each study area situates at different socio-economic development levels. Considering the socio-economic development ranking of the districts, there is a balanced and gradual distribution in the districts of Muğla and Denizli, however, the level difference between the districts of Gaziantep is quite high (SEGE 2019b; 2013). Detailed analysis of the districts was made under field studies.

Table 2. Socio-Economic Development Index of Provinces in Turkey (SEGE 2019b; 2013)

City	2017			2011		
	Ranking	Index	Level	Ranking	Index	Level
Muğla	8	1,175	1	8	1,04	1
Denizli	10	0,923	2	10	0,912	2
Gaziantep	30	0,250	3	30	0,267	3

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Figure 1. Provincial map of the study areas located in Turkey

In the study, the distribution of population densities of the cities, construction changes by years, population changes by years are indicated with maps and figures.
In the findings section, using the greenhouse gas inventory reports of the provinces, road transport, residential and service buildings, and waste factors were compared.

Denizli

The main economic activity of Denizli province is the industry sector (Provincial Directorate of Environment and Urbanism, 2016). According to the data from the "Research of Socio-Economic Development Ranking of Districts SEGE-2017, Denizli districts are mostly in the third level (2019). In this respect, there is a balance in the distribution of resources in the districts.

Population Density and Urbanization Process of Denizli Province

The population in 2016 is 993,442 inhabitants. Pamukkale and Merkezefendi districts, formerly central districts, constitute 63% of the total population of the province. The population of Pamukkale district is 347,444 and the population of Merkezefendi district is 287,852. The third highest district population is Çivril district with 60,721 people. As seen in Figure 2, there is a big difference between the central districts. Between 1990 and 2000, Denizli province, with a rate of 47%, was one of the cities with the fastest growing urban population in the country (TURKSTAT, 2021a).

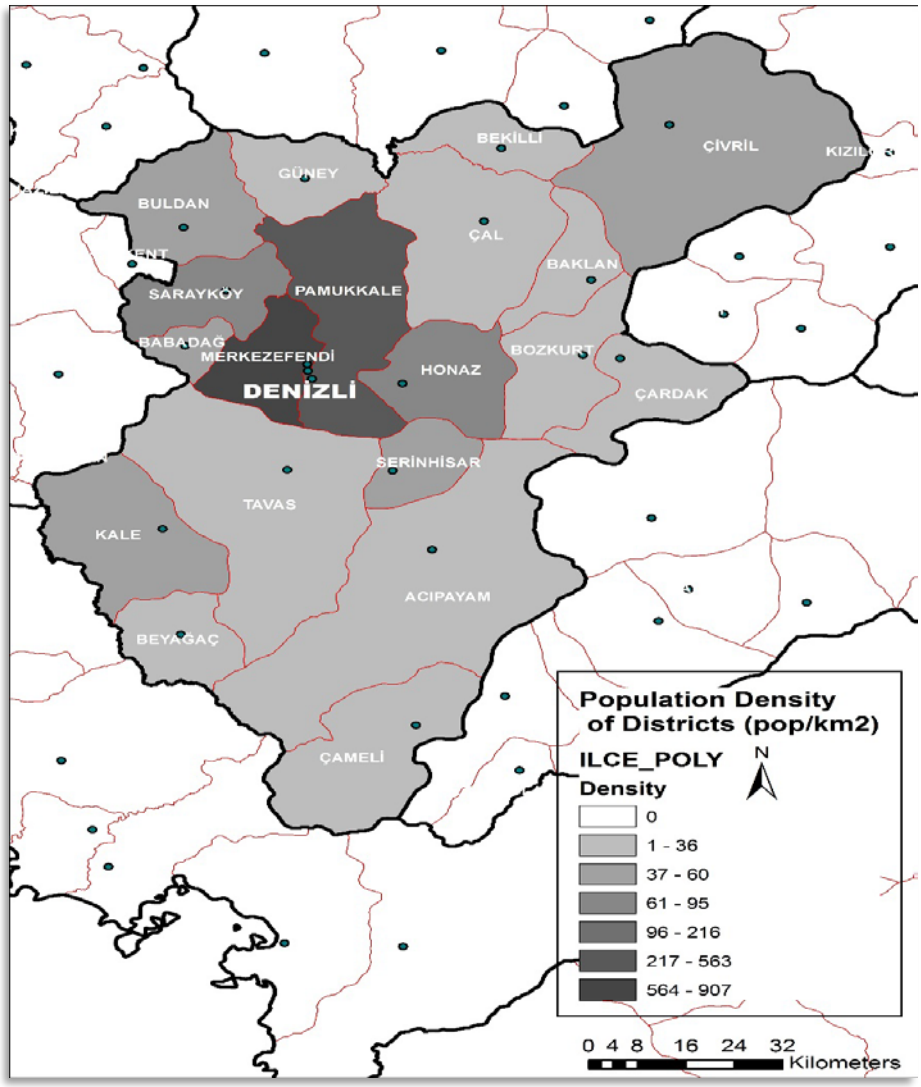

Figure 2. Population Density of Districts of Denizli Province in 2016 (This figure created by the authors, using the data of TURKSTAT, 2021a)

The change in the artificial areas and the population growth rate of Denizli province between 1990 and 2018 are given in Figure 3.

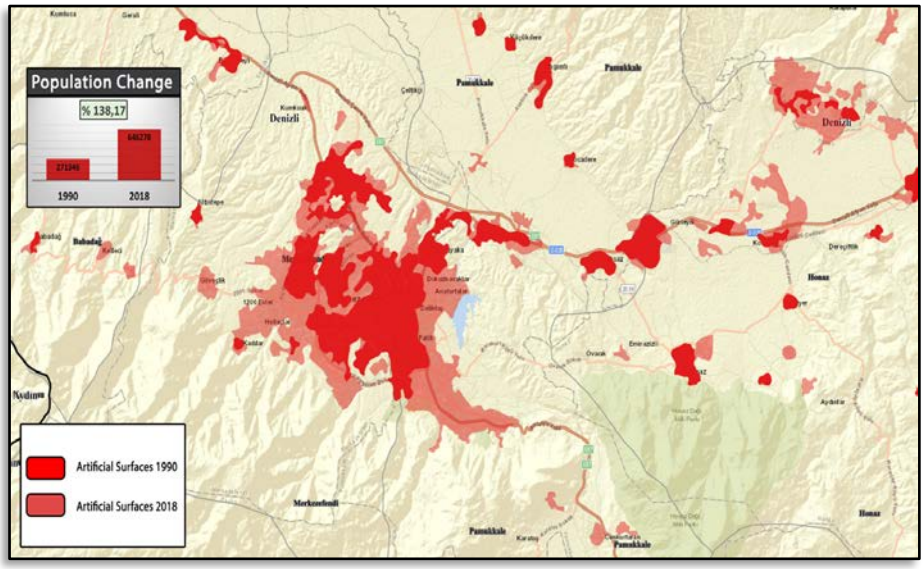

Figure 3. Changes in the artificial surfaces and population in Denizli between 1990 – 2018 (This figure created by the authors)

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As seen in the Figure 4 and 5, the change in the urban fabric between 1990 and 2018 is 38%. The increase in other artificial surfaces has increased 12 times during this period. Population growth is at the rate of 138%. While population growth is higher than urban fabric, it is considerably less than other artificial surfaces. When this change is compared with the energy consumption rate per capita, energy savings have been made in the province.

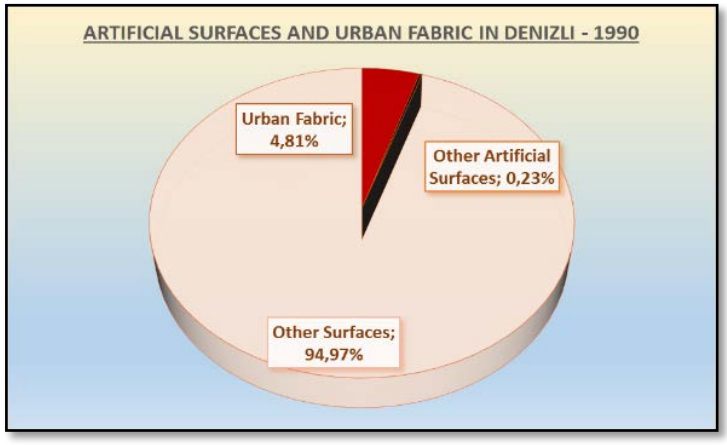

Figure 4. Artificial Surfaces and Urban Fabric in Denizli – 1990

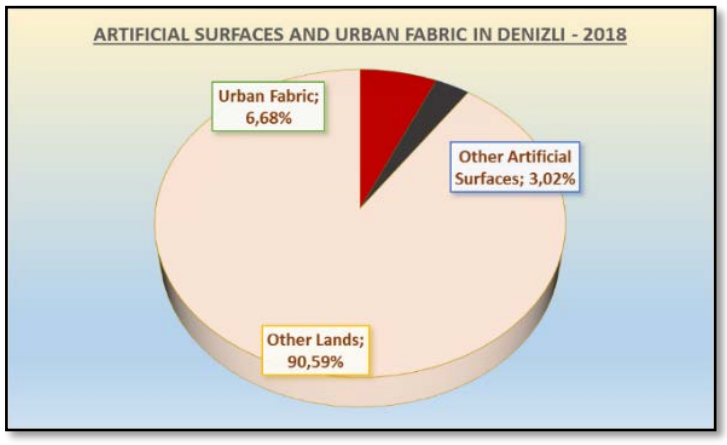

Figure 5. Artificial Surfaces and Urban Fabric in Denizli – 2018

Carbon Equivalent Emissions of Denizli Province

According to the results obtained with the IPCC approach, the total greenhouse gas emissions of Denizli province for 2016 were calculated as approximately 7.5 million tons of CO_2e. When this amount is compared to the population of Denizli in the same year (1,005,687), it means 7.5 tons of CO_2e per person. This result is above Turkey's average amount of emissions (6.3 tons CO_2e per person) for 2016. Total emissions of Denizli constitutes 1.5% of Turkey's total emissions in 2016 (Denizli Metropolitan Municipality, 2019).

Figure 6 shows that 43.8% of total emissions are based on fixed sources; 23.1% on transportation, 20.8% on industrial processes, 11.3% on agriculture and animal husbandry, and 1.0% on waste management. Almost three quarters of these emissions are caused by Scope 1 - Direct

Emissions and 22% from Scope 2 - Indirect Emissions. Emissions from residences, commercial/institutional buildings, manufacturing industry and construction, the energy industry, and agricultural activities were calculated within the scope of the fixed resources sector.

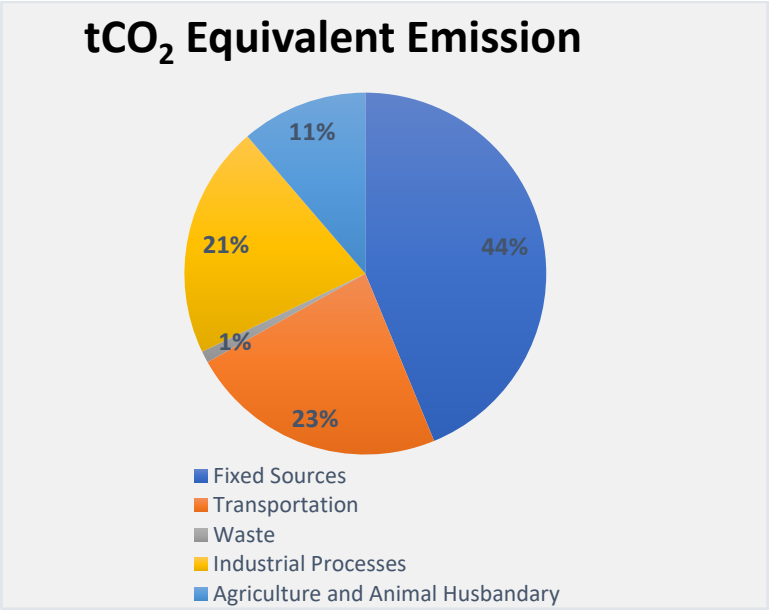

Figure 6. Greenhouse Gas Inventory Sectoral Distribution of Denizli

Denizli is a city that continues to grow. It is stated in TURKSTAT reports that the population of the province, which was 1 million in 2016, will reach up to 1.2 million in 2030. A significant increase in greenhouse gas emission-related parameters is expected between 2016 and 2030, particularly in industrial production, vehicle ownership, and building stock. Besides, Denizli's 2030 emissions are predicted to be 11.9 million tons of CO_2e. In the same year, per capita emissions are expected to be 10.1 tons of CO_2e. A target of 21% has been set for 2030 as a reduction target. Accordingly, it is predicted that Denizli's emissions per capita will be reduced to 8.0 tons of CO_2e in 2030, and total emissions will remain as 9.5 million tons of CO_2e (Denizli Metropolitan Municipality, 2019).

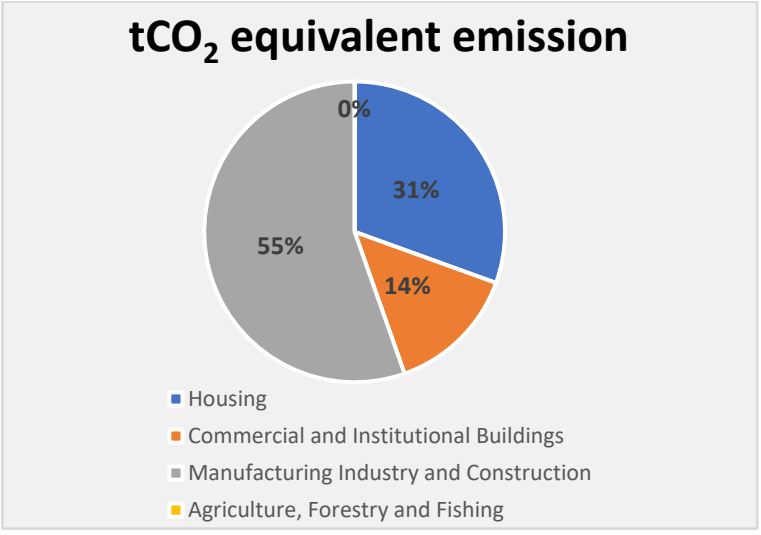

Figure 7. Fixed Sources CO_2 Emission of Denizli

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Gaziantep

The industry has great importance in the economy of Gaziantep province. There is a huge difference between districts in terms of socio-economic levels (SEGE, 2019b). This illustrates that the distribution of resources among districts is not equal. This state may lead to several economic, social, and ecological problems in the time. On the other hand, Şehitkamil is the only district in the first level in the Southeastern Anatolia region.

Population Density and Urbanization Process of Gaziantep Province

The total population of Gaziantep Province in 2015 is 1,931,836 (TURKSTAT, 2021a). Şahinbey and Şehitkamil are Gaziantep's central districts, each of them has a higher population than most of the other cities in Turkey with a population of 845,000 and 710,000 respectively. These two districts constitute 64% of Gaziantep's population. In this respect, Gaziantep has a monocentric development type. 2000 - 2014 in terms of the growth rate of population has taken first place in Gaziantep, Turkey (Figure 8).

The population of the province, which was 214.499 in the 1927 census, increased by 534% in the last 70 years. This growth rate was 317% for the same period in Turkey.

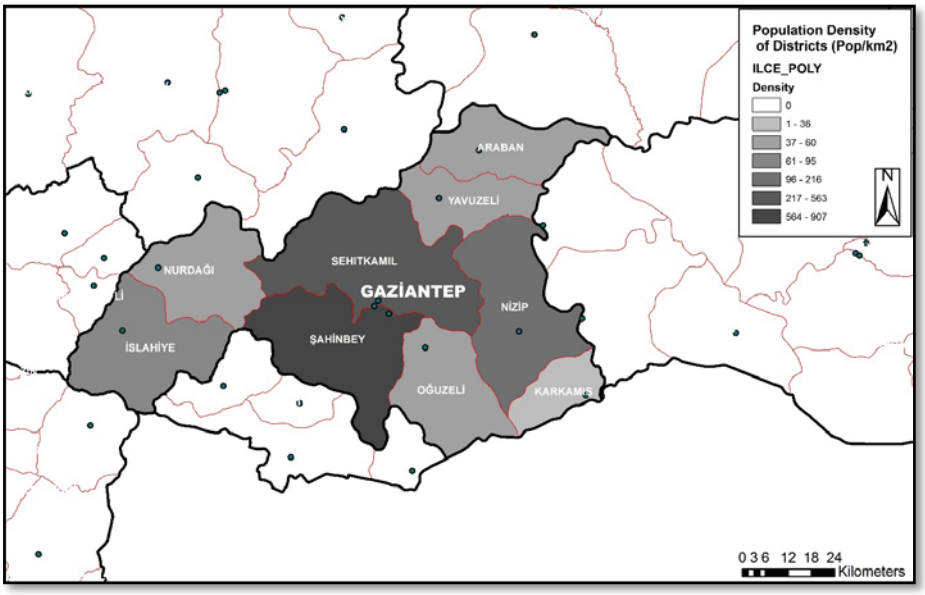

Figure 8. Population Density of Districts of Gaziantep Province in 2015 (This figure created by the authors, using the data of TURKSTATa)

Figure 9 shows the change in the artificial surface of Gaziantep province between 1990 and 2018. According to this map, the existing city form has expanded and a new area has been formed on the north side. The increase in other artificial surfaces occurred almost 4 times during this period.

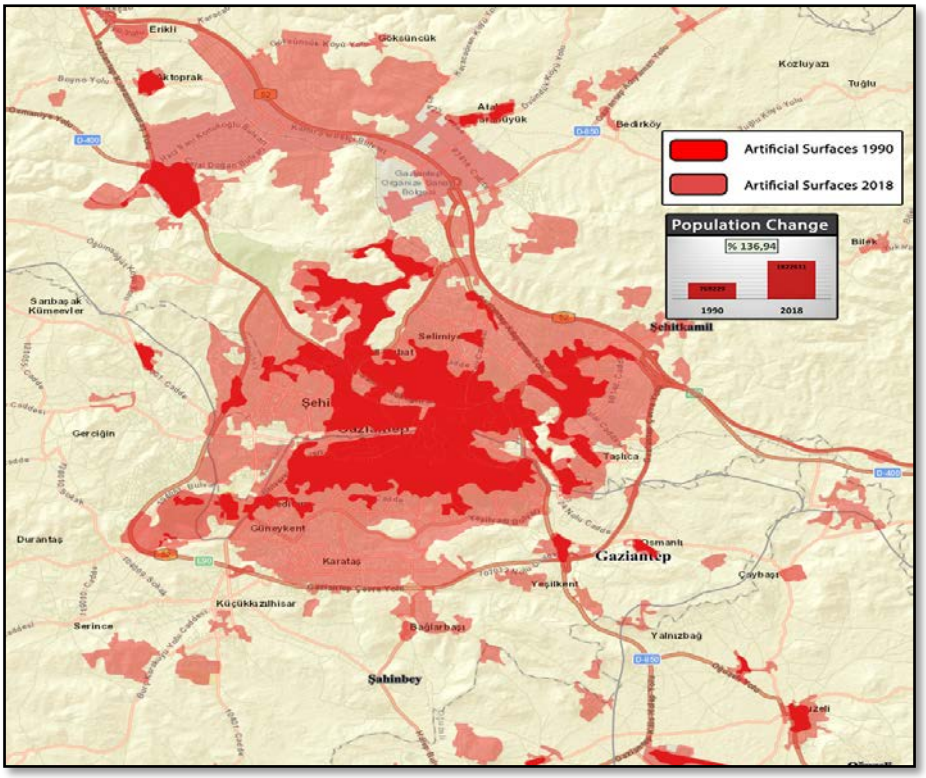

Figure 9. Changes in the artificial surfaces and population in Gaziantep between 1990 and 2018 (This figure created by the authors)

Figure 10 and 11 show in detail the change in the urban fabric and other artificial surface rates of Gaziantep province between 1990 and 2018. The change in the urban fabric between 1990 and 2018 is 56%. Population growth is at the rate of 137%. While population growth is higher than urban fabric, it is considerably less than other artificial surfaces. When this change is compared with the energy consumption rate per capita, energy saving has been achieved in the province based on urban fabric data.

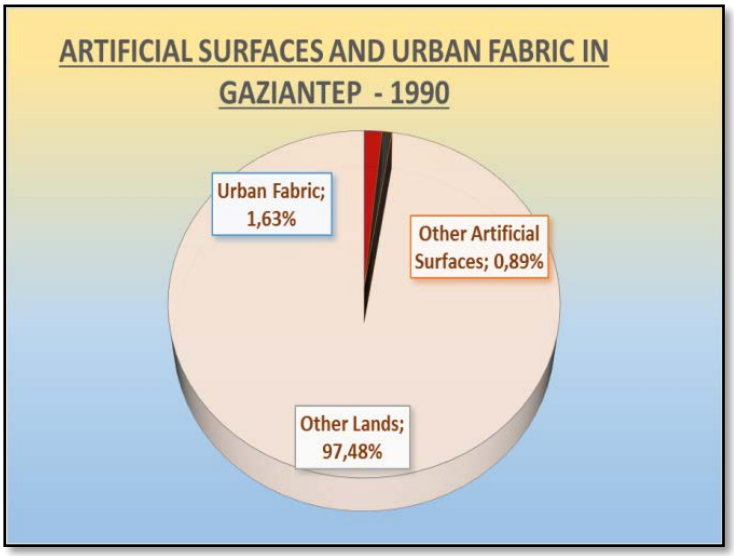

Figure 10. Artificial Surfaces and Urban Fabric in -1990

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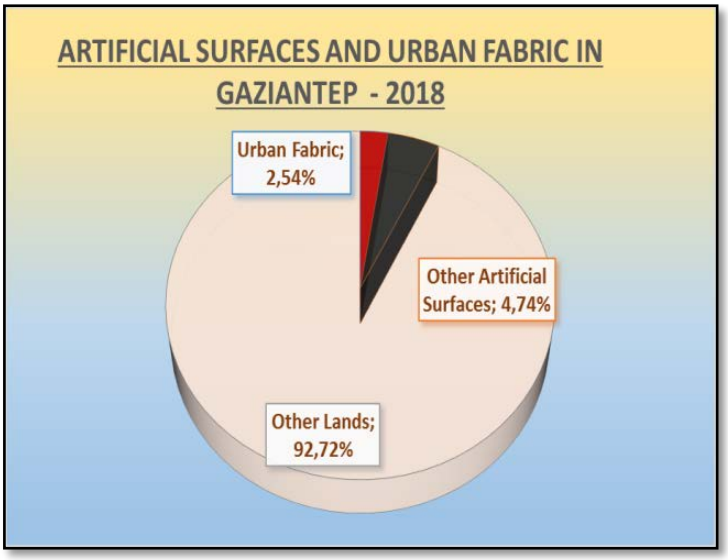

Figure 11. Artificial Surfaces and Urban Fabric– 2018

Carbon Equivalent Emissions of Gaziantep Province

The most important livelihoods in Gaziantep are agriculture, animal husbandry, energy resources, handicrafts, industry, and trade. Phosphate, manganese, and bauxite are mined in Gaziantep, which is extremely poor in terms of mineral resources. Gaziantep, which is the center of the Southeastern Anatolia Project (GAP) with its geographic entrance gate, industry, and commercial volume, keeps under the influence of many provinces around it economically (Provincial Directorate of Environment and Urbanism, 2018).

According to the analysis results obtained with the IPCC approach, the total greenhouse gas emissions of Gaziantep province in 2015 were calculated as approximately 10 million tons of CO_2e. When this amount is compared with the population of Gaziantep in the same year, it means 5.32 tons of CO_2e per capita. This result is below Turkey's average amount of emission 6.04 tons CO_2e per person for 2015 (Gaziantep Metropolitan Municipality, 2016).

The distribution of the CO_2 equivalent emission of Gaziantep province by sectors is given in the Figure 12. The most emissions are made in the industry sector and, transportation takes second place. Forestry is in the last place with 7.97 ktons (Gaziantep Metropolitan Municipality, 2016).

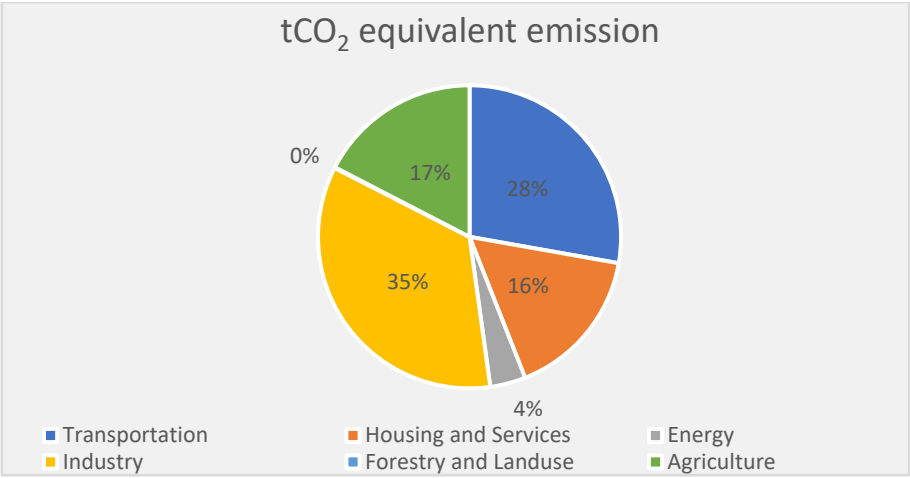

Figure 12. CO_2 equivalent emission of Gaziantep Province by sectors

The fact that the main sector in the province is the industry has also affected GHG emissions. Gaziantep will continue to receive immigration with its business potential. Its population will gradually increase. The fact that the per capita emission rate is lower than the country average. Arrangements should be made in industrial and transportation areas. Besides, city plans and city management issues are very important in terms of fair access to resources in this province, which has very high potential.

Muğla

The main livelihood of the people is tourism, agricultural production, forestry products, underground resources management, traditional handicrafts, and fish production. In Muğla, socio-economic indexes of districts are generally higher than the country average (SEGE, 2019b). This illustrates that the distribution of resources to districts is equal. Moreover, coastal districts indexes are higher than the central district. This example is important in terms of comparing the GHG emissions and socio-economic level.

Population Density and Urbanization Process of Muğla Province

The population density of Muğla province is low when compared to the average of Turkey. With the development of tourism in recent years, a large increase in the population has been observed in the summer months. While the population growth rate in Muğla was 32.45 ‰ in 2008, it decreased to 31.62 ‰ in 2014. The concentration of the population in urban areas means an increase in pressure on the environmental areas (Provincial Directorate of Environment and Urbanism, 2014).

As seen in the Figure 13, many centers have been formed in Muğla province. Especially with the development of coastal tourism, there has been a population shift from the central district of Menteşe to the coastal districts since the 1990s. Even, the population of the districts is higher than the central one. This trend has led to a multicentric development type.

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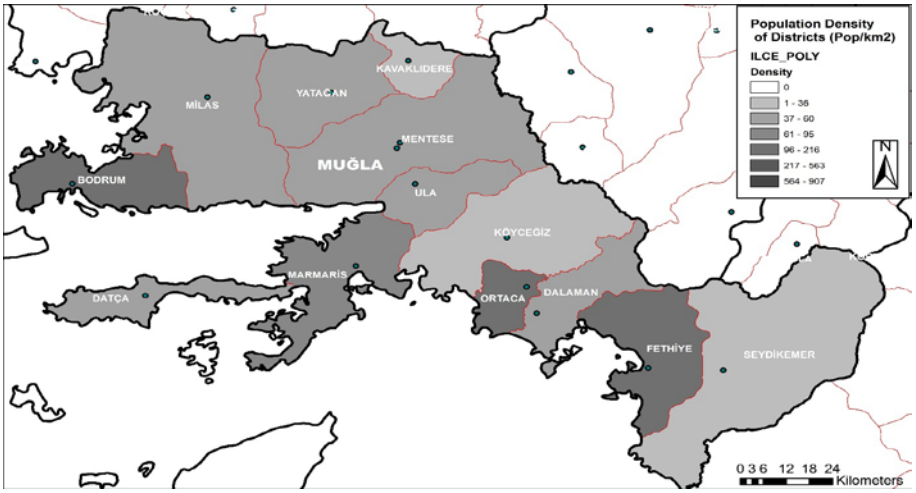

Figure 13. Population Density of Districts of Muğla Province in 2013 (This figure created by the authors, using the data of TURKSTATa)

Bodrum is an extreme example. However, it is important to see the impact of the frenetic growth of the tourism and construction sectors on ecology. The importance of coastal tourism in Muğla has led to an increase in construction in Bodrum district (Figure 14, 15, and 16). Almost the entire coast of the district has turned into the artificial surface. Because of the high socio-economic level, the number of private car ownership is high, so it is easy to access various functions from anywhere. This is one of the reasons for gaining its current form.

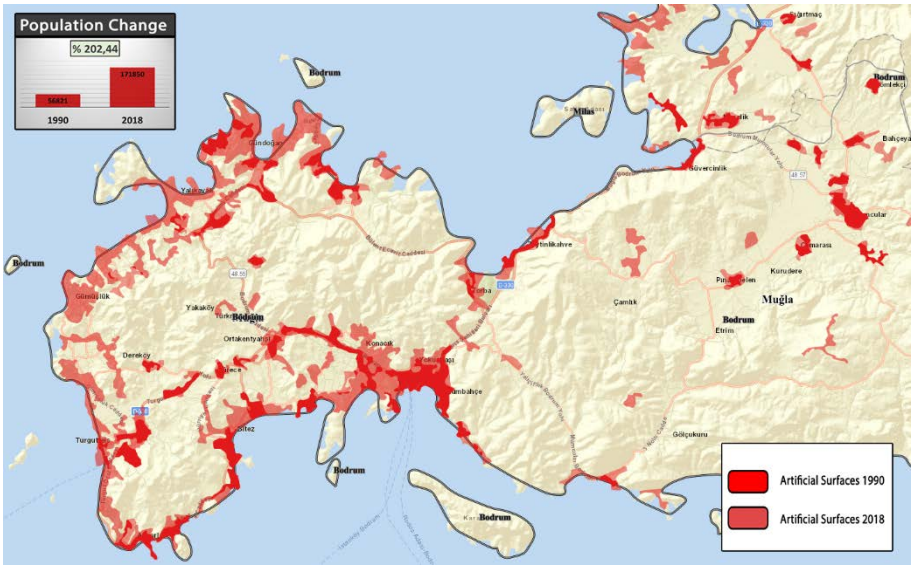

Figure 14. Changes in the artificial surfaces and population in Bodrum between 1990 and 2018 (This figure created by the authors for this paper)

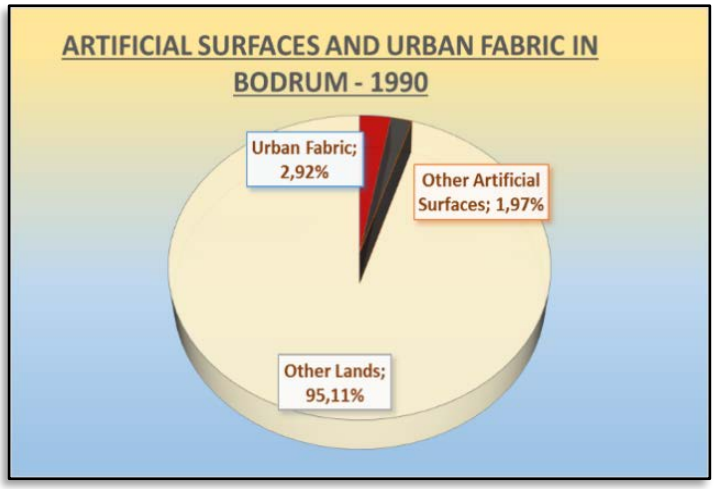

Figure 15. Artificial Surfaces and Urban Fabric in -1990

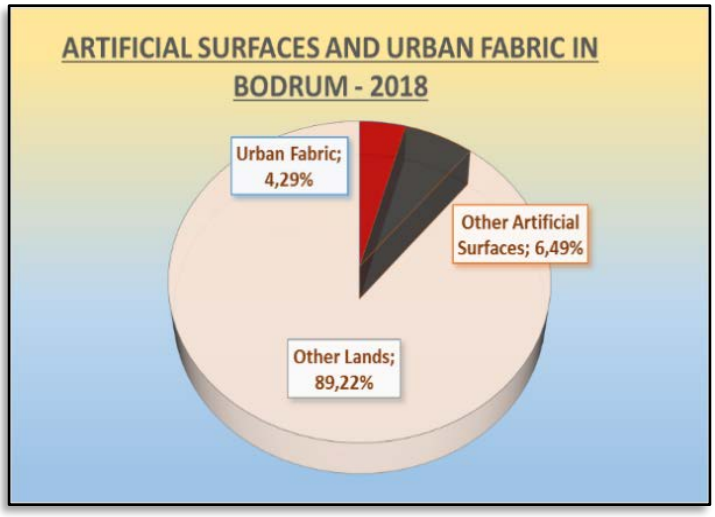

Figure 16. Artificial Surfaces and Urban Fabric in -2018

One of the districts where population growth is very high is Marmaris (Figure 17). However, its structural form has not changed much like Bodrum's. Rather, it resulted in the expansion of its current form.

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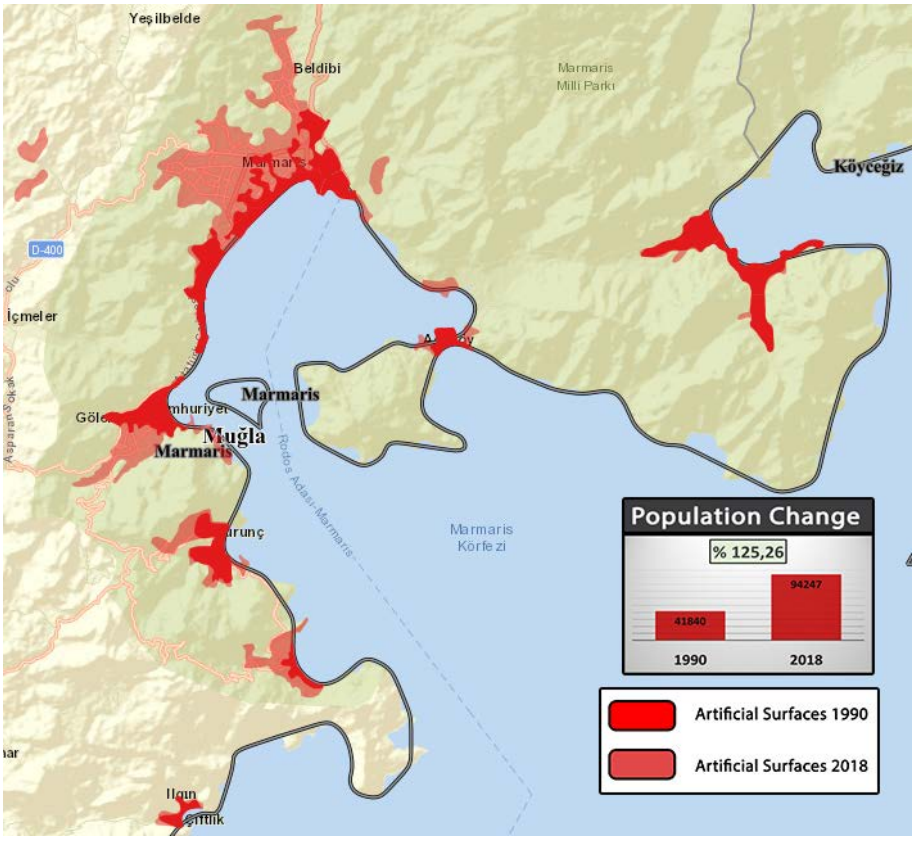

Figure 17. Changes in the artificial surfaces and population in Marmaris between 1990 and 2018 (This figure created by the authors)

It is observed that fragmented settlements has been formed in Menteşe. (Figure 18). According to the population growth rate, the increase in construction is quite high.

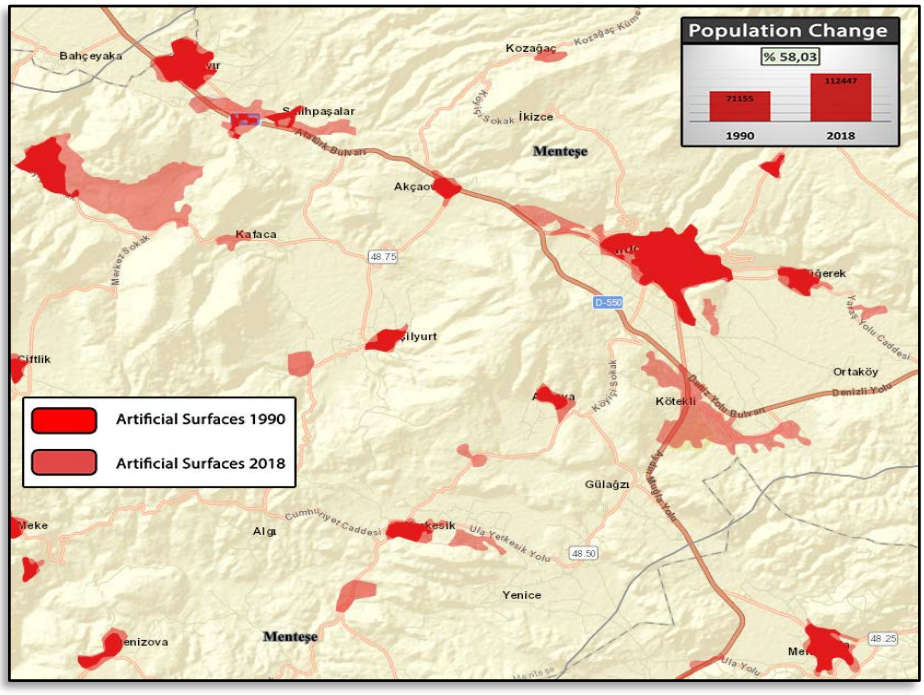

Figure 18. Changes in the artificial surfaces and population in Menteşe between 1990 and 2018 (This figure created by the authors for this paper)

In Milas and Fethiye, between 1990 and 2018, artificial surface increased more than the population increase. This result can be explained by the seasonal population increase and buildings for this demand.

In Figure 19 and 20, Bodrum, Fethiye, Marmaris, Menteşe, and Milas districts with a population of over 80,000 have been studied. General structuring of the city form, which is mostly fragmented, is far from a compact development type. Between 1990 and 2018, the total artificial surface increase in these five districts is 79%. Due to the seasonal increase of the population, the connection between population - artificial surface - energy consumption could not be clarified.

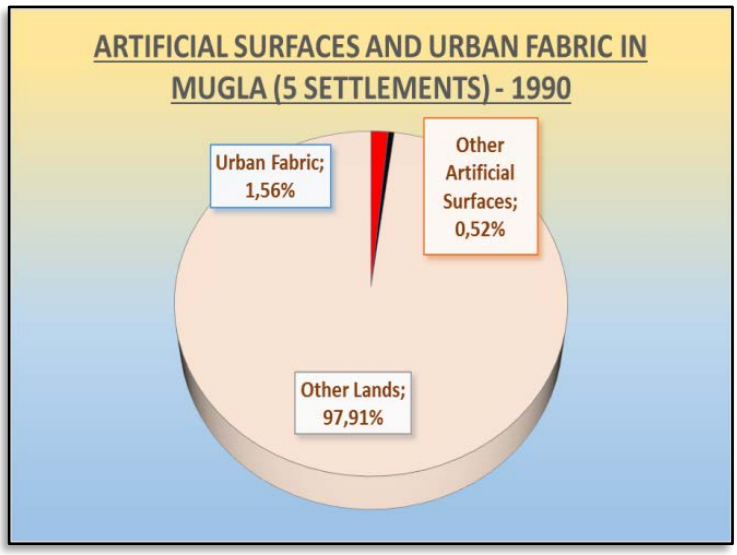

Figure 19. Artificial Surfaces and Urban Fabric in -1990 between 1990 and 2018 (This figure created by the authors for this paper)

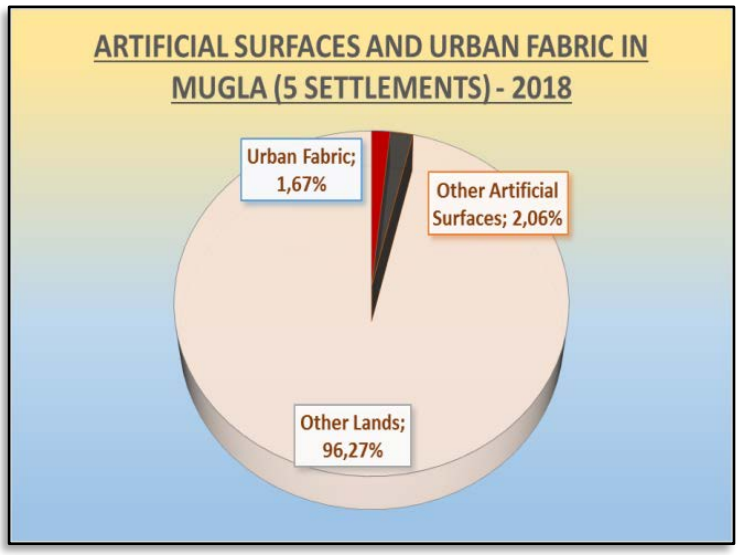

Figure 20. Artificial Surfaces and Urban Fabric in -2018between 1990 and 2018 (This figure created by the authors)

Carbon Equivalent Emissions of Muğla Province

Total emissions of Muğla calculated according to the GPC BASIC approach for 2013 were calculated as 11.203.766 tCO_2 equivalent when thermal power plants and airway transportation were added. While 986.093 tCO_2 equivalent of these emissions is Scope 1- Direct Emissions, 1.217.672

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tCO_2e are due to the total electricity consumption in Muğla. When these two major emission sources are excluded, total emissions are equivalent to 3,247,861 tCO_2, while 2,030,189 tCO_2e arises from the total electricity consumption of Scope 1 and 1,217,672 tCO_2e (Muğla Metropolitan Municipality, 2013).

When it is calculated in thermal power plants in the evaluations, it constitutes the most important emission source of the city, followed by airline-based emissions (Figure 21). However, when these two emission sources are excluded, solid waste is the largest greenhouse gas emission source in the city with 893,632 tCO_2e (Figure 22). With a share of 653,817 tCO_2, emissions from diesel vehicles come in second place. This is followed by electricity consumption of 628,983 in commercial/corporate buildings, 380,192 tCO_2 domestic electricity consumption, and commercial electricity consumption. Finally, domestic coal consumption comes with a share of 71,414 tCO_2e (Muğla Metropolitan Municipality, 2013).

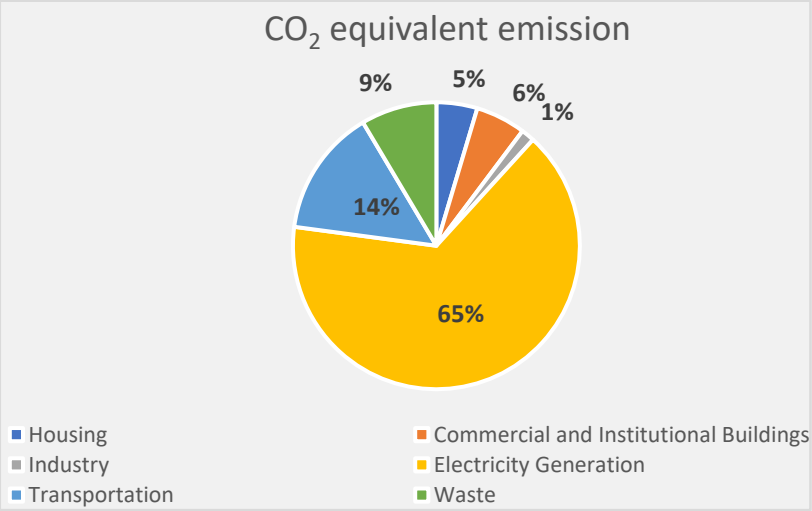

Figure 21 CO_2 equivalent emission of sectors in Muğla

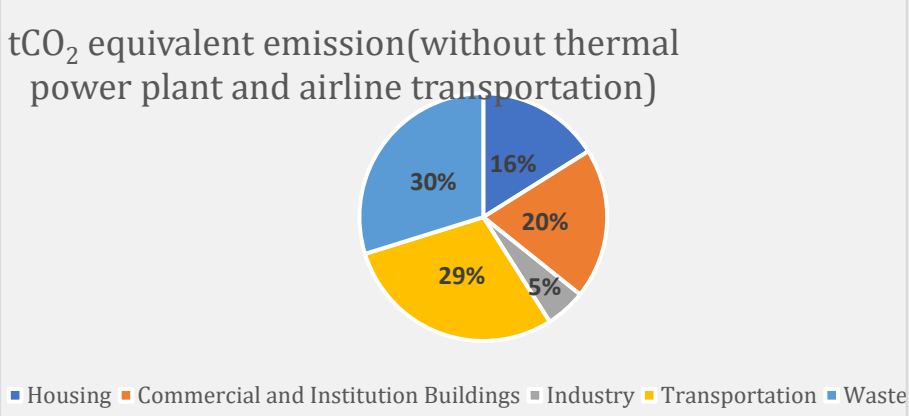

Figure 22 CO_2 equivalent emission(without thermal power plant and airline transportation) of sectors in Muğla

In the studies carried out for the coastal Aegean region where Muğla is located, the temperature increase is predicted to be more limited in the first years, it is expected that the temperature increase will be higher in the future (after 2040). On the other hand, the winter precipitation will

increase. Since the tourism sector has an important place in the economy of the province, it is estimated that the expected changes lead to disasters such as floods and weather events, as well as problems such as loss of income, increase in expenses (cooling and energy consumption).

Findings

The findings of cities' CO_2 emission rates have been classified according to road transport, housing, and building services, waste. Also, data on the number of private cars and the average number of households were used.

Road Transport

In this section, the greenhouse gas emission rates of the provinces originating from road transport are compared. While comparisons are being made; population, income level, and a total number of private vehicles data were used.

As seen in the Table 3 and Figure 23, Muğla is the province with the highest transport emission per capita. This is followed by Denizli and Gaziantep provinces, respectively. In Table 4, where the number of private vehicles is compared to the population, Muğla is shown to be the highest province followed by Denizli and Gaziantep, respectively. In Table 5, the per capita Gross Domestic Product (GDP) values are compared, Muğla is the highest, and Gaziantep is the lowest one.

These results show that transport emission rates are directly related to income level.

Table 3. Road transport emission rate per capita of provinces (This table created by the authors, using the data of TURKSTAT, 2021a)

Province	Population	GHG (tCO_2e)	GHG/pop
Denizli	1005687	534044	0,531
Gaziantep	1931836	950000	0,49
Muğla	866665	934689	1,07

Table 4. The ratio of private car ownership to the population by provinces (This table created by the authors, using the data of TURKSTAT, 2021b)

Province	Population	Number of Private Cars		Num.prvt.car/pop
Denizli	1005687	203194		0,42
Gaziantep	1931836	237561		0,27
Muğla	866665	214209		0,60

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Table 5. GDP of Provinces (This table created by the authors, using the data of TURKSTAT, 2021c)

Province	Gdp per capita (TL)	Gdp per capita($)	Report Year
Denizli	30199	9988	2016
Gaziantep	21731	8009	2015
Muğla	24360	12793	2013

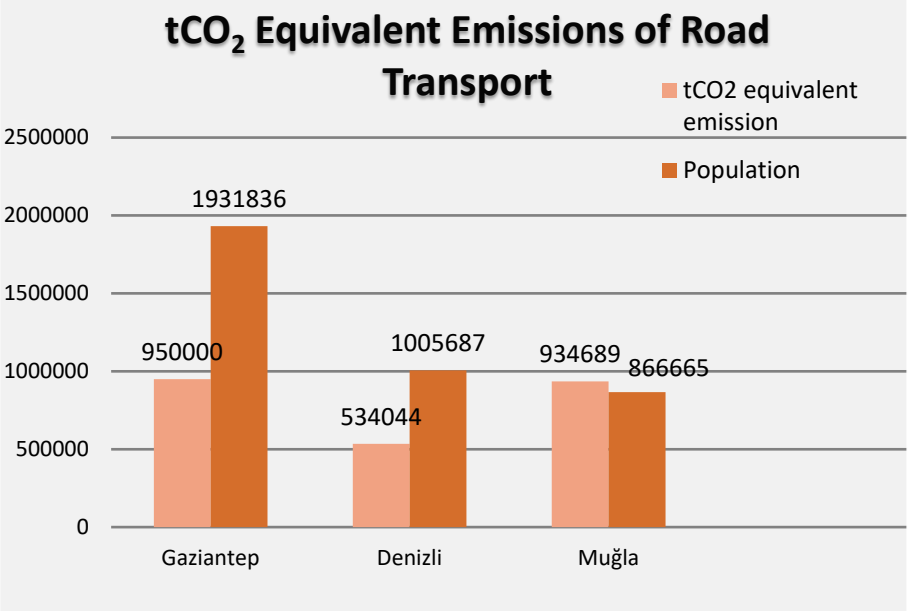

Figure 23. CO_2 Equivalent Emissions of Road Transport of the Provinces (This figure created by the authors for this paper)

Waste

Muğla's high waste emission rate is caused by thermal power plants. As seen in the Table 6 and Figure 24, it is obvious that thermal power plants devastate nature. On the other hand, Denizli produces more waste than Gaziantep. This is in line with their population size.

Table 6. Waste emission rates of provinces (This table created by the authors)

Province	Population	Waste emission (tCO_2e)	W. GHG / Pop.
Denizli	1005687	78092	0,077
Gaziantep	1931836	125000	0,06
Muğla	866665	970664	1,12

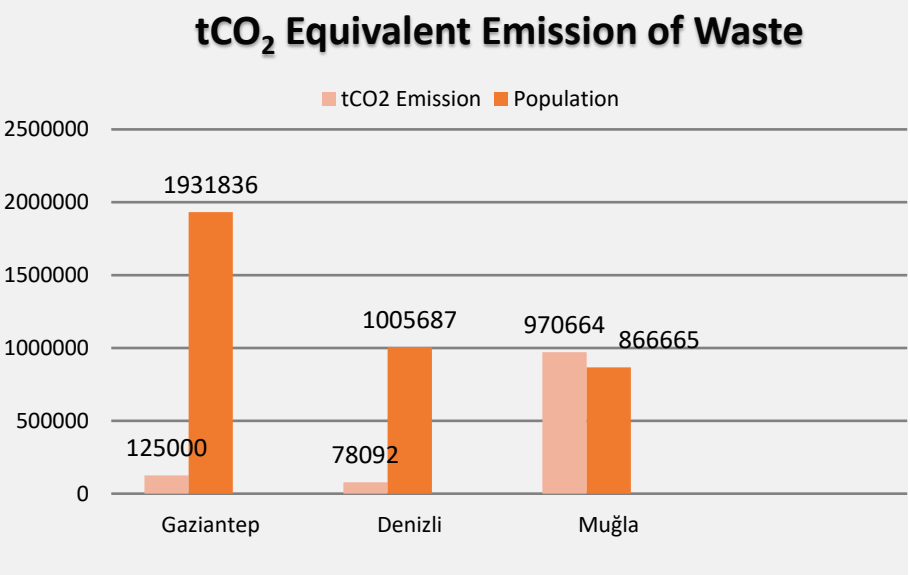

Figure 24. CO_2 Equivalent Emissions of Waste of the Provinces (This figure created by the authors for

Housing and Services

In Tables 7 and 8 and Figure 25, comparing the average household size with the GHG emission rates of houses and services, it is reasonable that Gaziantep has the lowest rate. However, the reason for Denizli's high emission rate is affected by other factors.

Table 7. Average Household Size of Provinces (This table created by the authors using the data of TURKSTAT, 2021d for this paper)

Province	Average household size	Report Year
Denizli	3,07	2016
Gaziantep	4,32	2015
Muğla	2,97	2013

Table 8. GHG Emission Rates of Housing and Services of Provinces (This table created by the authors for this paper)

Province	Population	Emission of Housing and Services (tCO_2e)	GHG/Pop
Denizli	1005687	1448312	1,44
Gaziantep	1931834	2013350	1,04
Muğla	866665	1143702	1,32

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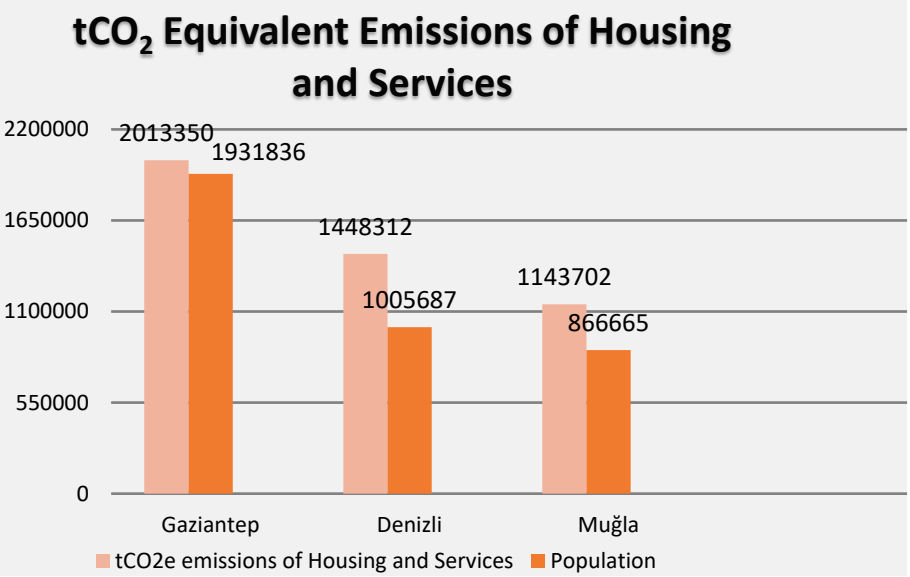

Figure 25. CO_2 Equivalent Emissions of Housing and Services of the Provinces (This figure created by the authors for this paper)

RESULTS AND DISCUSSION

The population has shifted from the central district towards the coast due to tourism. With the increase of population density in the coastal districts, Muğla province has gained a multi-centered form. Moreover, there is a direct relationship between the high-income level and the number of private cars. Due to the high socio-economic level, the use of private cars has increased. Regarding this, proximity to services has lost its importance. Moreover, forms diverging from the center and coastal settlements have occurred. The high emissions in road transport can be explained by these reasons.

Table 9 summarizes the results of the study by sectors. The effect of thermal power plants on nature in Muğla shows the importance of the basic sectors on urban resilience.

Average household size affects greenhouse gas emissions of housing and services. In addition to this, it is thought that there are other factors affecting GHG emissions in housing and services.

There is a positive relationship between population and waste emission rates. However, other reasons also affect these rates.

Table 9. Results (This table created by the authors for this paper)

Sectors	Denizli	Gaziantep	Muğla
Road Transport	Medium Value	Low income level / low n. of private car / low GHG emission	High income level /high n. of private car/ high GHG emission
Waste	More research needed	More research needed	Devastating sectoral impact
Housing and Service Buildings	More research needed	High population density / low GHG emission	More research needed

CONCLUSION

In this study, urban resilience is discussed within the framework of city size, hierarchy, and development type. The greenhouse gas emission rates are evaluated by the criteria of population, density, distribution of building density, artificial surface, socio-economic level, basic economic sectors, and housing type.

A hierarchical urban system structure is essential for the resilience of the city to be able to organize itself, adapt to external changes faster, and create a complex and strong structure. Each of the case cities in this study does not fully meet the hierarchy criteria. Because of the rentier ambitions the city size of the districts are close to each other in Muğla, especially in the Bodrum district. Thus, the hierarchical structure has gradually weakened. Medium-scale districts are insufficient in Denizli and Gaziantep provinces where currently some cities are overgrown. As a result, small-scale cities are directly connected to large-scale cities, which creates a problem in terms of coordination between small and large-scale cities. For this reason, the hierarchical structure has not developed enough in all three cities.

City size is an important criterion for low infrastructure cost, efficient use of resources, and capacity to access capital of all kinds. Yet, this criterion may differ in the resilience of the city according to the factors such as population, area size, and distribution of various urban functions. There is a relationship between population and GHG emissions. However, this relationship is affected by density, development type, change of artificial surfaces, and socio-economic level. Besides, the high-income level is effective in increasing GHG emissions. The case studies show that if the expansion of artificial surfaces is more than population growth, there is an increase in energy consumption and hence increase in GHG emissions. Development type includes criteria such as compactness, urban sprawl, mono-centric and poly-centric urban forms, mixed land use, and diversity of building type. Currently, the form of Muğla province shows a poly-centric structure, while Gaziantep and Denizli provinces have a mono-centric structure. Actually, the development type of Muğla province has changed in time as the coastal zone has been attracting more people with a rising demand for new constructions. While coastal districts of Muğla have started to develop due to tourism, the city center (Menteşe district) has relatively shrunk. Since the development type continues in a fragmented way, city forms are gradually growing away from compactness, which causes the city structure to turn into a car-oriented. Therefore, the GHG emission level of the road transport has risen.

The economic sectors have great impact on the urban resilience. Thermal power plants in Muğla have a destructive effect on the urban ecology. In this respect, it is crucial to base the city economies on more sustainable sectors.

Gaziantep province is the case with the lowest emission rate per capita with its high population and relatively low socio-economic level criteria. Although the province of Denizli has the same development type as

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Gaziantep, its population and socio-economic development ranking are very different. This situation shows that the measures of city size and socio-economic income level affect the amount of greenhouse gas emission significantly. In this respect, these two examples are also particular cases.

In summary, measures of population density, development type, hierarchy, income level, and the economic sector must be taken into account to ensure urban resilience. Yet, as these variables will differ in each province, their effects will also vary. There is no optimum form for urban resilience. Thus, the issue of urban resilience should be handled in a multifaceted and multidimensional way. For Turkish cities, there is a need for a comprehensive urban policy agenda towards resilience.

CONFLICT INTEREST

No conflict of interest was declared by the authours.

FINANCIAL DISCLOSURE

The authors declared that this study has received no financial support.

ETHICS COMMITEE APPROVAL

Ethics committee approval was not required for this article.

LEGAL PUBLIC/PRIVATE PERMISSIONS

No survey and in-depth interviews, that require legal permissions, were conducted during this research.

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Data Mining the City: User Demands through Social Media

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Abstract

Purpose

Information technologies are commonly used in architectural and urban design. The use of these technologies providing support at every stage of the design opens up different perspectives for designers and users. The aim of the study is to obtain user demands for green spaces of a specific district by mining data through social media and to detect the actual green spaces of the same district using applications developed for this purpose. User demands for design decisions and applications of green spaces and the current situation of the study area are evaluated.

Design/Methodology/Approach

The research is firstly realized through social media, and data obtained from Twitter is analysed in order to evaluate user demands for parks and green spaces of Ataşehir district in İstanbul City. Secondly, all green areas in the same district are detected by using digital maps. Two applications are specifically designed for this research; Tweet Grabber is used for user sentiment analysis on social media and Map Grabber is processed for extraction of green spaces via maps. The total area of the green spaces is compared with the desired area of open and green spaces per user.

Findings

The user demands and thoughts obtained in the study about the green spaces of the district are compatible with the actual situation of green spaces. It is observed that the users are mostly dissatisfied with the adequacy of green spaces. Designers, politicians, municipalities and all stakeholders can benefit from the obtained user expectations and feedback. Interpreting user demands by mining data through social media enables user participation in design decisions. This research method can be supportive and adaptive in related issues of design for the cities, enabling user participation in architectural and urban design.

Research Limitations/Implications

Parks and green spaces of Ataşehir district of İstanbul are taken as a case study. Twitter is chosen for mining of data in social media based on parameters such as keywords and location.

Social/Practical Implications

The impact and support of users in design decisions can be clearly demonstrated by advanced information technologies. Mining data through social media and developed applications will contribute to design decisions and policies for architectural and urban spaces.

Originality/Value

Tweet Grabber and Map Grabber applications are developed for this research in order to get text based and image based data. The research includes a unique case study for mining data through social media on a specific design issue and target location.

Keywords: *Architecture, city, data mining, design, social media.*

INTRODUCTION

Dissemination of information is faster and more effective today than in the past decades. More data can be accessed more quickly in each business sector. Obtaining and interpreting user data in design issues have been carried out with traditional methods for centuries. Nowadays, the process of obtaining and evaluating this data is changing with the opportunities provided by the rapidly increasing acceleration of information technologies. Studies using data mining method have started to play a critical role in identifying different problems in design issues and developing solutions under this topic. The use of user sentiment analysis and map processing techniques has been revealed to allow a researcher in design field to process data that is far too big for manual processing. The analysis of urban data helps to get information about the city and opinions of the citizens for planning and decision making (Psyllidis et al., 2015). Resch et al. (2016) carried out a study on evaluating emotions of the citizens by analysing data from social media and they conclude that extracting emotions from social media can remark planning aspects of cities; and the emotions, thoughts and expectations about the city detected by tweets can be utilized in urban planning process. Technology enables the citizen participation in public planning projects through the medium of Web (Brabham, 2009). Tasse and Hong (2014) inform in their study that social media data can help planners for future projects, can be useful for measuring the pulse of residents and for their integration to new cities. Salesses et al. (2013) indicating that available data for urban perception is limited, used a method in their study based on online image ratings to quantify how users perceive the cities. They pointed at the future development of different techniques to explore how urban issues are perceived. As Seltzer and Mahmoudi (2013) inform in their study, citizen involvement is the result of multiple techniques in planning processes enabling to make better decisions for liveable communities with equal opportunities.

In this study, it is pointed out that access to user demands, criticisms and suggestions in architecture and urban design can be realized through social media. The data obtained by data mining method from a district is evaluated in this research. The study is proposed to support user-oriented design in urban environment. In the research, Istanbul was selected as central province and Ataşehir as an example district in order to reach user data. This study has been focused on the determination of the current status of public green areas and the user comments for these spaces. The research includes specially developed software that are used for mining data through social media and visual map analysis to collect citizen insights on planning decisions about green areas. In this study green space encompasses parks, gardens, forests and groves. The demands of the citizens about all green spaces on the determined location are evaluated. This study discusses how the methods designed for this research can be adapted to different research

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in the field of design. This kind of approach to similar research is unprecedented with its specific software deliberately developed for this case study and with the determined location.

DATA MINING IN ARCHITECTURAL AND URBAN DESIGN

The rapid development of information technologies brings about changes in building and urban scale. With the concept of smart buildings and smart cities, sustainable designs are handled in a user-oriented manner and studies are carried out to increase service quality and efficiency. The emergence of smart cities and big data concepts provide new potential platforms to resolve various urban diseases (Pan et al., 2016). The analysis of big data also provides predictions of urban life and allows alternative views for urban development by supporting everyday life and decision-making processes (Kitchin, 2014). There are research to determine the current status and identity of the city for efficient planning in urban development and correct operated design processes. Different scientific methods have been applied in these research. Chang et al. (2017) explored the different social areas of the city of Zurich, including parks, gardens, playgrounds and squares using data mining technologies. They pointed out that the interpretation of the available data with the methods they used could guide the designers in determining the urban identity characteristics for social areas. A similar study was carried out by Chang et al. (2018) for the city of Taipei where data mining technologies were used to determine both the socio-economic behaviors of users and the current status of social areas. Based on the results obtained, an urban design workshop was organized, and the views and comments of citizens in the urban design decisions were taken over the web platform and were incorporated in designs. Access to more responsive and liveable urban ideals has been provided with their study. In a study conducted by Valls et al. (2018), it was concluded that it is possible to obtain valuable data and information to determine the different uses and architectural requirements of urban space, but it is emphasized that this data may be challenging to retrieve, structure, analyze and visualize. As stated in the same research, social media applications can be used as a tool to evaluate user responses in public participation processes before final project, as well as obtaining data for the initial definition of the project and feedback after the completion. Münster et al. (2017) pointed out that the detailed planning process does not constitute a guarantee for the broad acceptance of an envisioned urban project. Therefore, participation of inhabitants in urban planning processes, the digital environments and digitally supported approaches are important for this purpose. As it is mentioned in their research; social media is a virtual and two-way communication channel for user participation in urban planning.

Data mining and methods of use

The interpretation of a large number of data produced everyday can no longer be processed manually. Therefore, data mining has become a very necessary field of study. Data mining is very useful for analysing situations where the relationship between input and output is complex and/or when there is a large amount of data. Data mining is commonly characterized by volume, velocity, variety, veracity and value concepts (N. Khan et al., 2014; Yang et al., 2017; Zikopoulos et al., 2012). Volume that is the magnitude of large-scale datasets (Rao et al., 2018) increases every day and the size of the data set increases as well. Velocity refers to the speed of change in data as social media posts (Hashem et al., 2015). Various data is stored from many resources, and different types of data can be used for information. Big data can be structured, unstructured or semi-structured data. Veracity represents the quality of data as it is reliable and generated correctly. The data should be convenient for the purpose and be up to date. Many benefits can be obtained by analysing and processing the big data referring to its value characteristic (Elragal, 2014; Younas, 2019).

Data mining algorithms are generally divided into two categories: Classification and Clustering. Classification algorithms are useful in predicting the label of a data that will come without tag information by training in a dataset containing tag information. Clustering algorithms are used to divide the dataset by the number of selected clusters without any tag information in the dataset obtained. The aim of this process is to keep the distance of the clusters to each other to the maximum and to keep the distance between the elements in the cluster to a minimum. Both main methods have many sub-algorithms. Classification algorithms include artificial neural networks, Support Vector Machines (SVM), Decision Tree (Lessmann et al., 2015; Nguyen et al., 2014; Wong, 2015). All these algorithms generate a model by training a training set. The test data is fed to the model, and it is expected that the data will be classified correctly. Clustering algorithms include k-means, fuzzy c-means, density-based clustering algorithms (Allahyari et al., 2017).

The term data mining is commonly encountered in various sectors such as engineering, health, education, marketing and banking. The use of data mining is applied in order to process data having great importance in order to reach knowledge in the collected information. In our daily lives and in many sectors, the storage and analysis of the cumulating data becomes more difficult. However, the processing and interpretation of data becomes inevitable in the process of producing the required information. Data mining is broadly defined as the process of discovering interesting patterns and information from large amounts of data. These data sources can be databases, data warehouses, Web, other information repositories or data that is dynamically transferred to the system (Han et al., 2012). The ability to analyse data in the relevant field provides a significant advantage for those offering products and

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services in that sector. Therefore, in the field of architecture and urban design, various studies are held by using data mining approach. When the importance of user types, characteristics, needs and demands at the design stage is taken into consideration, the analysis of available data will be valuable in design processes. The studies will especially prove to be beneficial in public open spaces where social life is shaped and social habits and preferences emerge.

Mining of data through social media

Obtaining and interpreting data in a medium where users can express themselves, thoughts and feelings guides researchers and planners. The undeniable power and rise of social media have given importance to scientific studies in this field. Social media has become a platform where real-time user views are shared extensively. It also constitutes an important source for obtaining positive or negative perceptions and comments in many cases. User demands in cities are shaped by a wide variety of users.

The expansion of urban big data has an important role in the development of cities. Urban big data types are summarized under different topics. The type of data that includes examples such as social media, web usage, GPS, online social networks is called user-generated content (Thakuriah et al., 2017). Urban-scale research through social media is highly valuable in terms of access to large audiences. The positive contributions to decision-making processes in planning and design stages are emphasized in scientific research conducted through social media. In one example of these studies; Chen et al. (2017) used TripAdvisor social media application to examine how the city is perceived by tourists. Positive and negative comments were analysed and the issues that should be focused on planning and design in terms of parking problems were determined. They pointed out that further studies carried out via social media could include matters such as land use, transportation, open spaces, health, education and others. In another study conducted by Chen et al. (2016) for the city of Boston, data mining was carried out through different social media sources to uncover problems such as poorly or improperly used areas. Residents who share information about their environment through social media can complete or even change the information measured by physical sensors. Human perception provided by social media has the potential to support smart city initiatives (Doran et al., 2015). Mueller et al. (2018) define design feedback of the inhabitants as an essential way for a responsive city by integrating their ideas and wishes in design processes. Thus, citizen participation will contribute to transdisciplinary research studies. The intensive and widespread use of social media by the inhabitants can make it easier to obtain large-scale data on many different areas of the city. Planners and politicians can reach the opinions of the citizens on various issues about architectural and urban

design. On the other hand user participation has its challenges as there is always the risk of criticism.

METHODS

This research is based on two applications for the purpose of the study. Software called Tweet Grabber is developed to obtain a dataset of tweets from Ataşehir district in İstanbul containing keywords related to selected keywords and location. A selected algorithm is applied to detect comments about green spaces in the district by using the dataset based on user tweets. The green spaces in the district are calculated by the other developed software called Map Grabber. This software is used to detect all green areas automatically by using digital maps. The result of this detection is used to calculate the green spaces per inhabitant and to interpret the data obtained. In Figure 1, the data collection and processing methodology of the system are demonstrated.

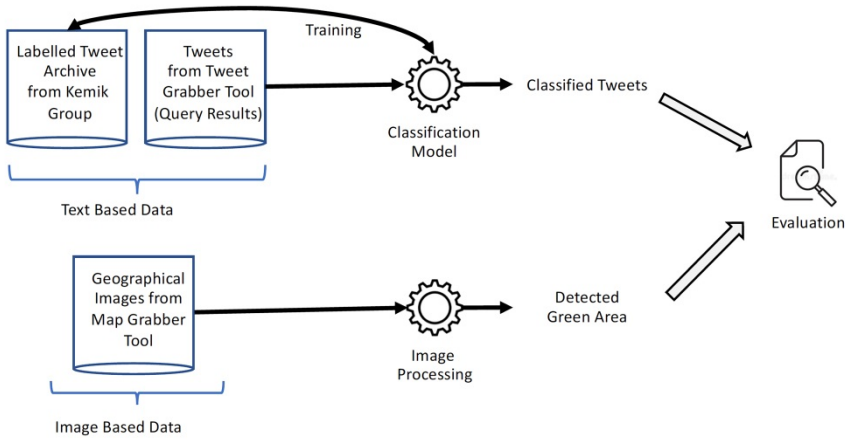

Figure 1. Data collection and processing methodology

The results of tweets classified in the study are compared with the status of the green areas detected within the district. It is aimed to determine how the existing green spaces and services are evaluated by the users, what their wishes and expectations are, and what their suggestions and needs are for future projects.

Data collection on social media

Data is needed to analyse people's emotions through social media. Twitter was selected in this study as the source of social media data. Twitter has a growing popularity for leading user generated content (Kotzias et al., 2016) and acts as a valuable method to gather user viewpoints (Hasib et al., 2021). Twitter enables interactions between the users and institutions and the feedback help organizations to improve their services or products as well (Salur & Aydin, 2020). It is possible to search and collect tweets with various keywords on Twitter. Twitter allows access to their data with some limitations through its API (Valls et al., 2018). However, performing this process manually may take some time. For this reason, software called Tweet Grabber has been

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developed that automatically saves tweets by searching with parameters such as keywords, location where the tweet was sent. A library called “tweetinvi” was used in the software infrastructure. There are similar studies in the literature (Chatterjee & Perrizo, 2015; Kobayashi et al., 2016). In order to use this library, it is necessary to take developer permission from Twitter and enter the developer ID codes given by Twitter into the library. The screenshot of the developed tool is given in Figure 2. This application is developed with C# language using the Tweet capture API provided by Twitter. With the developed interface, various parameters can be received from the user and fed to the Twitter API. Twitter has query limits because the Twitter API provides tweet capture. Within these limits (300 Tweets in 15 Minutes), multiple queries were made at different times to create the necessary tweet database.

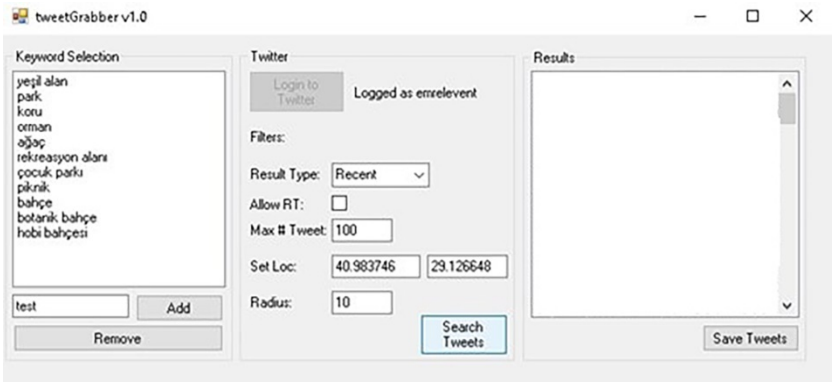

Figure 2. Tweet Grabber application

Since the study was in Turkey/İstanbul/Ataşehir location, Turkish keywords were used to search data to be received via Twitter. The keywords used are given below.

- Green Area (Yeşil Alan)
- Park (Park)
- Grove (Koru)
- Forest (Orman)
- Tree (Ağaç)
- Recreation Area (Rekreasyon Alanı)
- Child Park (Çocuk Parkı)
- Picnic (Piknik)
- Garden (Bahçe)
- Botanic Garden (Botanik Bahçe)
- Hobby Garden (Hobi Bahçesi)

The software collects keywords by scanning them on Twitter. At the end of the process, related tweets were collected in a text file.

Finally, the tweet archive prepared by the “Kemik” study group at Yıldız Technical University was taken to be used as training data in the sentiment analysis (Amasyali et al., 2018). In this database, there are tweets containing the name of a commercial company from Turkey the

database of which has been labelled by the Kemik research group. This archive contains approximately 17k tweets and tag information for each tweet. The labels that were used were positive, neutral and negative.

Map extraction

Detecting green areas in urban space is an important problem. This process can be done in several ways. The first is to obtain the data of the relevant municipalities. The second can be manually identified green areas through maps. Finally, the maps can be loaded into an application, and green areas can be detected automatically.

There are many studies in the literature for automated green field detection. These are studies made with satellite map images. These studies basically take the images of online map providers such as Google Maps, Google Earth and OpenStreetMap and process them with various image processing techniques such as vegetation extraction, green area detection and water resource detection. Google and OpenStreetMap allow data to be retrieved and processed from their maps as long as the data is not used for commercial purposes (Google, 2021; OpenStreetMap, 2021). OpenStreetMap contains vectors; however, it is not possible to mark each green area separately. For example, a green area in the garden of an apartment will not be identified. In this respect, the system success performance of working with marked vectors will decrease. In a study with images taken from Google Earth (Almeer, 2012), vegetation extraction is performed using the Back Propagation Neural Network algorithm. Pre-recorded images are fed to the algorithm for training, so that the vegetation is learned. It works successfully in places such as deserts, cities and highways. In another study conducted on Google Maps (Hegadi & Sangolli, 2011) segmentation was made according to colour characteristics; for example a coastal view distinguishes between sea and green fields. In the study by using the deep convolution neural network algorithm (Kaiser et al., 2017), it is possible to distinguish buildings and streets on maps obtained through OpenStreetMap. In the study of street level foliage analysis (Li et al., 2015), street images were obtained via Google Street View. The green areas were determined according to the colour filtering on the street pictures taken.

In this study, the Map Grabber software is developed in C# like the Tweet Grabber software. The purpose of this software is to detect all green areas in Ataşehir district borders. For this purpose, firstly all the borders of Ataşehir location were drawn as a polygon. With the developed software, all maps in the given borders were collected. Figure 3 shows the software from which the maps were obtained. As a result of this process there were 124 map images in total.

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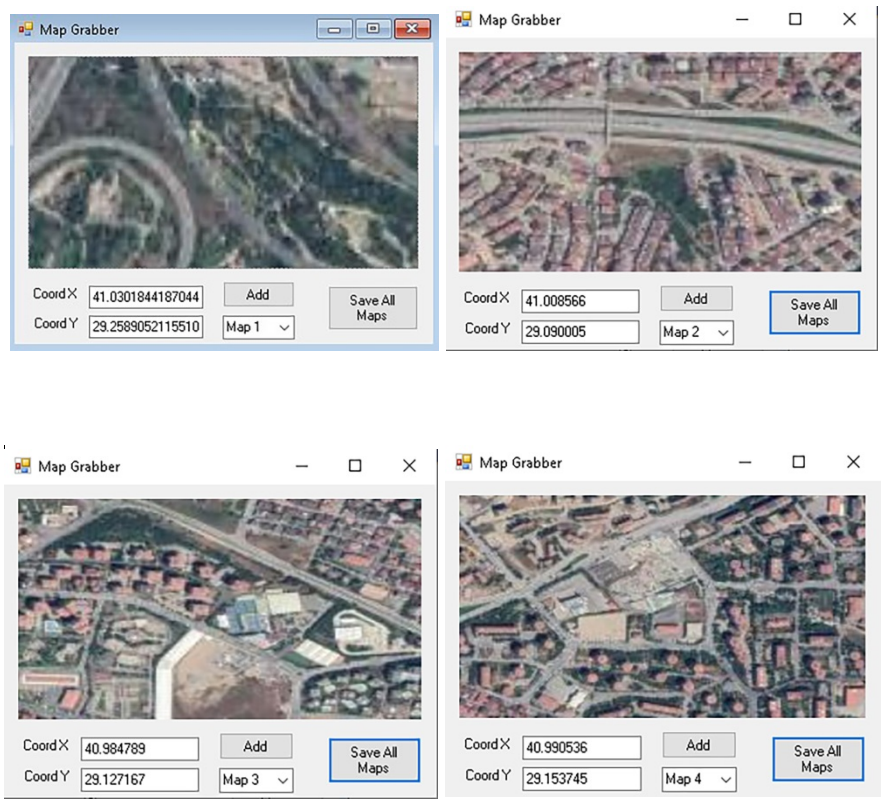

Figure 3. Map Grabber application

Sentiment and map analysis methods

Sentiment analysis method is one of several methods used to draw meaningful results from the data obtained through social media in order to improve product and service quality. A study was carried out to analyse emotions and classify them in categories of news, politics and culture by using Bayesian classification algorithm (Baykara & Gürtürk, 2017; A. Khan et al., 2015; Pang & Lee, 2008; Santos & Gatti, 2014). In another study, word, semantic and character-based analysis was conducted for Turkish sentiment analysis (Amasyali et al., 2018).

In this study, a data set was created by searching related keywords on Twitter. Each of the elements in this dataset should be classified as positive, negative or neutral. A tweet archive of approximately 17k was used for the training process, previously tagged by other researchers (Amasyali et al., 2018). There are 4500 positive, 6800 negative and 5800 neutral tweets in the dataset used.

Six different approaches have been applied for the classification of the dataset. These approaches are listed below:

- Bag of Words (BoW): A matrix is created for all words in all documents. For each document, the number of words (TF) is recorded. It is then normalized with the reverse document frequency (TF-IDF). The extracted values are classified by machine learning algorithms such as SVM. In literature (Joulin et al., 2016; Schmidt & Wiegand, 2017), this algorithm is being used for hate recognition and author classification has been conducted.

- N-Gram Bag: Indicates subtracting the repeat rate in a given sequence. N refers to the size of the sequence to be found in the text. A matrix is created based on the number of sequence sizes selected. The outputs are classified by a machine learning algorithm as in the Bag of Words method.
- Word Vectors: The approach groups synonymous words and for this, it tries to find a space where the coordinates of the words with close meaning are close. A tool called Fasttext provides ready-made training vectors. With these vectors, word vectors are obtained with training examples. With Word2vec technique, the words in the text are expressed as a vector. The sample to be tested is matched to the closest group by looking at the spatial distance.
- Long Short-Term Memory: In addition to whether the words are in the text or not, how words are arranged is also important. The sequence between words can be modelled with Long Short Term Memory algorithm.
- Character Based Convolution Neural Networks: Includes embedding characters instead of words. The dimensions of word vectors can be very large. However, character vectors are quite small compared to word vectors. The algorithm generates the results with CNN algorithm by hovering filters over the generated matrix.

"Character Based Convolutional Neural Networks CB (CB-CNN) algorithm was found to be a more successful classification method in the literature (Amasyali et al., 2018). With the selected (CB-CNN) algorithm, a model was created with 17k training data. The model created at this stage was classified by feeding tweets from Ataşehir location. After the sentiment analysis, the amount of green space has been extracted from the maps in order to compare with the current situation.

Map analysis is an important issue in green field extraction. Green areas were determined from the raw images taken. An example of raw image is shown in Figure 4.

Figure 4. Captured raw image

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The raw image is first converted from the RGB colour space to the LAB colour space. The image is then segmented by colour by using K-Means algorithm. In the resulting clusters, clusters with green tones are selected, the remaining clusters are coloured with black. The processed image is shown in Figure 5.

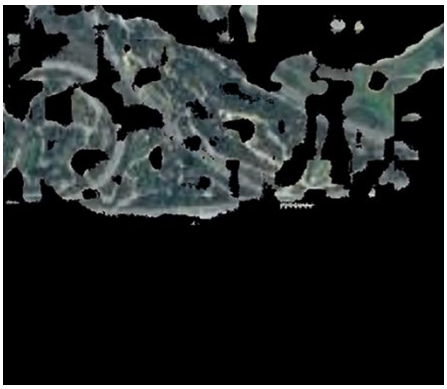

Figure 5. Processed image

The number of pixels remaining in the processed image indicates the amount of green space. Based on the distance view point on the map, the total area is calculated based on the amount of area each pixel represents.

RESEARCH FINDINGS

Current situation analysis

The green space in Ataşehir district was determined by using the image processing techniques. The total green area in the region is calculated to be 511k square meters. As reported by TUIK (Turkey Statistical Institute), Ataşehir district has a total population of 416,318 in 2018 (TUIK, 2019). The District Municipality is updating this total as 422,513. District area is totally 25.84 square kilometres (Ataşehir Municipality, 2020). The district appears as a region where construction activities and transportation density increase rapidly. The region is a developing part of the city with the potential demands of the residents.

It is stated that the children's playground, park, square, district sports area, botanical park, recreation area and recreation infrastructure areas should be at least 10 square meters per person according to the plans made by the Ministry of Environment and Urbanization within the borders of district under the title of Open and Green Areas. This size was determined as 5 square meters per person for plans within the city borders including infrastructure spaces such as zoo, urban forest, afforestation area, exhibition, fairground/festival area and hippodrome. The same minimum area sizes are specified in the population groups of 0-501.000 and over (Ministry of Environment and Urbanization, 2019). In this research, open and green space area for each person is found to be less than 2 square meters within the district. The ratio of open and green areas against the total district area is below 2%. This rate is far below the percentage of public green space in many world cities (e.g.

Amsterdam 13.0%, Cape Town 24.0%, London 33.0%, Hong Kong 40.0%) (World Cities Culture Forum, 2019).

Interpretation of Research Data

In the study, the tweets of the users from Ataşehir district about the current status of green spaces were classified and fed to the model. There are 2969 tweets that are fed to the model. 72% of these tweets were negative, 18% positive and 10% neutral (Figure 6).

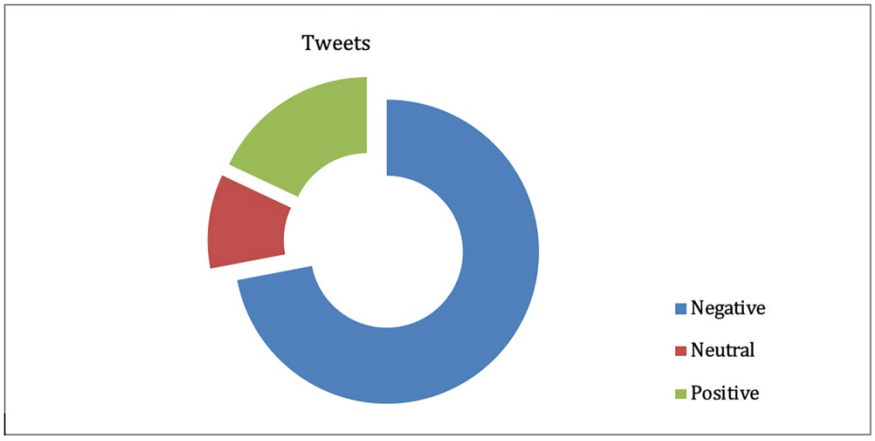

Figure 6. Interpretation of tweets

The frequencies of words in tweets are summarized in two groups. In the first group, there are keywords used for searching data (Table 1) and in the second group the most used adjectives, pronouns, punctuations and other items are listed (Table 2).

Table 1. Frequency of keywords in tweets

No	Word	Frequency
1	picnic	534
2	park	475
3	area	416
4	green	402
5	garden	399
6	grove	384
7	tree	296
8	child	166
9	forest	142

Almost all searched keywords were encountered in tweets. The words "picnic", "park" and "green/area" were mostly used by the residents. A significant majority mentioned the concepts of "garden", "grove" and "tree." In the second group, it is remarkable that exclamation and question marks are frequently used in the statements examined. It is observed that users are very responsive and questioning about parks and green areas. Words such as "a/one", "none", "more", "much/many", "but" exist widely in tweets. Users provided remarkable explanations and warnings about green areas within the district.

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User opinions about green areas are predominantly negative with a large quantity of 72%. In negative tweets, it is emphasized that green spaces are not cared enough, construction facilities are constantly increasing and conscious urbanization is not taken into consideration. Many tweets indicate that the green areas are inadequate and poor; requests for improvement are conveyed and criticism is included in planning and goal setting issues. Users with negative opinions have a critical approach to review environmental and urban planning policies. The needs for parks and green spaces are also expressed consistently. The residents state in many tweets that while urbanization increase in the form of concrete construction, green areas are gradually decreasing. They criticized the authorities for failing to take precautions in some cases. Users complained about the lack of parks and green spaces in many locations.

Table 2. Frequency of other items in tweets

No	Word	Frequency
1	a/one	792
2	and	455
3	!	439
4	?	420
5	this	374
6	you	222
7	what	213
8	for	190
9	none	166
10	more	138
11	much/many	137
12	every	129
13	but	119
14	beside	102
15	with	96

When the content of positive tweets (18%) in the research is evaluated, it is found that individual areas and landscapes, some of the park samples and green space projects are appreciated. Some of the users told their personal opinions about sample projects and reported their likes. There are no positive opinions or notifications on green space adequacy, number of parks and the investment/planning policies throughout the district.

The tweets reviewed contain only 10% neutral comments and opinions by users for the current situation. These users shared their opinions on social media under the title of green spaces, but no positive or negative opinions were found related to the study. However, the majority of neutral interpretations have wishes for the extension of green areas and parks. Although they do not contain negative expressions, those tweets highlight the sensitivity of the users about green spaces in the district. In

Table 3 there are sample tweets of the research which are fed to the model.

Table 3. Sample of tweets by categories

Positive	Botanic garden in Ataşehir…
	The green area is wonderful.
	We dream of botanical garden.
	The best park-garden I have ever seen.
Neutral	We wish green space and parking area.
	They can tear it down and make a great playground.
	A bright future for tomorrow ?? what should you leave to future generations. How about a curse or a prayer? Desert land or green area/forest.
Negative	We want green space, car parking and swimming pool, don't want high-rise buildings that cause traffic congestion.
	Green area is not visible.
	Illegal parking, the lack of green space, the store products on the sidewalk and uniformity problem of colour and/or form in concrete work creates a terrible image.
	The green area was occupied.

User opinions and demands were found to be compatible with the current park and green spaces situation of the district. The percentage of negative comments points to improper situations in planning and design. Since the size of the green area of the district is not at the level of the targeted standards, user dissatisfaction has increased. Users chose to share their expectations and criticisms for public and green spaces through Twitter application with other residents, local administrators and politicians. This dissatisfaction was revealed by user sentiment analysis as a result of data mining. Green space design projects and samples which were appreciated in the district were shared through social media and similar practices were requested.

DISCUSSION AND CONCLUSION

In this study, the total area of green spaces of the district is detected as insufficient against the targeted standards by the map processing method developed for this research. By user sentiment analysis on social media application Twitter, it is concluded that the user thoughts and demands are compatible with this result. The users mostly (72%) have complaints and dissatisfaction about green spaces. The developed applications help to support and check both the text and image data at the same time. This study enables to mine demands and thoughts of the users about green spaces of the district and evaluate this data by matching it with the actual condition of green areas. The applications and the methodology will help to promote citizen participation in taking decisions and design issues about urban planning and architecture. City planners, designers, and politicians can benefit from the information obtained from users of the district regarding their needs and the

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inadequate green areas. In this study, a limited data set for processing and sample location is taken into consideration to evaluate. In future studies, social media can be used widely and locations can vary for other related research about urban issues such as water supplies or built environment.

Improving the spatial and urban quality of life will be realized through accurate and well planned designs. A sufficient planning infrastructure is required for the healthy use of all spaces, structures and environments by citizens. Successful designs should be able to meet user needs and demands within sustainability and accessibility requirements. The direct impact of green spaces on urban life and public health and their positive contribution to environmental quality will increase the daily living standards of users. In order to determine the characteristics of these items and to analyse them spatially, it is important to determine user satisfaction. Based on the analysis of different living spaces, it will be possible to reach planning and design ideas throughout the city. Evaluating the user demands before the design stage will be a guide for healthy planning. Reaching user opinions and suggestions about existing designs promotes the collaboration for city development. Social and political areas will benefit from the positive contribution of user participation in planning and design stages. By the result of this research; it has been pointed out that mining data through social media can be used as an effective tool for planning decisions in the field of design. User data can be obtained through current and advanced information technologies. Social media has become an important medium as it provides users cross-sections from their daily lives and mediates the rapid dissemination of information. As in this case study, user sentiment analysis helps making sense of thousands of tweets written on social media. It is also observed that image processing methods can be used to find vegetation on maps and to automate significant detection. Processing and interpreting this data in a proper way will bring new dimensions for design issues. The developing trend of social media in social life enables these studies to be carried out more widely and in detail.

Researchers from different disciplines will be able to contribute to design techniques by using data mining methods in architecture, urban modelling and planning. Analysing and interpreting design products, urban experiences and utilizing these experiences, thoughts, opinions and demands in new products and spatial designs will increase project success. Finding out how the products and designs presented to the users are perceived by them, how practical and real-life problems arise will generate useful feedback for all actors. Reaching the problems, needs and demands of the dwellers will become easier and more practical with these scientific research techniques. Perception and interpretation of the entire built environment and its products by users will be valuable for designers and politicians. It will be aimed to develop different support tools in terms of spatial planning and design. As in the

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case study, users have dissatisfaction with parks and green areas planning and design within the district. A participatory planning and design will bring positive results in design processes by taking into account the spatial suggestions and demands of the users. It will be possible to develop policies for architectural and urban spaces and to make long-term planning decisions by using user demands and feedback. The researchers can include these outcomes in decision-making processes of planning. The municipalities and designers can benefit from extraction process of user opinions.

CONFLICT OF INTEREST

No conflict of interest was declared by the authors.

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The authors declared that this study has received no financial support.

ETHICS COMMITTEE APPROVAL

Ethics committee approval was not required for this article.

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In this research, the necessary permissions were obtained from the relevant institutions and organizations during the study.

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Changes and Problems of Conservation in Ankara-Ulus Historical City Center: Koyunpazarı Slope and Atpazarı Square

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Abstract

Purpose

In this study, the settlement located in Koyunpazarı Slope and Hisar (Atpazarı) Square, which has an important position in the Atpazarı-Koyunpazarı-Samanpazarı area, which is the oldest part of the Ankara-Ulus Historical City Center, was examined in a way to include Çengelhan and Çukurhan. With this study, it is aimed to determine the changes and conservation problems in the field and to give direction to the changes planned for the future in the area.

Design/Methodology/Approach

Analysis and evaluation studies conducted in 1998 have been repeated in the mentioned area. Research and surveys have been conducted on the number of buildings in the area, the number of floors, the physical conditions of the buildings, the number of sub-units, types of activities, ownership status, frequency of purchasing goods, types of transportation, spatial competence, infrastructure competencies and future expectations of the working population.

Findings

As a result of these studies, the changes and problems occurred in the period from 1998 to 2020 have been determined. It has been observed that there are serious changes in the area due to cultural tourism, as in all over the world and in our country. The infrastructural deficiencies are the main problems identified in the area. Furthermore, it has been observed that the traffic problem has not been solved completely and also some buildings need repair.

Research Limitations/Implications

The fact that the field of study could not be expanded due to the application of the survey questions in the field of study in 1998 constitutes the limitations of this study.

Social/Practical Implications

With this study, it is aimed to draw attention to the conservation of the historical environment in Koyunpazarı Street and Atpazarı Square, which is an important point of the Ulus Historical City Center, and to create a social awareness about the preservation of the area in question.

Originality/Value

This study is significant as it discusses the conservation problems in one of the oldest areas of Ankara and aims to give direction to future changes in the field by formulating proposals for the solution of these problems.

Keywords: *Ankara, architectural heritage, Atpazarı Square, conservation, Koyunpazarı Slope*

INTRODUCTION

Tangible or intangible architectural heritage is historical sources that provide important information about the past of societies and must be absolutely preserved. Especially the conservation of the historical environment and areas that have become the symbol of the cities is extremely important in terms of the identity of the cities. The conservation of these environments is only possible by making them suitable for today's living conditions. To achieve this, it is necessary to make a detailed analysis of the mentioned structures and areas, to determine what and how to protect them, and to determine the principles of conservation by considering the needs of today's users.

According to the Ankara-Ulus Development Plan approved in 1989, Koyunpazarı Slope and Atpazarı Square which have been foreseen to be primarily rehabilitated have become the symbol of the city of Ankara due to its being the center of trade and shopping for hundreds of years and is a very important area in terms of the city's identity. This study includes the buildings facing Koyunpazarı Slope and Atpazarı Square, Çengelhan-Çukurhan and Ahi Elvan Mosque (Figure 1,2,3).

Figure 1. General view of Koyunpazarı Street (Karakuş, 2020)

Figure 2. View from Atpazarı Square towards Koyunpazarı Street and Çengelhan (Karakuş, 2020) (Urak,1998)

Within the scope of this article, several studies were reviewed in detail such as the study titled "Tarihi Çevre Koruma-Yenileme Çalışmalarında Kentsel Bölge Ölçeği: Ankara Kale Önü Koyunpazarı Yokuşu Koruma-Geliştirme Projesi Örneği" prepared by Ziya Utkutuğ and et al., "Ankara Şehir Merkez Gelişimi (14.-20. yy)" by Mehmet Tunçer, the study titled "XVI. Yüzyılda Osmanlı Devleti'nde Çarşı'nın Kent Hayatına Etkisi: Ankara Örneği" prepared by Ziya Dinç, the master's thesis titled "An Exploration Of Urban Soundscape in Ulus, Ankara" prepared by Nehir Bera Biçer, the study titled "The Impacts Of Perception Criteria On Aesthetic Response To Urban Streets: A Case Study in Downtown Ankara, Turkey" prepared by Ayşe Tekel, Aybike Ceylan Kızıltas and Sara Afshar, the study titled "Ankara Hanlar Bölgesi'nin Mekânsal Gelişimi ve Bugünkü Kullanıcı

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Profilinin Değerlendirilmesi" prepared by Zeynep Çakır, Güliz Bilgin ve Burcu Özüduru, the Doctoral Study "Ankara Çukur, Çengel ve Safran Han Örneklerinde Yeniden Kullanım Müdahalelerinin Koruma Açısından İrdelenmesi ve Bir Değerlendirme Yöntemi Önerisi" prepared by Serap Sevgi and the Doctoral Study "A Tale of Ulus Square: A Critical Assessment of Continuity, Transformation and Change in a Historic Public Open Space in Ankara" by Elif Sena Koçyiğit. It was observed that other studies mentioned other than the study prepared by Utkutuğ et al., which analyzed the situation of the area in the 1990s, did not focus on conservation problems of area. This study includes a detailed analysis and evaluation of conservation issues and solutions, focusing on changes

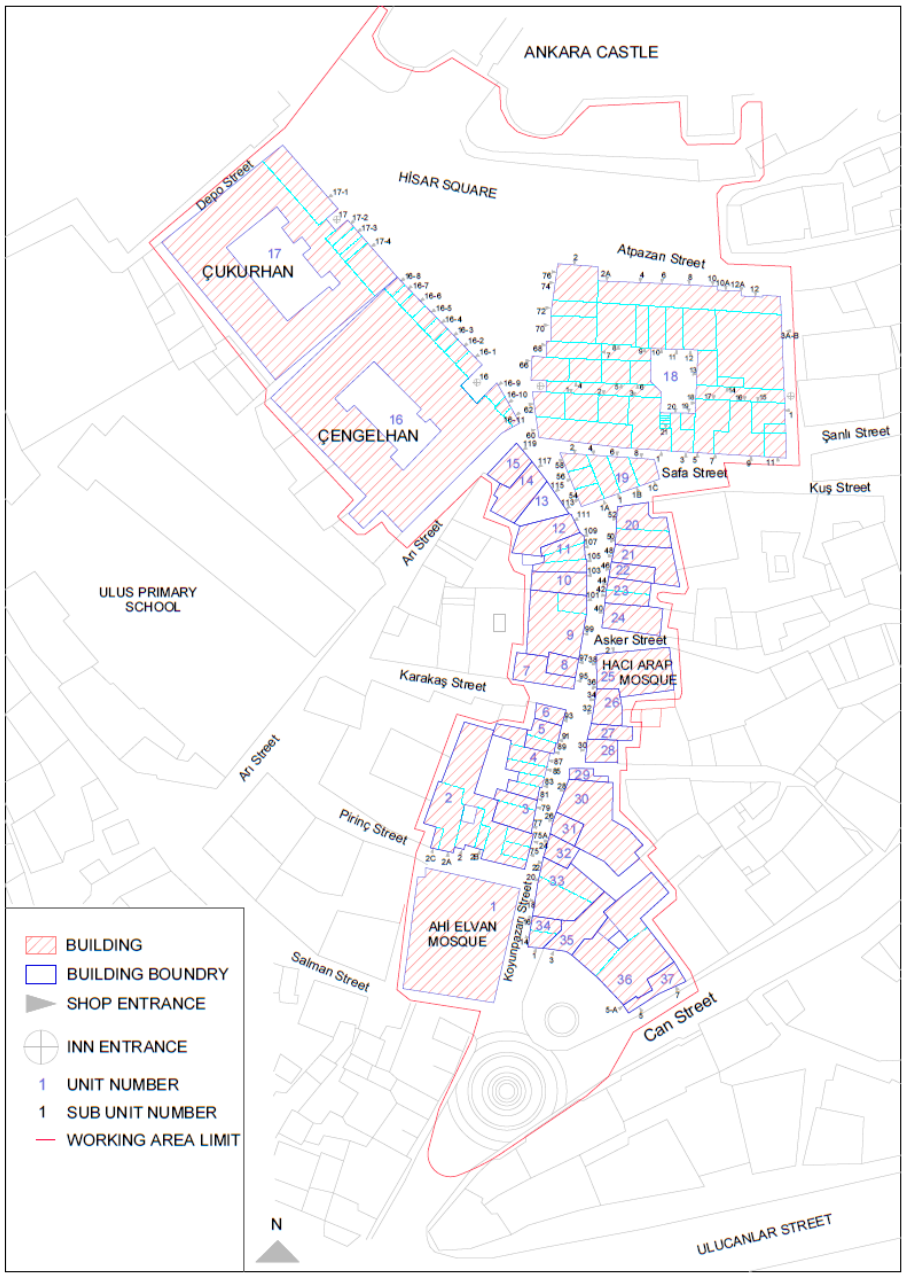

Figure 3. Analysis of addresses and borders (Karakuş, 2020)

seen in the field after the 1990s. In this way, it is considered to be important because it aims to fill a gap regarding the literature on Koyunpazarı Street and Atpazarı Square.

METHODOLOGY

In this study, literature and resource scanning was carried out primarily on the historical development of the field of study and the development of conservation in the world. The maps and plans of the area covering the 1998 study were re-examined on site, and updates on the structures were made on these plans. The data obtained in the field of study were obtained by determinations, surveys and observations from 37 main units and 100 subunits (each of the commercial units in a main structure) located in Koyunpazarı Slope and Atpazarı Square. In the surveys and observations, the number of structures, the number of floors and their physical condition, their use of space in subunits and the types of activities were emphasized. Surveys conducted in commercial units focused on socio-economic characteristics such as property structure, market and environmental relations, frequency of purchase of goods and types of transportation used, spatial competence, infrastructure adequacy and future expectations of the working population. For this purpose, the survey questions prepared for each commercial unit were carried out by face-to-face interview method. The surveys were then transferred to the computer environment and compared with the results obtained in the analysis and surveys conducted by Mrs. Z. Gediz Urak in the same field in 1998. In the intervening period, changes in the field were detected and the reasons for these changes were emphasized. It has been observed that there are significant changes in the type of activity in commercial units depending on cultural tourism as in the whole world and in our country. It has been observed that the old types of activity cannot be preserved in the area that has an important place in the commercial life of Ankara city in the past, and infrastructure problems cannot be solved and an integrated conservation approach cannot be put forward. In this study, solutions to the conservation problems identified were tried to be presented.

THEORETICAL FRAMEWORK

It is seen that the first efforts to protect were carried out for the protection of places of worship. Such protection activities were also frequently seen in Ancient Egypt and Mesopotamia (Erder, 1975), and interventions made at that time were carried out in order to maintain the existence of structures depending on their religious, symbolic, political roles and meanings rather than protection (Jokilehto, 1999). The preservation of ancient buildings during the Roman Empire, when the city was considered as a work of art as a whole, was one of the important issues (Erder, 1971). The effect of religion on conservation approaches did not always yield positive results. As a matter of fact, to spread

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Christianity faster, structures representing other religions were tried to be eliminated and there were significant destructions (Erder, 1975).

Since the 14th century, interest in monumental buildings and works of art from ancient times started to increase, and interventions to protect them became more conscious (Erder, 1975). Since the 16th century, the view was formed that art works and historical buildings were worth preserving because they were expressions of a culture or national identity (Jokilehto, 1999).

The idea of conservation, born in the 18th century in response to the destruction of the French Revolution, developed in France under the leadership of Eugene Emmanuel Viollet-le-Duc (Ashurst, 2007; Kuban, 2000). The romantic movement under the leadership of John Ruskin emerged against the stylistic method of recomposition (Ahunbay, 1996; Kuban, 2000). According to this current, no changes should be made to the building in the name of restoration. In England, William Morris supported this movement (Ahunbay, 1996). Opinions on restoration developed over time, and in the late 1800s, historical restoration and contemporary restoration movements were born. It is seen that the first legal studies for the protection of architectural monuments were carried out in the late 18th century and early 19th century, during which the concept of historical monuments emerged.

The Athens Charter, prepared after the conference in Athens in 1931, discussed the necessity of preserving monumental structures together with their surroundings and the need to use modern methods to repair them (Ahunbay, 1996; Binan, 1999; Erder, 1975; ICOMOS, 1931, Athens Charter). ICCROM (International Center for the Study of the Preservation and Restoration of Cultural Property) was established in 1959 under the leadership of UNESCO (Binan, 1999).

At the 1964 conference in Venice, indiscriminate and different interventions in historical buildings were criticized and the convention adopted the rule of respecting the traces of all periods. With the Venice Charter, the concept of monuments has been redefined and expanded from a single structure to include urban or rural settlements that witness a certain civilization and/or a significant development and a historical event (Ahunbay, 1996; Erder, 1975; ICOMOS, 1964, Venice Charter). ICOMOS (International Council on Monuments and Sites) was established in Warsaw in 1965.

1975 was declared as the year of European Architectural Heritage, and the European Architectural Heritage Charter was prepared in the same year. With these bylaws, the concept of architectural heritage has been replaced by the concept of historical environment. Important approaches such as the universal value of the historical environment, the integrated conservation approach that seeks to establish the right relations between conservation-economy and social structure, and the tools for its implementation are included (Mazı, 2009). With the Amsterdam Declaration prepared in the same year, it is stated that architectural heritage is in danger and the planning method that can prevent these

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dangers is integrated conservation (ICOMOS, 1975, Amsterdam Declaration).

The Burra Charter, which is used as a guide for the protection and management of cultural heritage sites, was adopted by Australian ICOMOS members in 1979. The charter set out the purpose of protection as the maintenance of the cultural value of the area and the consideration of its safety, care and future, and determined the ten principles of protection (ICOMOS Australia, 1999, Burra Charter).

In 1985, the Council of Europe adopted the Convention on the Protection of Architectural Heritage of Europe and emphasized that the cultural assets to be protected by this Convention should be remarkable in historical, archaeological, artistic, scientific, social and technical respects, and it was emphasized that cultural assets are a source of creativity for all mankind (Council of Europe, 1985).

Adopted by ICOMOS in Washington in 1987, the Regulation on the Protection of Historic Cities and Urban Areas sets out the principles, goals and methods for the protection of historical cities and areas. With this regulation, it is stated that socio-economic development should be ensured for the protection of historical cities and urban areas and that it is of great importance that urban policies work in integrity and that the participation of the city's people is a prerequisite for the success of conservation programs (ICOMOS, 1987, Washington Charter). With the Nara Certificate of Authenticity adopted after the Nara Originality Conference held in Nara, Japan, the idea that authenticity should be taken into account in the protection of cultural and architectural heritage in the world has been adopted (ICOMOS, 1994, Nara Certificate of Authenticity). As a result of developments such as the 2002 Budapest Declaration, the 2008 Quebec Congress on the Perception and Presentation of Cultural Heritage Sites, the Valetta Principles for the Protection and Management of Historic Cities and Urban Areas in 2011, the Functional Principles implementation Guide to the Implementation of the 2013 World Heritage Convention, and the 2014 Florence Declaration, the conservation approach has taken a contemporary place. In the process, people's approach to the concept of protection has changed on an individual and community scale and the importance given to protection has increased greatly around the world.

Apart from the developments in conservation, cultural tourism has been another issue affecting the historical environment and architectural heritage. Cultural tourism began to be considered a separate category of tourism in the late 1970s, with the realization by tourism marketers and researchers that some people were traveling to understand the culture or heritage of a region in more depth (Tighe, 1986). Cultural tourism was initially conceived as a private and niche activity, thought to be after a smaller number of better educated, wealthier tourists looking for something other than a standard sand, sun and sea holiday, but in the 1990s it was considered a high-profile and mass type of activity (Richards, 1996). Cultural tourism is a type of tourism activity where the

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main motivation of the visitor is to learn, discover, experience and consume cultural attractions and products that are tangible and not in a tourist destination (Richards, 2018). Tourists participating in cultural tourism aim to watch and participate in archaeological sites and museums, historical and cultural heritage, art galleries, festivals, sculptures, music and dance events, religious festivals (Richards, 2001; Küçükaltan et al., 2005). Artifacts and historical circles that bear traces of ancient lives are of great importance for cultural tourism as a result of being able to draw attention to them.

The marketing of cities and regions has become an important issue (Giritlioğlu & Avcıkurt, 2010), with the tourism sector, which was previously used only as a means of national development and supported in this direction, later becoming a supporter of local, regional and urban development (Tosun & Bilim, 2004). This situation has led to the emergence of activities aimed at ensuring that the touristic features of each region are presented by revealing them. In our country, cultural tourism studies have been carried out by relevant institutions and organizations in many cities and regions.

Visiting cultural assets by tourists can provide a variety of benefits to local people and governments. First of all, historical, cultural and natural areas are protected in this way. In addition, cultural or heritage tourism is very important for both locals and tourists to know about the history and culture of the region (Huh, 2002). The most important of the positive effects of tourism on cultural assets is the economic effects of local people, such as raising the level of life and creating new jobs. Economic development brings with it socio-cultural development. Increasing the public awareness of the local population also increases investments in conservation (Akgül, 2003).

On the cultural assets of tourism, it has negative effects such as overuse of tourists, commitment to tourism, tourist behavior, unregulated tourism infrastructures, loss of control over cultural features, physical deterioration of assets (McKercher & Cros, 2002). The growth of cultural tourism coincided with the acceptance by a wider society of the need to protect and preserve our diminishing cultural and heritage assets. As a result, cultural heritage management advocates have begun to publish policies to protect cultural values from inappropriate tourism uses (ICOMOS, 1976). It has been adopted by the International Cultural Heritage Charter that tourism should bring benefits to the host community, provide them with opportunities to preserve and maintain their cultural heritage and cultural traditions, and establish a sustainable tourism industry (ICOMOS,1999). The concept of sustainability, which gains importance in all areas of life, also gains importance in tourism. Sustainable tourism, which includes social responsibility, economic efficiency and ecological sensitivity at every stage, is defined as planning and carrying out tourism activities by ensuring the protection and continuity of all natural, cultural, ecological and biological resources in parallel with tourism developments (Beyhan & Ünügör, 2005). In

sustainable tourism, it constitutes the main goal of development by preserving future opportunities, meeting the needs of traditional settlements and existing tourists without destroying natural and cultural resources and putting the environment first (Avcıkurt, 1997).

HISTIRICAL DEVELOPMENT OF THE AREA

The establishment of the city of Ankara dates back to 4000 BC, and the city sometimes became a provincial center that lived in peace and was equipped with monuments, sometimes it gained importance as an important military garrison, a commercial and industrial city on the main roads, and sometimes it was inundated and destroyed by invasions (Bakırer & Madran, 1984).

Founded in Kırsehir in the 13th century by Nasırüddin Ahi Mahmut Evran and organized primarily by leather workers, the Ahi-order spread rapidly in Ankara. Leathering has taken a very important place in economic life due to the widespread livestock in the city (Kosay, 1935). In the same period, it is known that sof weaving has developed as well as leathering and Ankara “sof” (mohair) is known worldwide (Akdağ, 1974). During this period, the plain just outside the Citadel Gate of the castle[1] serves as a "marketplace", and in the following years, the inns built around this marketplace developed trade in the city together. Starting in the 14th century, the function of Ankara as a "border city" changed and began to gain the function of "commercial city" (Aktüre, 1984). In Ankara, it is seen that commercial activities are concentrated on the road connecting Atpazarı Square and the castle to the caravan roads outside the “Dışkale” gate (Tunçer, 2001).

[1] This plain is called Atpazarı Bazaar by Ziya Dinç, and it is written that there are shops composed mostly of peddlers and animal trading is also carried out.

It is seen that the important buildings built by the Ahi People in Ankara are concentrated in Atpazarı Square, the oldest center of the city (Figure 4) (Tunçer, 2001). The construction of these structures directly affected the development of the neighborhoods and trade center in the aforementioned area. During this period, it is known from various studies that “sof” (mohair) trade was carried out in Mahmut Pasha Bedesten (Covered Bazaar) (Bakırer & Madran, 1984), which was built in the late 15th century on the Abacılar Slope leading west from Atpazarı Square, and that numerous inns operated around Mahmut Pasha Bedesten (Aktüre, 1978; Bakırer & Madran, 1984; Aktüre, 2001). In the 16th century, Bedesten, the oldest parts of the castle and the city, the Khans District and part of the Long Bazaar were named “Yukarıyüz” (Figure 5), and the part under today's Anafartalar Street, which extends from Hacı Bayram Mosque to Karacabey Complex, was named “Aşağıyüz” (Tunçer, 2001; Bakırer & Madran, 1984). The center of “Yukarıyüz” is Atpazarı. In and around Atpazarı, Bedesten, along with Mahmut Pasha Inn, Uzunçarşı and the artisan bazaars and inns leading to it were located. The center of “Aşağıyüz” is Tahtakale (Kaledibi). Here, Hasan Pasha Inn and the surrounding bazaars and Haseki Mosque are two important elements (Ergenç, 1984). The area between Atpazarı and Koyunpazarı, where the Ahi Elvan Mosque, Hacı Arab Mosque and Ahi Şerafettin Mosque are

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located, has grown as an important religious center for the city and commercial activities have developed around the mosques in this religious center. Small-scale commercial activities consisted of peddling, blacksmithing, copper making and animal-related shopping, while large-scale commercial activities consisted of inn buildings where mohair trade was carried out (Biçer, 2019; Koçyiğit, 2018).

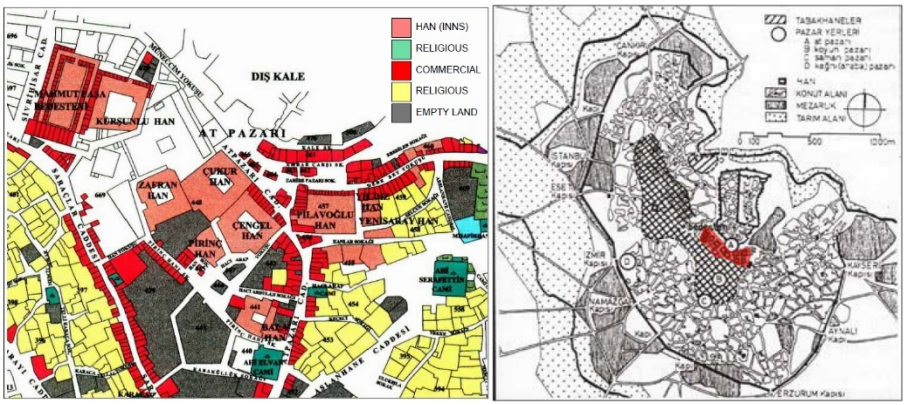

Figure 4. Ankara Khans Region is drawn in line with Ankara Cadastral Maps dated 1929 (Tunçer, 2001: 22)

Figure 5. Commercial center formed in the upper part of Ankara in the 16th and 18th centuries (Aktüre, 1978: 119)

Ankara has been rich in agriculture and animal products for a very long time and has been trading its own products (Bakırer & Madran, 1984). Especially in the 15th and 16th centuries, it became a vibrant art and commercial city that sold its agricultural products, and the "sof" fabrics it produced in the eastern and western markets (Bakırer & Madran, 1984; Ergenç, 1984). As in Ottoman-Turkish cities, live animals were traded in open markets in Ankara, and there were neighborhoods such as "Samanpazarı", "Odunpazarı", "Koyunpazarı", "Atpazarı" and "Balıkpazarı" (Tunçer, 2001).

In Ankara, which experienced its brightest period commercially in the 16th and 17th centuries, an economic collapse began due to the decline of production activities by the end of the 19th century and the city lost its status as a trade center (Aktüre, 2001). With the decline of lint exports in the 1850s, inn structures that had an important place in lint ("sof") trade and storage began to lose their function (Biçer, 2019; Tunçer, 2014). In the fire of 1916, Mahmut Pasha Bedesten and Atpazarı Square were greatly affected (Tunçer, 2014; Aktüre, 2001) and Atpazarı Square and its surroundings completely lost their importance to the city (Koçyiğit, 2018).

With the declaration of Ankara as the capital in 1923, the city regained its importance and began to reshape as planning activities accelerated (Çakır et al., 2019). In line with the Jansen Plan approved in 1932, various trade and production activities were carried in this direction with the relocation of ministry buildings to the Red Crescent (Kızılay) direction (Tankut, 1984). As a result of the gradual shift of the city center in Kızılay to the south, the region has undergone new transformations in approximately 15-year periods (Utkutuğ et al., 1993).

With the rapid population growth and intensive construction that emerged after Ankara became the capital, the Khans Region has become a neighborhood of the city. Although the area remains commercial, it remains in the poor part of the city. Due to the fact that it remains within the area shown as "Protocol Area" in the prepared zoning plans and is located outside the main road network, it has been preserved to a certain extent taking into account its cultural importance (Urak, 1999).

The Ankara Nazım Zoning Plan, which was started to be prepared by the Ankara Metropolitan Area Zoning Planning Bureau in 1973, was approved and entered into force in 1982. In this plan, it was decided to develop the Central Business Areas towards the area called “Kazıkiçi Bostans” located west of Çankırı Street in order to ensure the protection and development of Ulus Historical City Center (Tunçer & Cengizkan, 1996). No implementation took place in the field until the National Zoning Plan was approved in 1989, the primary purpose of which was both the revival and physical renewal of the functional structure of the Nation, which left its basic functions to the Kızılay over time. One of the projects prepared in this direction was approved in 1991 by the Department of Architecture, Keklik Street and Environment Protection Development Project developed by the Department of Architecture of Middle East Technical University, and in 1991, the Koyunpazari Slope and Environment Protection Development Project prepared by the Department of Architecture of Gazi University Faculty of Engineering and Architecture were approved but could not be implemented (Urak, 1999). In the study conducted by Utkutuğ et al., they found that during each transformation process in the field, the sub-sociocultural groups that came to the region tended to change the physical environment in parallel with the new functions in line with the requirements. Especially traditional houses have lost their originality by losing their courtyards, dividing or receiving add-ons from the renovations carried out in this process (Utkutuğ et al., 1993).

While all of Çengelhan was registered on behalf of Ankara Metropolitan Municipality, the deed was canceled according to the law no. 7044 and registered on behalf of the General Directorate of Foundations in 1997, and the necessary expropriation procedures were carried out by the General Directorate of Foundations (Ankara Regional Directorate of Foundations Archive). With the decision of Ankara Council for the Protection of Cultural and Natural Assets dated 25/01/2002 and numbered 7741, survey projects, conservation, repair and re-functioning projects were approved with the decision dated 15/08/2003 and numbered 8715. In 2000, the inn was leased for 18 years as part of the Restore-Operate-Transfer tender made by the Ankara Regional Directorate of Foundations and has been functioning as Rahmi Koç Museum since 2005 (Figure 6) (Sevgi, 2020; Aksoy, 2010).

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Figure 6. Çengelhan after restoration (Karakuş, 2015)

Çukurhan was registered on behalf of the General Directorate of Foundations (Ankara Regional Directorate of Foundations Archive) as a result of the lawsuit to resolve the partnership, which started in 2003 and concluded in 2004. Çukurhan's survey projects were approved by the Decision of the Ankara Regional Council for the Protection of Cultural and Natural Assets dated 2/2/2007 and numbered 2089, while the restitution, restoration projects and reports were approved by the Ankara Renewal Area Cultural and Natural Assets Protection Regional Board on 11/05/2007 and numbered 24. Çukurhan's Restore-Operate-Transfer tender was held in 2006 by the Ankara Regional Directorate of Foundations and the inn has been leased for 29 years and has been used as a boutique hotel since 2010 (Figure 7) (Sevgi, 2020; Aksoy, 2010).

Figure 7. Çukurhan after restoration (Karakuş, 2017)

"Koyunpazari Street Rehabilitation Project" (Figure 8) prepared by Mimor Architecture Office was approved by the Ankara Renewal Area Regional Council for the Protection of Cultural and Natural Assets on 04/07/2008 and numbered 189. The "Can Street Rehabilitation Project" prepared by Altındağ Municipality was approved by the board decision dated 3/10/2007 and numbered 62. In line with the projects mentioned, the applications were completed in 2009.

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Figure 8. Koyunpazarı Street Rehabilitation Project, site plan and eastern view (Archive of Mimor Architecture Office)

The "Dışkale" (Outer Fortress) was tendered in 2011 in the form of 4 stages within the scope of Ankara Outer Castle and Inner Castle Street Rehabilitation Projects. Both the projects and applications of this stage have been completed. In The Inner Castle, stage 1 projects were completed and the application tender was held at the beginning of 2020. Projects are also in the tender stage for stage 2.

The Zoning Plan for The Protection of The Altındağ Renewal Area was canceled by the decision of the Council of Ministers on 21/01/2010 and numbered 2010/88. Therefore, the applications made in the area are carried out according to the Urban Site Transition Period Protection Principles. As for the new Conservation Development Plan works, there has been no progress yet.

SEQUENTIAL TIME SURVEY OF SPACE UTILIZATION IN KOYUNPAZARI SLOPE

Koyunpazarı Slope and Atpazarı Square are in an important position on the pedestrian road starting from Ulucanlar Street and Hergelen Square, reaching the Kale Gate from Kurşunlu Mosque- Ahi Elvan Mosque and Koyunpazarı Slope (Figure 9-10).

Koyunpazarı Slope joins with Can Street in the south and rises towards the north with a slope of about 7 percent. The structure and environmental character of Pirinç Street, Hanımlar Street, Karakaş Street, Asker Street, Kuş Street, Sefa Street and Arı Street, which is perpendicular to Koyunpazarı Street, are similar. However, the wide-floored and four-storey buildings at the end of these streets opening to Can Street disrupt the character of the environment (Urak, 1999).

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Figure 9. General view from Koyunpazarı Street (towards Ahi Elvan Mosque) (Karakuş, 2020; Urak, 1998)

Figure 10. View of Çukurhan and the Castle from Atpazarı Square (Karakuş,2020)

Although only the lower floors of the units 2, 19, 28 and 36, which were residential in 1998, were converted into shops at that time and the upper floors preserved their original character, in the examination carried out in 2020 it was seen that only the upper floor of the unit number 28 was used as a residence, but it was not used after the fire that occurred two years before in the upper floor. It has been determined that the accommodation function is continued on the upper floor of Bala Han number 2 (Figure 11), but the house part has been converted into a cafe. These structures constitute important focal points in the area. The building numbered 36 (Figure 12) also presents a beautiful view while approaching the Koyunpazarı Slope from Ulucanlar. Building no. 19 (Figure 12), which gives the most beautiful view while climbing from Koyunpazarı Slope to Atpazarı Square, is structurally in a very bad condition, and the teahouse on the upper floor could not maintain its function and has turned into a warehouse.

Ahi Elvan Mosque on Koyunpazarı Slope, Hacı Arap Mosque (Figure 13) and Pilavoğluhan, Çukurhan and Çengelhan facing the Atpazarı Square are historical buildings of monumental scale. The fountains in Atpazarı Square and Koyunpazarı Square are valuable environmental elements of these squares.

In a study conducted by Ayşe Tekel, Aybike Ceylan Kızıltaş and Sara Afrher, a test was applied to a certain number of participants to determine whether there was a difference between participants' aesthetic reactions to Ankara's three streets with different characteristics. According to this test, it was seen that the traditional "Koyunpazarı Street" was perceived more positively than other streets. Within the scope of the study, aesthetic reaction variables were found that made this street more positive. Accordingly, "Importance", "Order",

"Care", "Pleasure", "Arousal", "Rhyme", "Pattern" and "Harmonic Relations" were found to be the variables that most and positively affected the satisfaction of Koyunpazarı Street (Tekel et al., 2018). This study shows how impressive the area is still today.

Figure 11. Pirinç Street Number 2 (Bala Han) (Karakuş, 2020)

Figure 12. Building numbered 36 in Can Street and building numbered 19 in Koyunpazarı Street (Karakuş, 2020)

Figure 13. Ahi Elvan Mosque and Hacı Arap Mosque (Karakuş, 2020)

Among the 37 buildings shown in Figure 3 on the street where there is mostly commercial use, buildings 1 (Ahi Elvan Mosque), 2 (Balahan), 16 (Çengelhan), 17 (Çukurhan), 18 (Pilavoğlu Han), 19, 27 and 28 are registered. Within the scope of this study, as in the study conducted in 1998, Çengelhan and Çukurhan were separated from other buildings and evaluated within themselves.

The number of 37 building units on the street has not changed in the intervening twenty-two years. But, while the number of sub-units was 118 in 1998, 115 sub-units were identified in 2020. From these sub-units, numbers 5 and 5A on Can Street, numbers 18 and 20, 28 and 28A, 30 and 30A, 32 and 34, 75 and 75A, 83 and 85, 87 and 89, 99 and 101 on

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Koyunpazarı Street, 3A and 3B on Hanlar Street, number 76 on Koyunpazarı Street and number 2 in Atpazarı Street were combined and larger shops were created. Also, the numbers 9 and 10, numbers 17 and 18 in Pilavoğlu Han were combined, and the units numbered 1 and 2 were combined with the number 62. For this reason, the number of sub-units has decreased to 100. The number of sub-units in Çengelhan and Çukurhan, which was 15 in 1998, has been determined as 16 in 2020.

Within the scope of the study, participants were asked questions about the use of space and activity, property structure, occupational execution time, types of transportation used, frequency of purchase of goods, spatial competence, job preference, desire to live in the region, water, electricity, gas-natural gas, toilet, kitchen, sink, heating in commercial units and how the venues were heated.

Space Utilization and Types of Activities in the Area

In this area, which generally consists of one and two-storey buildings, 13 buildings (35.14%) are single-storey and 21 (56.76%) are two-storey. In the area, 2 buildings (5.41%) are three- storey and 1 building (2.70%) is four-storey (Figure 14). There was no change in the number of buildings between 1998-2020, but it was observed that the number of floors of three buildings increased by one. One floor was added to two of the single-storey buildings and one to one of the three-storey buildings.

When 2 mosques and 1 housing were removed from 118 sub-units identified in 1998, 19 (16.52%) of the remaining 115 sub-units were wholesale shops, 58 (50.43%) retail stores, 4 (3.48%) workshops, 10 (8.70%) hotels, restaurants, tea shops and barbers, 5 (4.35%) were warehouses and 19 (16.52%) could not be identified. When 2 mosques have been removed from 100 sub-units in 2020, 3 (3.06%) of the remaining 98 sub-units are wholesale shops, 33 (33.67%) are retail stores, 34 (34.69%) are retail shops with a workshop, 1 (1.02%) workshop, 10 (10.20%) hotels, restaurants, tea shops and barbers, 9 (9.18%) warehouses, 2 management units and washbasin, 6 (6.12%) of them are empty (Figure 15).

In 1998, 6 (40%) of the shops in Çengelhan and Çukurhan were retail shops, 3 (20%) were hotels, restaurants, tea shops and patisseries, while 6 (40%) were empty. In 2020, 10 (62.50%) are retail shops, 2 (12.50%) are a hotel and a patisserie, 1 (6.25%) is a museum and 3 (18.75%) are administrative units.

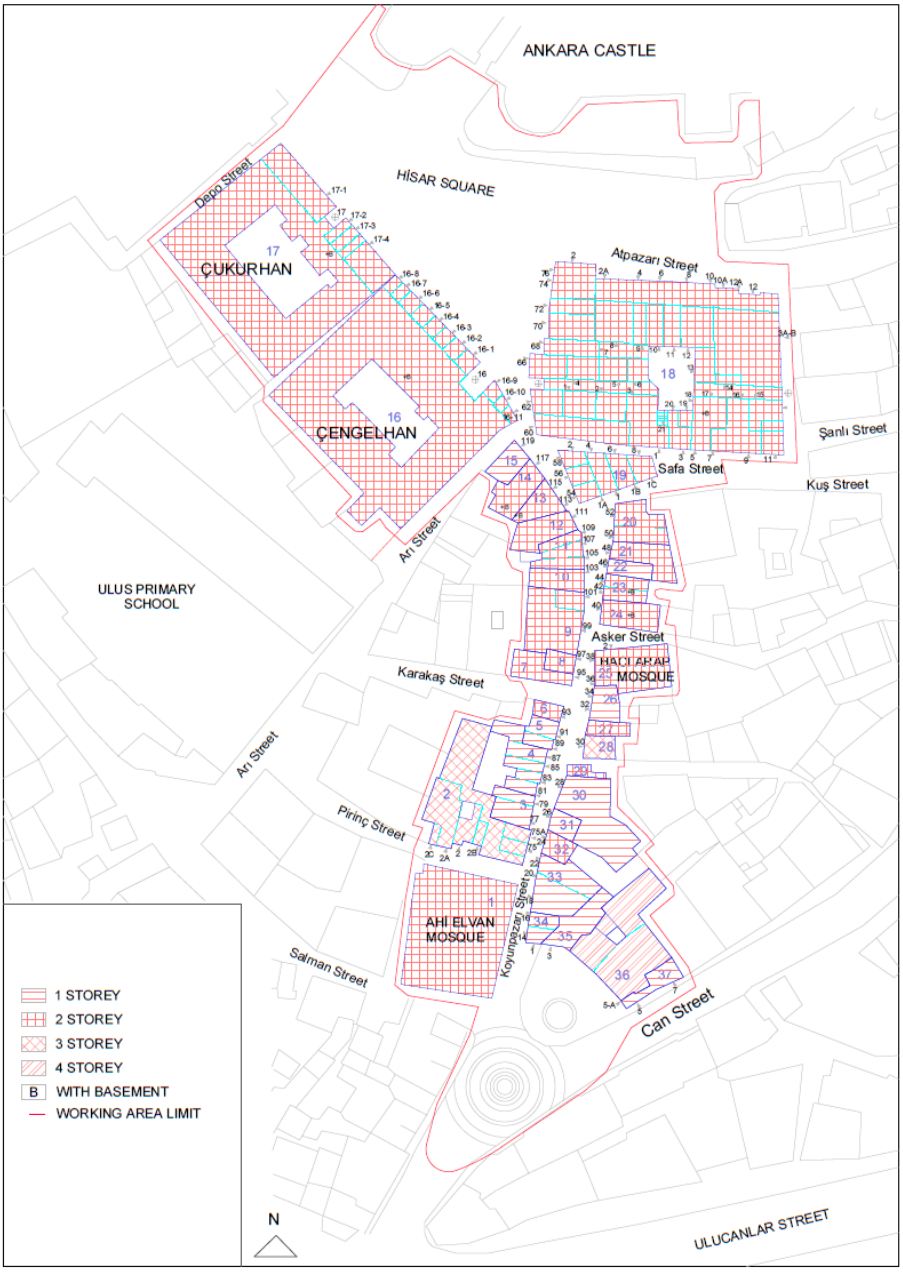

Figure 14. Analysis of number of floors (Karakuş, 2020)

Koyunpazarı Slope still maintains its feature of being a lively commercial street, although not as much as before. It has been observed that there have been serious changes in the types of activities in the area in the meantime (Figure 16-17). The number of saddlery (raw leather), which was 15 (12.71%) in 1998, dropped to zero in 2020. Thus, raw leather warehouses and truck transportation that threaten the building and human health have moved away from the region. The number of shops (29.66%) engaged in original activities in the area (basket shop, chest shop, hardware store, spice shop, etc.) decreased from 35 to 10 (10%). The number of haberdashery stores, drapery shops and wool shops has also decreased from 18 (15.25%) to 10 (10%). Among the newly emerged activities, the number of metal scrap dealers, framers, drum repairers, tent-umbrella manufacturing and wedding, henna material makers is 5

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(5%). Warehouses are now used for legumes, dried nuts and fruits, sacks and ready-made wool, and their number has increased from 6 (5.08%) to 9 (9%). The number of shops that are vacant or whose activities are not known in the area under investigation decreased from 12 (10.17) to 6 (6%). The most important change in the types of activities in the area is the giftware (tile, ceramic, etc.), jewelry design, silver, rosary, painting, artificial flower, mosaic and jewelry design workshops that were not available in 1998. The workshops that started to operate in Pilavoğlu Han have been a positive development for both the inn and Koyunpazarı Street. The number of gift shops and workshops operating in the area is 34 (34%) and 1 unit is used as an executive office and 1 unit is used as a WC in Pilavoğlu Inn.

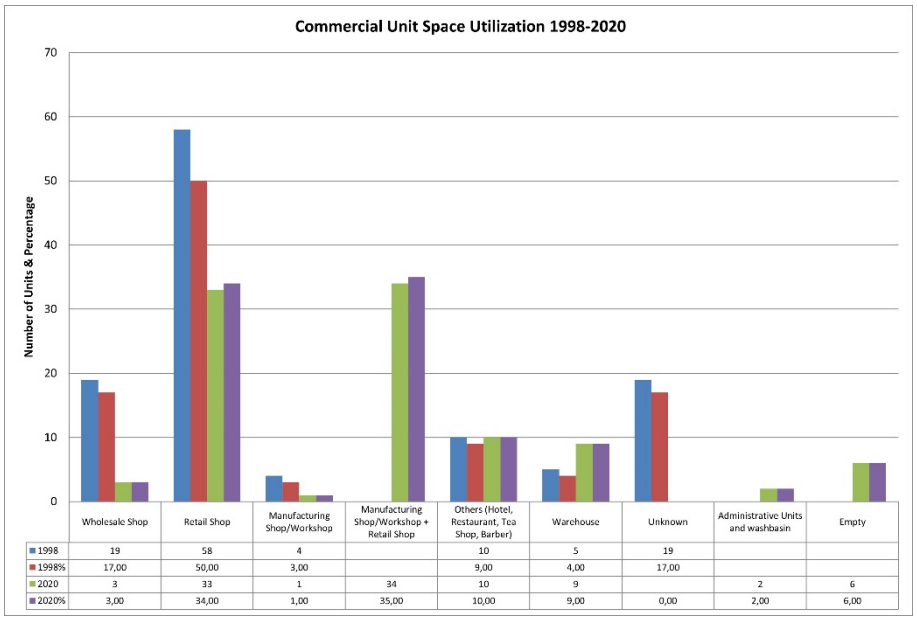

Figure 15. Commercial unit space utilization

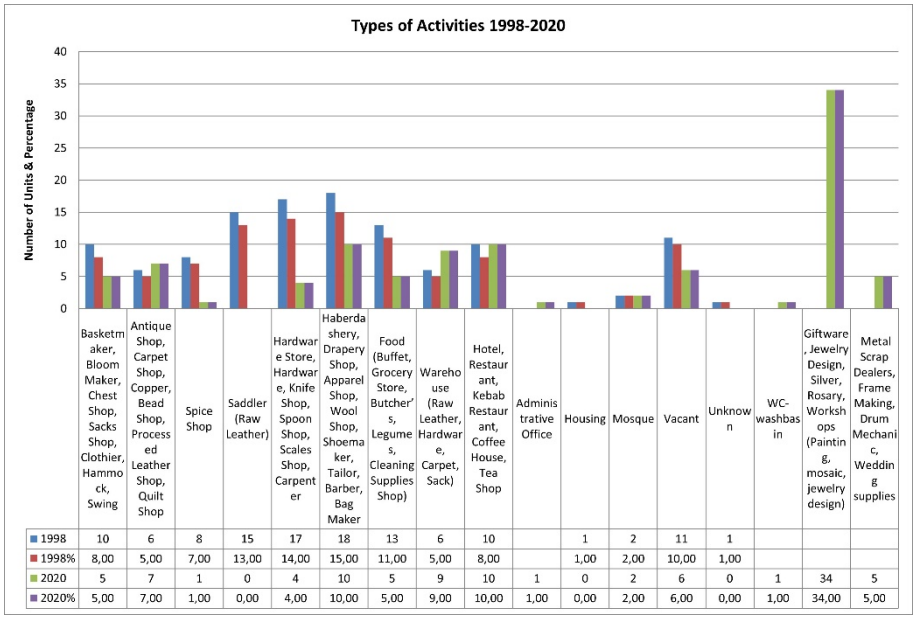

Figure 16. Types of activities in the area

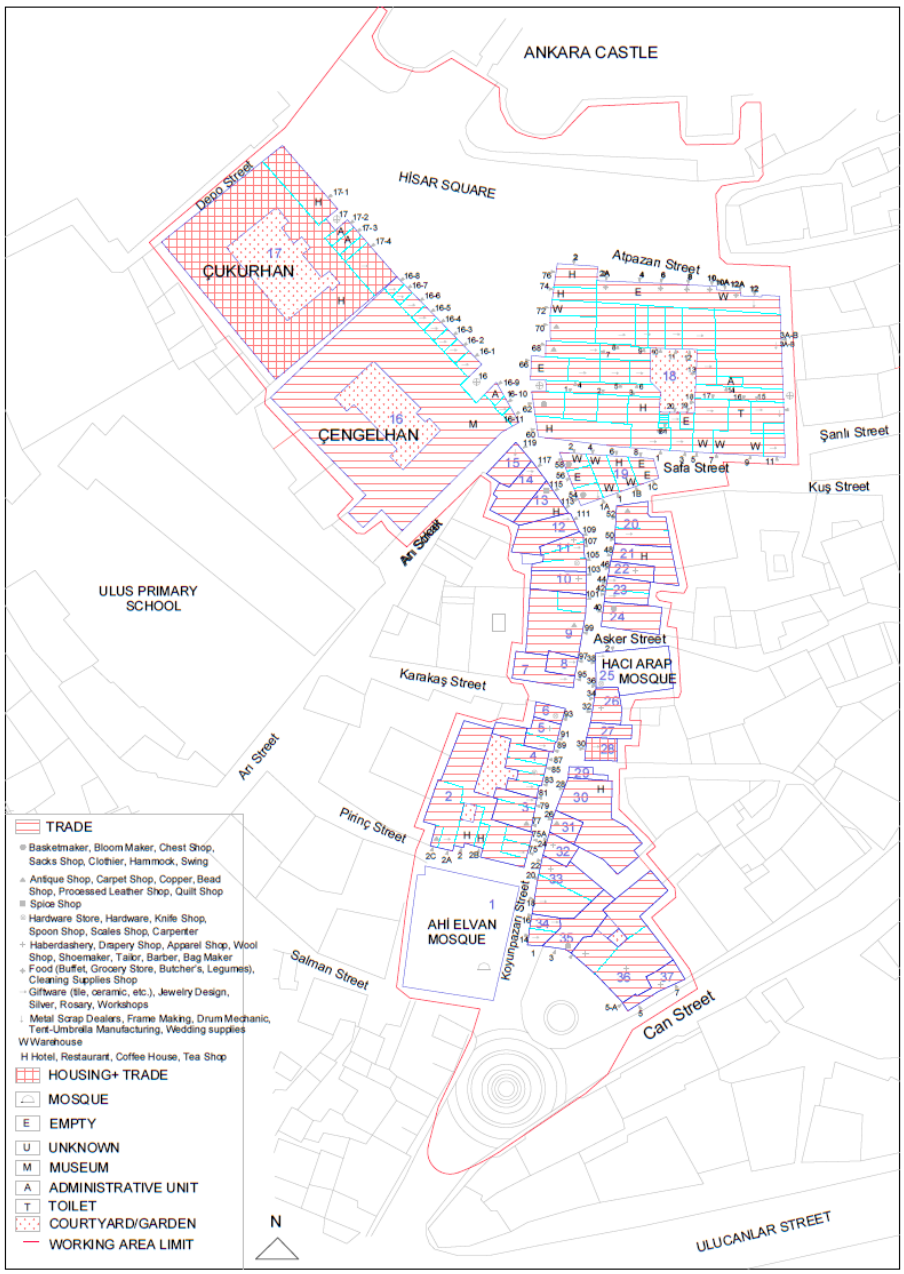

Figure 17. Analysis of space utilization-Types of Activities (Karakuş, 2020)

In Çengelhan and Çukurhan, the food and hardware functions were prevalent in 1998 however, we do not see these functions in 2020. When we look at the year 2020, the main function in Çengelhan is the museum and the hotel function in Çukurhan. In addition, there is also a patisserie-restaurant in Çukurhan. Apart from this, we see that 7 of the units (43.75%) are souvenirs, jewelery shops, 1 (6.25%) is a shop selling olive and olive products, 2 (12.50%) are shops selling paintings and ceramic objects and the other 3 units (18.75%) are used as museums and administrative offices belonging to the hotel.

Ownership Status in Commercial Units

Ownership status, market and environmental relations, infrastructure conditions, transportation and qualification conditions have been

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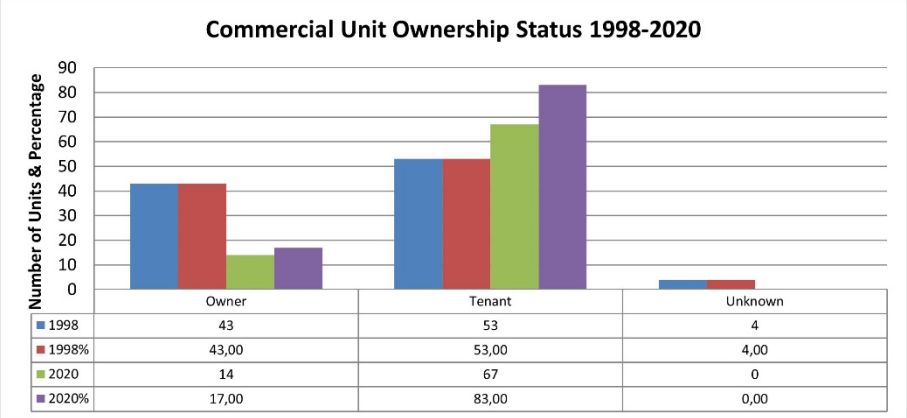
examined in 81 actively used sub-units (excluding empty and storage rooms). While 53% (53 sub-units) of the workplaces in Koyunpazarı Slope were tenants in 1998, the rate of tenants increased to 82.72% (67 sub-units) in 2020 and in the intervening period, the property ownership has dropped from 43% to 17.28% (14 sub-units) (Figure 18). In the period after 1998, all of Çengelhan and Çukurhan became the property of the General Directorate of Foundations and were put into use. The expropriation procedures in the parcels in front of Çengelhan were completed. The mentioned inns were rented for 49 years under the Restore-Operate-Transfer model. For this reason, all units in the inns are tenants. Likewise, in Pilavoğlu Han, all the shops in it have been rented by the owner.



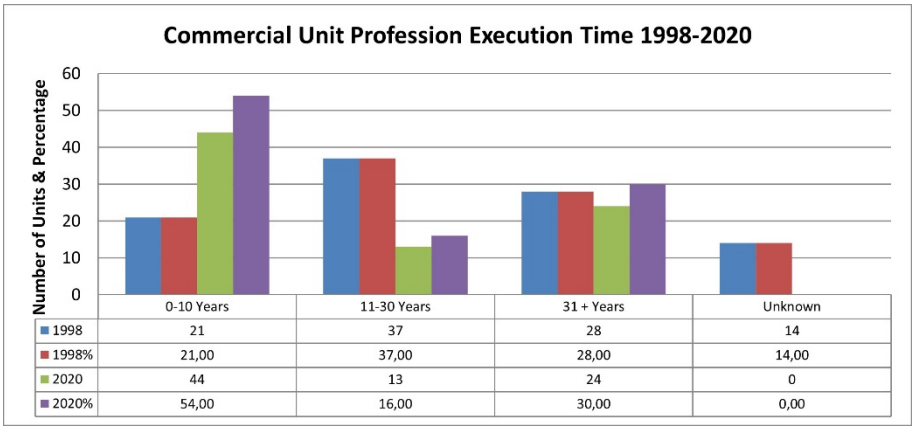
	Owner	Tenant	Unknown
1998	43	53	4
1998%	43,00	53,00	4,00
2020	14	67	0
2020%	17,00	83,00	0,00

Figure 18. Types of activities in the area

When the ownership status and activity types are compared, it is observed that the owners are mostly engaged in activities such as haberdashery, drapery, apparel, shoemaker and tailorship, secondly wicker basket maker and sack maker; it is understood that the tenants are mostly engaged in activities such as souvenirs (tiles, ceramics, etc.), jewelry design, silversmiths and rosaries. As a result of the policies followed in the area, it has been observed that the gastronomic and touristic goods trade activities for the tourist population have increased gradually. In Çengelhan, activities such as giftware, handicrafts, jewelry design are predominant in the shops outside the museum function of the main building. In Çukurhan, the most important function apart from the hotel function is the patisserie (Divan Patisserie) function. In addition, souvenirs are sold in 3 shops.

Looking at the profession execution time of the business owners in Koyunpazarı Slope, the rate of those who have been operating in the area for more than ten years has decreased from 65% (65 workplaces) to 45.68% (37 workplaces). The rate of those who have been operating for less than ten years has increased from 21% (21 workplaces) to 54.32% (44 workplaces) (Figure 19). When the profession execution time and the ownership status are compared, it has been determined that the owners who have been working for more than 30 years are more than the tenants, and the tenants who have been working for less than 10 years

are more than the owners. It has been observed that the tenants in Çengelhan have been operating since 2005, when the inn began to operate, and they have been operating in Çukurhan since 2010. The reason why there are no shops operating longer is that the inns have been completely emptied and rented out through restore-operate-transfer method.



	0-10 Years	11-30 Years	31 + Years	Unknown
1998	21	37	28	14
1998%	21,00	37,00	28,00	14,00
2020	44	13	24	0
2020%	54,00	16,00	30,00	0,00

Figure 19. Commercial Unit Profession Execution Time

Market and Environmental Relations and Types of Transportation in Commercial Units

When the relationships between the activities in the Koyunpazarı Slope and immediate vicinity and inner and outer parts of Ankara have been examined, it has been seen that there are no tradesmen buyers outside Ankara except for the tourists who come to buy the goods sold and produced in this area. Depending on the types of goods sold, local people and mostly local and foreign tourists stand out among the buyer groups.

In the intervening time, the rate of shipping the goods of workplaces located on Koyunpazarı Slope by truck decreased from 50% (50 workplaces) to 16.05% (13 workplaces). In parallel with this decrease, the rates of shipping by automobile and van have increased. 53.09% (43 units) of the workplaces transport their goods by automobile, 29.63% (24 units) transport their goods by van or cargo (Figure 20). This is due to the changes in the works and types of activities in the area. In addition, the decrease in the frequency of daily purchases from 13.00% to 9.88% (Figure 21) has reduced the negative effects of vehicles in the area. It has been determined that almost all (91.67%) of the shops in Çengelhan and Çukurhan bring their goods through cargo companies.

In Koyunpazarı Slope, the rate of business owners who find the space of their commercial units sufficient was 52% in 1998, while this rate is 79.01% in 2020 (Figure 22). This increase in the adequacy ratio has appeared due to the combination of sub-units and the decrease in the use of areas such as wholesalers and workshops. In Çukurhan and Çengelhan, the rate of those who find their space sufficient is 81.82%, and the rate of those who do not find it sufficient is 18 (18%).

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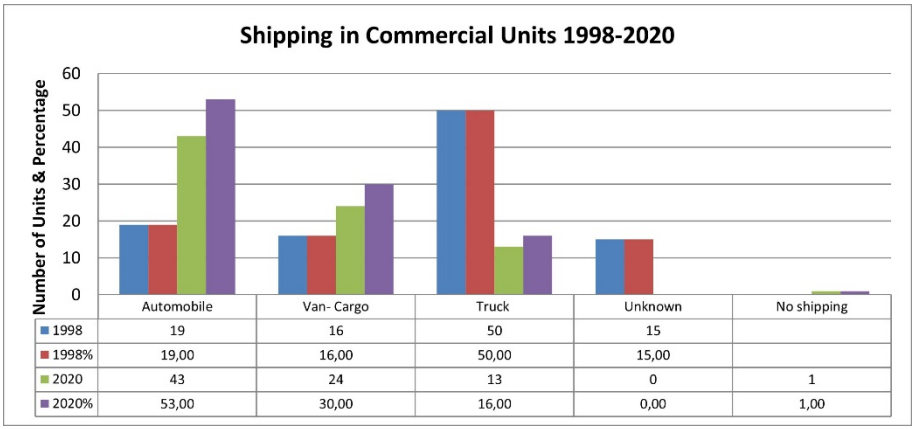
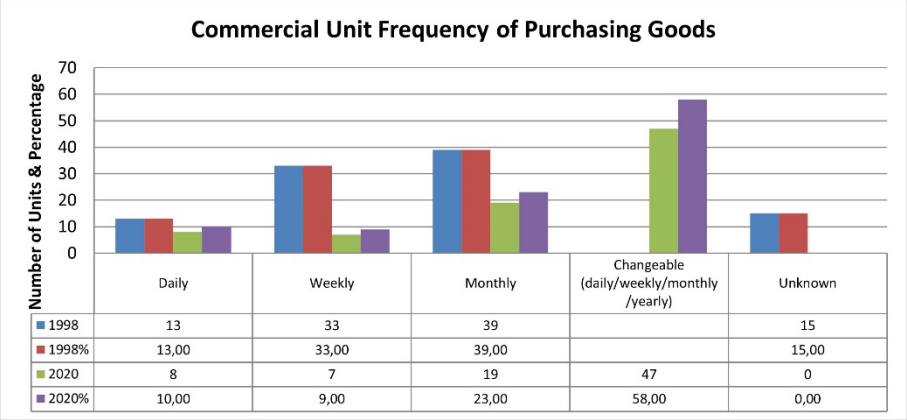


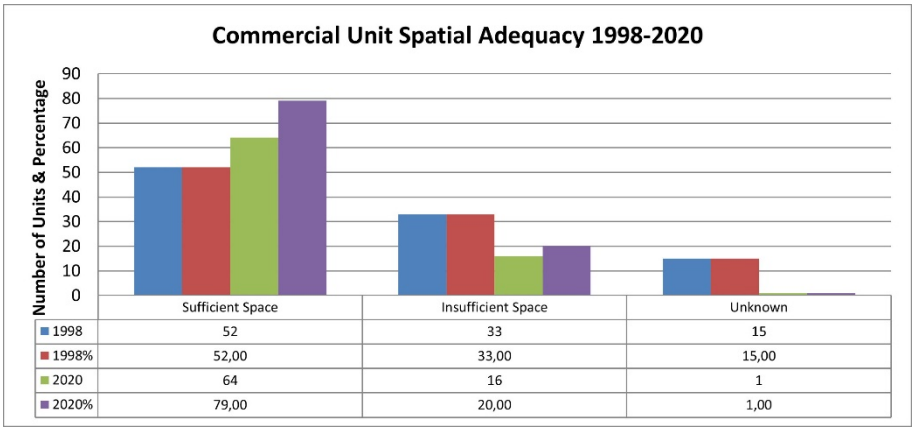
	Automobile	Van- Cargo	Truck	Unknown	No shipping
1998	19	16	50	15	
1998%	19,00	16,00	50,00	15,00	
2020	43	24	13	0	1
2020%	53,00	30,00	16,00	0,00	1,00

Figure 20. Shipping in Commercial Units



	Daily	Weekly	Monthly	Changeable (daily/weekly/monthly /yearly)	Unknown
1998	13	33	39		15
1998%	13,00	33,00	39,00		15,00
2020	8	7	19	47	0
2020%	10,00	9,00	23,00	58,00	0,00

Figure 21. Commercial Unit frequency of purchasing goods



	Sufficient Space	Insufficient Space	Unknown
1998	52	33	15
1998%	52,00	33,00	15,00
2020	64	16	1
2020%	79,00	20,00	1,00

Figure 22. Commercial Unit Spatial Adequacy

Those who want to continue their current activities in Koyunpazarı Slope (Figure 23) are in the majority with a ratio of 71.60% (58 workplaces). The reason why this rate decreased from 78% to 71.60% between 1998 and 2020 can be attributed to the fact that people find the products and materials they seek more comfortably in the shopping malls built recently. The rate of those who want to continue the same activity is the majority in Çengelhan (same type of activity 100%).

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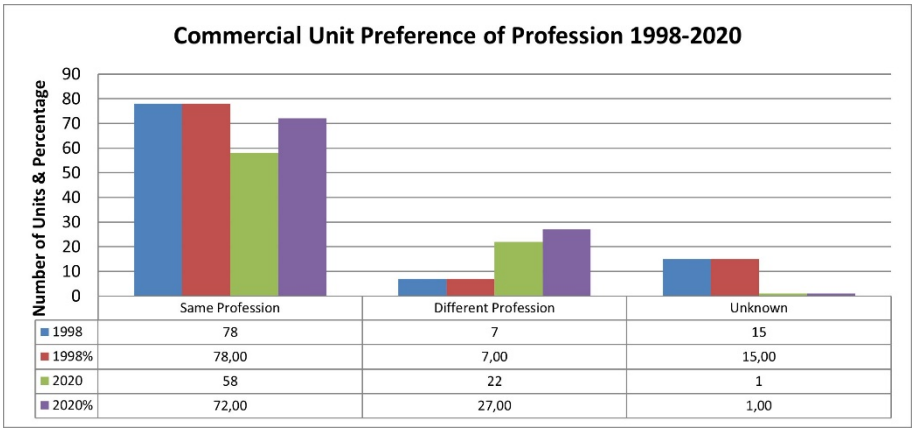
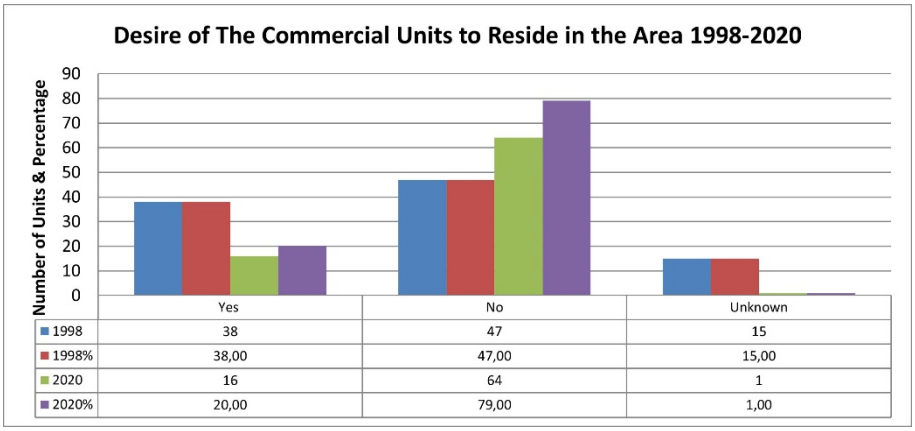


	Same Profession	Different Profession	Unknown
1998	78	7	15
1998%	78,00	7,00	15,00
2020	58	22	1
2020%	72,00	27,00	1,00

Figure 23. Commercial Unit Preference of Profession

The desire of the operators in Koyunpazarı Slope to reside in the region has decreased from 38% to 19.75% within twenty-two years (Figure 24). This rate has changed from 20% to 18.18% for the operators in Çengelhan. It is thought that this decrease in the rates is due to the decrease in the number of residences in the region, the changes in the number and quality of the visitors of the region and the desire of the operators to live in the more expensive districts of Ankara.



	Yes	No	Unknown
1998	38	47	15
1998%	38,00	47,00	15,00
2020	16	64	1
2020%	20,00	79,00	1,00

Figure 24. Desire of the commercial units to reside in the region

Physical Condition of Buildings and Infrastructure and Health Conditions in the Area

Considering the status of the buildings in the area, the percentage of buildings in good condition increased from 32.43% to 91.89% (Figure 25). Çengelhan and Çukurhan were repaired within the scope of the restore-operate-transfer tender held by the General Directorate of Foundations, Ahi Elvan Mosque was repaired in 2017, Hacı Arap Mosque was repaired in 2007 and Koyunpazarı Street Rehabilitation works were completed in 2009. However, Pilavoğlu Han and the building at the intersection of Koyunpazarı Street and Safa Street, two important buildings in the area, are still structurally in poor condition (Figure 26).

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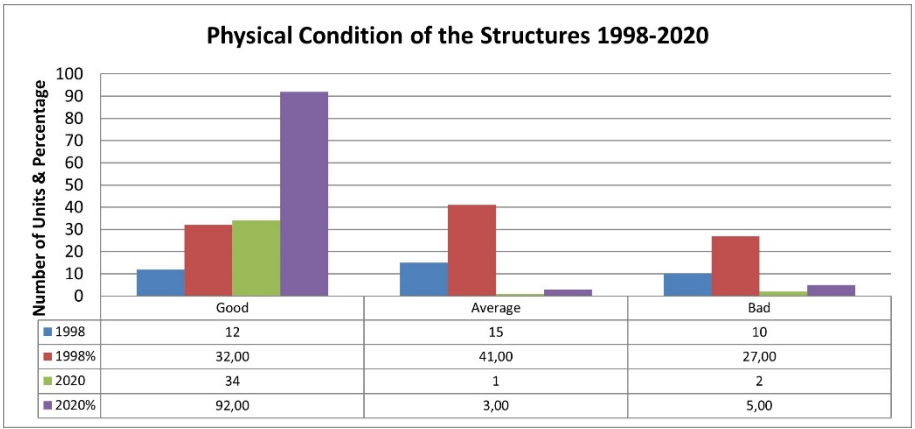

	Good	Average	Bad
1998	12	15	10
1998%	32,00	41,00	27,00
2020	34	1	2
2020%	92,00	3,00	5,00

Figure 25. Physical condition of the structures

Figure 26. Pilavoğlu Han and the building at the intersection of Koyunpazarı Street and Safa Street (Karakuş, 2020)

Infrastructure services that are directly related to health conditions such as water, electricity, natural gas, toilet, kitchen, washbasin and heating create a very negative picture in the work area. Although there is a sewerage connection in the area, only 23.46% of the units have water connection and the majority (75.31%) do not have a water connection. Toilets and washbasins are often not available due to the lack of water. The working population in the area generally uses the public toilets adjacent to Ahi Elvan Mosque. Inside the Pilavoğlu Han, there is a public lavatory and toilet area used by the employees of the inn. All units have electricity, except for 1 workplace. There is no central heating except one of the units in the street, which has no coal gas or natural gas connection, but Çengelhan and Çukurhan have a natural gas connection and underfloor heating is provided. 49 (60.49%) workplaces in the area are heated by electric heaters and 24 (29.63%) workplaces are heated by stoves. Besides, there is no heating in 1 (1.23%) workplace. The kitchen is only available in workplaces where it is needed such as in kebab restaurants, restaurants, tea shops, and cafes. The insufficiencies in health conditions continue in the same way (Figure 27).

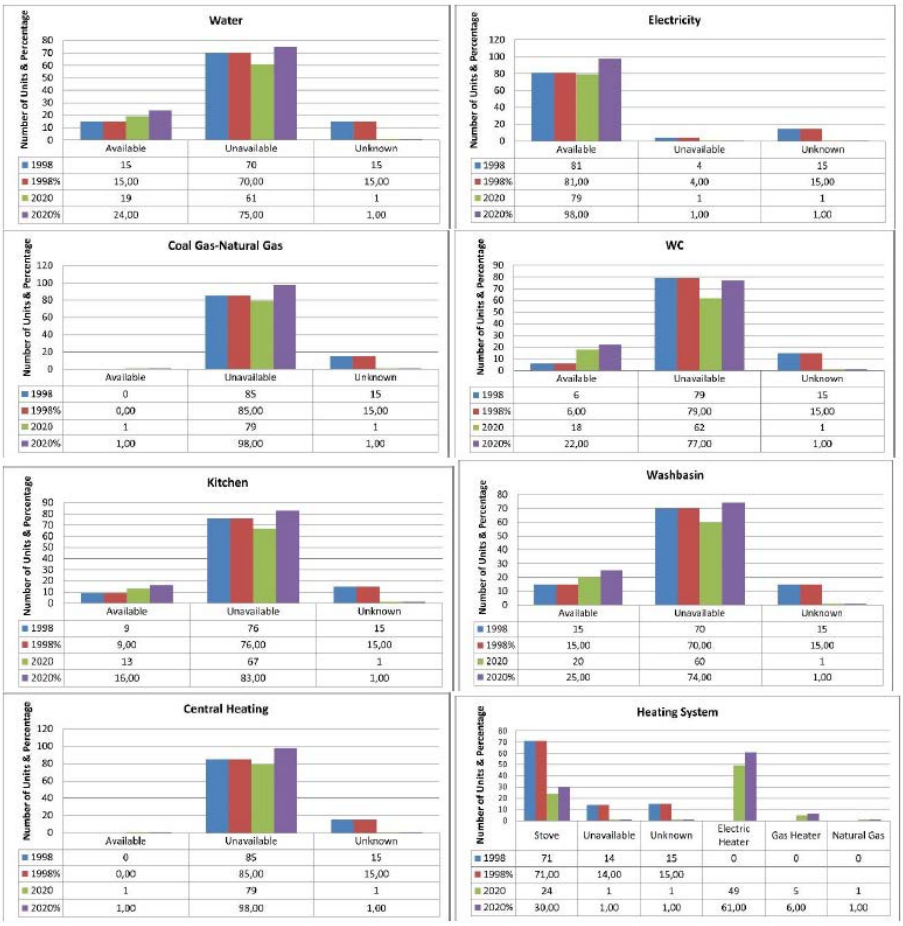

Figure 27. Commercial unit health and infrastructure conditions

EVALUATION OF RESEARCH RESULTS

The evaluation made as a result of the consecutive researches of the use of spaces in Koyunpazarı Slope and Atpazarı Square are gathered under the titles of physical conditions, social-functional conditions and infrastructure conditions.

Physical conditions:

• It has been observed that the number of buildings (37) in the area did not change during the intervening period, but two floors were added to two of the single-storey buildings and one to one of the three-storey buildings. Since the 1990s, various project studies have been carried out for the conservation of the area, but although they have not been implemented, these studies have drawn attention to the importance of the field and prevented significant physical changes in the field.

• Among the buildings in the area, Çengelhan, Çukurhan, Ahi Elvan Mosque and Hacı Arap Mosque have been repaired by the General Directorate of Foundations. Koyunpazarı Street Rehabilitation works were completed in 2009. For this reason, the structures in the area are in good physical condition to a great extent. However, Pilavoğlu Han and the building at the intersection of Koyunpazarı Street and Safa Street are in urgent need of repair. The completion and implementation of the project works in the inner and outer castle, which are closely related to the area,

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is also one of the positive developments regarding the area. However, it was also observed that a sustainable and integrated protection was not created in the area, and the works were limited to individual restorations and street rehabilitation works.

• In the intervening twenty-two years, the rate of trucking the goods of the workplaces in the area has decreased significantly. In proportion to this decrease, the rates of transportation by automobile, van and cargo increased. This situation arises from the change in activity types in the field (with the complete abolition of saddlery and the decrease in the number of wholesalers). In addition, the change in the frequency of buying goods by the workplaces operating in the field has also reduced the complexity and visual pollution caused by the vehicles.

• The reason for the increase in the rate of those who find commercial unit areas sufficient among the business owners in the workplace is that some workplaces are used by combining sub-units, as well as the decrease in workplaces that need more space such as wholesalers and workshops.

Social-functional conditions:

• In the study on the use of space, it has been observed that the ratio of wholesale shops decreased, while retail sales increased. When the activity types in the field have been examined, it has been seen that there have been no more saddlery, which existed in the previous periods, and there has been a serious decrease in the original activities such as hardware store, spice shop, and yarn. It is among the findings that the structures are saved from harmful effects such as the removal of saddlery (raw leather pre-processing mills) from the buildings and the salty-organic/acidic water that comes out of the sheep skins pressed into salt, causing melting in the brick and stone texture and threatening the carrier system. The most important change in the activity types in the field is the existence of souvenir shops (china, ceramics, etc.), jewelry and silver shops and painting, mosaic and jewelry design workshops that were not in 1998. On the basis of these changes in the field, it has been observed that activities for cultural tourism, which have gained weight in recent years, have been taking place, and as a result of the policies followed, commercial units engaged in the trade of gastronomic and touristic goods for the tourist population have increased gradually. After the resolution of the property problems of Çengelhan and Çukurhan, the museum and hotel functions assigned to the buildings are also functions determined for tourism.

• When the ownership structure of the commercial units in the area has been examined, it has seen that the rate of tenants has increased. This is due to the fact that the former property owners, who continued their original activities in the field, preferred to lease their workplaces due to their difficulties in continuing the old activities. In the period after 1998, the ownership of Çengelhan and Çukurhan has been transferred to the General Directorate of Foundations and all the workplaces in these

buildings are in the position of tenants since the buildings have been rented out by the restoration-operate-transfer method.

• When the duration of the profession of the business owners in the field is examined, it has seen that the rate of those who have been active in the field for more than ten years has decreased, and the rate of those who have been operating for less than ten years has increased. It has been observed that this situation has developed as a result of the changes in the activity types in the field and the former operators leaving their places to the new ones.

• In the Koyunpazarı Slope, the desire of the operators to sit in the region has decreased considerably in the intervening period. This decrease is based on the decrease in the number of residences in the region, the region staying in the poor part of the city and the difficulties experienced in adapting the traditional houses located near the area to today's needs.

Infrastructure conditions:

• The most important problem seen in the field is related to health and infrastructure conditions. Although there is a sewer connection in the area, most of the units do not have a water connection. Consequently, most workplaces do not have toilets and sinks. The population working in the area generally uses the public toilets near the Ahi Elvan Mosque. Inside the Pilavoğlu Han, there is a general lavatory and toilet area that the employees of the inn can use. In the street, which does not have gas and natural gas connections, there is only a heating system at number 60, and electrical heaters are used in other units. In Çengelhan and Çukurhan, there is a natural gas connection and underfloor heating is provided.

CONCLUSION

There has been a significant change of function in the shops located on one of these oldest commercial streets of Ankara. However, the speed of change is a parameter that needs to be controlled, and excessive rapid change can adversely affect the integrity of the values of a historic city. The size and frequency of interventions should be based on feasibility studies and should be in line with plan decisions. The preservation of a historic city requires efforts to maintain traditional arts and activities. New events should be carefully selected to prevent secondary adverse effects such as transportation/transport problems or traffic jams (ICOMOS, 2011, Valetta Principles). For this purpose, care should be taken to protect some shops (food, hardware stores, spice store, etc.) that continue their old functions. Changes in the fields of activity should be controlled and a planning work should be carried out in this area.

All interventions in historical cities and urban areas should respect their abstract and concrete cultural values. Every intervention in historical cities and areas should aim to improve the quality of life and the nature of the environment of the inhabitants (ICOMOS, 2011, Valetta Principles). The relevant municipalities and institutions should urgently bring a solution to the infrastructure problems identified in the area and the

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health conditions in the area should be improved. It should be ensured that the traditional residences around the area are made suitable for today's comfort conditions. In addition, an integrated protection policy that will include the commercial area subject to the research and the surrounding residential area should be developed.

The conservation zoning plan prepared for Altındağ Region (Ulus Historical City Area) should be completed and implemented urgently. For the reconstructions to be carried out in and around the area, the structuration conditions should be determined correctly and decisions should be made by evaluating the success of the new buildings in and around the area. The Protection Plan to be prepared must determine the conditions, rules, objectives and consequences of the change. It should determine which buildings and places should be strictly protected, which will be protected under certain conditions, and which can be overlooked in unusual circumstances. In addition, the plan to be prepared should aim to ensure a harmonious relationship between the historical city areas and the whole city (ICOMOS, 1987, Washington Charter). Before entering any new construction in the aforementioned area or in the immediate vicinity, an urban environmental analysis should be carried out not only to define the general character of the historical settlement, but also to identify the harmony of heights, the colors, materials and forms used, the types of facades and roofs used, the positions of building masses in the parcel, the construction rates in the parcels (ICOMOS, 1976, Nairobi Recommendations).

The structurally poor structures of Pilavoglu Han and building at the intersection of Koyunpazari Street and Safa Street needs to be repaired urgently. In order to carry out repairs in Pilavoglu Han, property problems should be solved and, if necessary, expropriated and the relevant institutions should lead the repair works.

Although the truck entrance has decreased, traffic arrangements should be made in the area and vehicle entry and exit times should be arranged in order to prevent the image and noise pollution created by the vehicles. Accordingly, parking arrangements should be made in a place where the area is easily accessible for those who want to visit the area or come for work to park their vehicles. These studies should be carried out in a way that does not damage the historical texture and its surroundings as stated in the Washington Charter.

The protection of historical cities and urban areas is part of the process of preserving and understanding the city and its environment as a whole and requires consistent, economic and social development policies that address these historical cities at all levels of planning and respect their social textures and cultural diversity. In addition, continuous monitoring and maintenance is mandatory to effectively protect a historic city or urban area. Up-to-date information and data (environmental analysis, history and development phases of the city, etc.) are needed for accurate planning. Since the protection of the historical city or area concerns the residents first, it is necessary to meet with the local people and

stakeholders, get their opinions and be in constant communication (ICOMOS, 2011, Valetta Principles).

It should be noted that historical cities and urban areas should be part of economic and social development policies and city and region policies at all levels (ICOMOS, 1987, Washington Charter). To achieve a sustainable tourism industry and ensure the transfer of cultural heritage sites to future generations, the participation and cooperation of representatives of local and/or indigenous communities, environmentalists, tourism operators, property owners, policy makers, national development planners and site managers is required. A significant portion of the revenue from tourism programs to heritage sites should be allocated for the protection, preservation and promotion of such venues, including their natural and cultural conditions (ICOMOS,1999, International Cultural Tourism Charter).

These determinations are thought to be guiding for the transfer and preservation and promotion of our cultural heritage in Koyunpazarı Slope and Atpazarı Square in Ankara's Historical City Center. In addition, it is recommended that this work be expanded by taking into other streets surrounding the area and act with a holistic understanding of protection.

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CONFLICT OF INTEREST

No conflict of interest was declared by the authors.

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LEGAL PUBLIC/PRIVATE PERMISSIONS

In this research, the necessary permissions were obtained from the relevant participants (individuals, institutions and organizations) during the survey, in-depth interview, focus group interview, observation or experiment.

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Resume

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Examining the Relationship Between Enclosure Ratio of Street and Skyline's Complexity

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Abstract

Purpose

The urban design criteria significantly affect the visual quality of space. Enclosure and Complexity can be defined as two crucial urban design principles that affect the perceptibility and visual quality of space. This study aimed to offer an objective and perceptual evaluation method in assessing the street's enclosure ratio. In the study, the street's enclosure ratio was evaluated via the street skyline's complexity.

Design/Methodology/Approach

According to the study's hypothesis, as the street's enclosure ratio increases, the street skyline's complexity level decreases. For testing this hypothesis, the street images were selected from the London and Chicago cities. Firstly, the skylines of the streets were determined on images, and then, the fractal dimensions of skylines were calculated. Then, the street's enclosure ratio and the factors that affect street skyline's fractal dimension were measured with a defined measurement system. Subsequently, the relationship between the street's enclosure ratio and calculated street skyline's fractal dimensions was examined by regression analysis.

Findings

As a result, it was determined that there is an inverse relationship between the street's enclosure ratio and the street skyline's fractal dimensions. As the enclosure ratio increases, the complexity of the skyline decreases. The decrease in the complexity level of the skyline weakens the visual quality and perceptibility of the street.

Research Limitations

In this study, the perceptual evaluation of the street's enclosure ratio was examined with an objective method. This method can also be reinforced with a subjective evaluation and more precise results can be obtained.

Social Implications

The obtained results can provide important clues to increase the visual quality and perceptibility of the streets. In perceptible spaces with high visual quality, feelings such as liking, trust, belonging and comfort develop in people.

Originality/Value

The fractal approach as an objective method is used widely for perceptual evaluation of the complexity level in cities. However, it was determined that very few studies examined the street's enclosure ratio with the perceptual and objective evaluation method. Perceptual evaluations of the enclosure were generally made with subjective methods. This study offered an objective and perceptual evaluation approach for examining the street's enclosure ratio.

Keywords: *Complexity, enclosure, street, skyline, fractal*

INTRODUCTION

In urban design studies, "having sufficient knowledge about design principles and techniques" and " directing the relationships and interactions between people, spaces and events correctly" are among the important issues to be considered. The theoretical framework of urban design principles and urban residents' perceptual-cognitive skills should be correctly correlated (Altaban, 2013). In urban spaces, the relationship between space and person is important. Because the person perceives and defines the space when he relates to it, urban design principles should strengthen the interaction between the individual and space (Aslan & Atik, 2015; Kalın & Yılmaz, 2012; Lynch, 1981). The strong relationship between person and space causes an increase in the sense of belonging, thus increasing the urban life's quality. One of the critical components of urban life's quality is visual data, and the quality of these data affects the visual quality. The visual quality of the space is related to how the person perceives and evaluates the space. The first sensory interaction of the person with the space is visual by nature (Val *et al.,* 2006). In the twentieth century, Le Corbusier and like-minded modern architects sought to eliminate the traditional structure of cities to increase automobile use and focus on the functionality of the city. Thus, cities turned into soulless spaces with poor visual quality and low perceptibility (Hall, 2014; Sussman & Hollander, 2015). The visual quality of the space is greatly affected by the design criteria of the space. "Enclosure" and "Complexity" principles, which are defined as two important urban design principles, affect the perceptibility and visual quality of the space. The enclosure is defined by vertical elements such as buildings, walls, and trees surrounding the space. The enclosure ratio, known as the rate of building height to street width, must be in a correct ratio to increase perceptibility. If the street is too wide, the space will not be on human scale, so the urban space is not visually and socially accessible. "Complexity" is the balance between chaos and monotony, the harmony between order and disorder. Complexity is expressed as the quantity of data an individual can perceive in his visibility angle of the vista. This perceived complexity includes the number, variety, and invisible connections between visual elements. As the visual information increases, space becomes more perceptible away from the monotonous. As the complexity increases, the density of new information presented to the individual increases, but excessive information confuses the individual. Therefore, the individual prefers optimal complexity, free from monotony and chaos. The fractal method, which can measure the optimal complexity level, is widely used in urban studies as a perceptual and objective evaluation method. However, very few studies examine the enclosure ratio of streets with perceptual and objective evaluation methods. This study aims to investigate the enclosure ratio of the street perceptually and objectively over the complexity level of the street skyline. In the study, firstly, the urban design principles affecting the visual quality were defined, then the concepts of enclosure and

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complexity were explained in detail. After that, studies examining the street skyline's complexity with the fractal method were examined. In the method section, the hypothesis was tested, and the results were interpreted and concluded as a result of the findings. The hypothesis and framework of the study are explained in Figure 1.

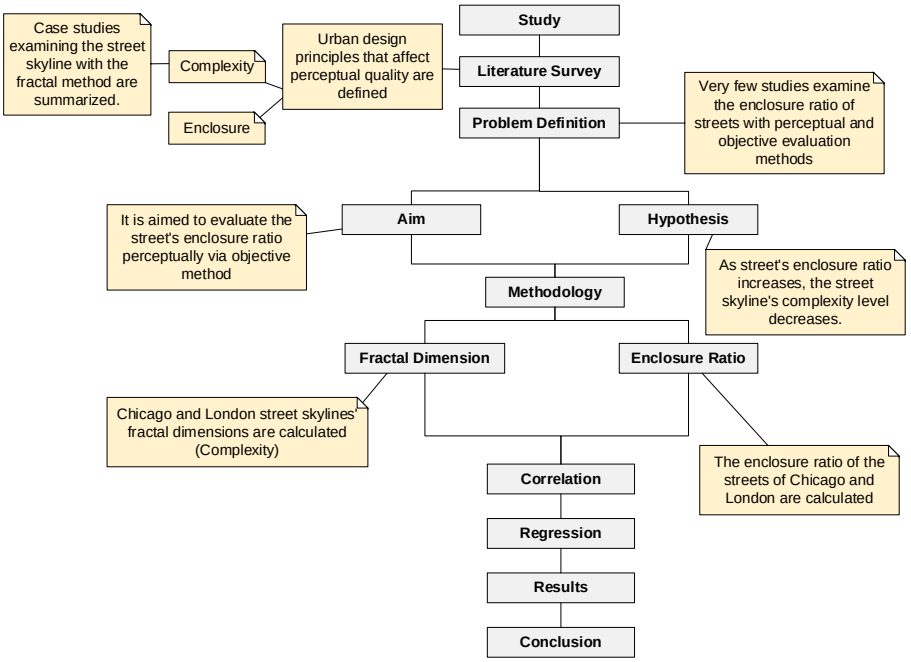

Figure 1. The hypothesis and framework of the study (Drawings by the Author).

PERCEPTUAL QUALITY CRITERIA

Streets are among the most significant urban spaces, and the perceptibility of these spaces is critical in urban design studies. Therefore, many studies investigate the characteristics of these urban spaces related to their quality. Some of these studies were summarized in Table 1.

Table 1. Perceptual quality criteria of streets

Researchers	Perceptual Quality Criteria
(J. Jacobs, 1961)	Complexity
(Trancik, 1986)	Enclosure, continuity, building facade
(Katz *et al.,* 1996)	Coherence
(Montgomery, 1998)	Street greenery, transparency, human scale, legibility, imageability
(Carmona *et al.,* 2003)	Enclosure
(Ewing *et al.*, 2005)	Enclosure, complexity, coherence, legibility, imageability, linkage, human scale, transparency
(Pendola & Gen, 2008)	Perceptual feelings, scale and width of street, height and facade of building,
(Cooper & Oskrochi, 2008)	Complexity
(Xavier & Portella, 2012)	Complexity

These criteria affect the users' willingness to stay on the streets or enjoy the place. They can also be defined as some of the basic perceptual features discussed in urban design studies (Gehl *et al.,* 2006). Ewing & Handy (2009) measured the subjective qualities of urban streets

objectively in their research. They revealed five urban design principles that affect the quality of the street; complexity, enclosure, imageability, transparency and human scale (Ewing & Handy, 2009). In many studies, the concept of enclosure and complexity are defined as critical components of visual quality that affects human perception (Berlyne, 1970; Blizek & Berlyne, 1973; Carmona *et al.,* 2003; Gehl, 2010; S. Kaplan *et al.,* 1972; Nasar, 1984, 1994; Rapoport, 1977).

Complexity

Visual richness in urban spaces defines complexity. As one of the critical perceptual metrics, complexity describes a high-level phenomenon revealing from the connected and interacted subcomponent of a system and explains both dynamics and processes structurally (Spencer, 2009). Complexity is broadly classified into four categories: "structural complexity", "functional complexity", "structural hierarchical complexity" and "functional hierarchical complexity" (R. Kaplan *et al.,* 1998). Structural hierarchical complexity is expressed as the quantity of data an individual can perceive in his visibility angle of the vista. This perceived complexity includes the number, variety, and invisible connections between visual elements. It is possible to associate the complexity of the street with four essential features: “layering at the edge of streets”, “social diversity”, “functional diversity” and “diversity in ages of building”. The visual complexity of the street is affected by the varying forms, sizes, colors, materials and architectural details of the buildings, also the density of street furniture and landscape elements (Ewing & Handy, 2009). The number and type of buildings, architectural details, decorations, landscape, and urban furniture affect the visual complexity of the urban spaces (Ewing & Handy, 2009; Tveit *et al.,* 2007). Perceived complexity in the space affects the individual's preferences (S. Kaplan *et al.,* 1972; Oostendorp & Berlyne, 1978), and the individual prefers the space with visual complexity (Blizek & Berlyne, 1973; Denis & Fernandez, 2014; Stamps, 2003, 2004). Despite the simplistic attitude of modern architecture in cities (or-or suggestions), traditional architecture with complexity (and-or-both suggestions) is recommended (Venturi, 1977). In cities consisting of similar elements with monotonous and homogeneous characters, the perception of complexity is lower, negatively affecting the urban identity. The relationship between the components is weak and ineffective, and space is not easily perceived (Alexander *et al.,* 1977; Barratt, 1980; Zacharias, 2001). According to Berlyne (1970), maintaining the balance between chaos and monotony in the arrangement of urban elements creates the optimal level of complexity. It thus positively affects the perception of the individual (Berlyne, 1970). Berlyne (1970) explains the relationship between perceptual assessment and visual complexity as in Figure 2.

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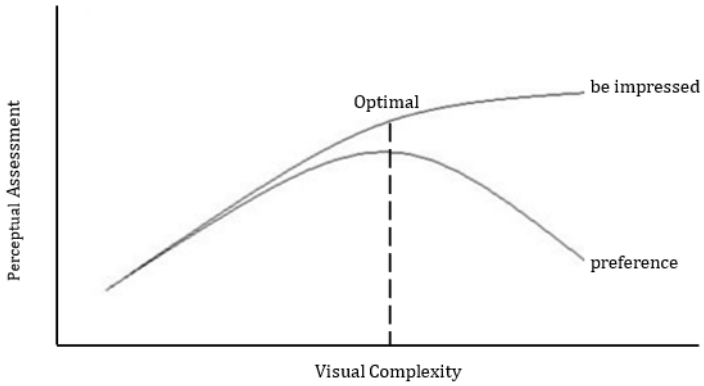

Figure 2. The The relationship between perceptual assessment and visual complexity (Berlyne, 1970).

As complexity increases, the density of new information presented to the individual increases, and the individual is impressed. However, the individual prefers the optimal complexity and does not prefer the increasing visual complexity. The number (number of details) and shapes (differences in details) of the elements that make up the pattern affect the visual complexity (Berlyne, 1970).

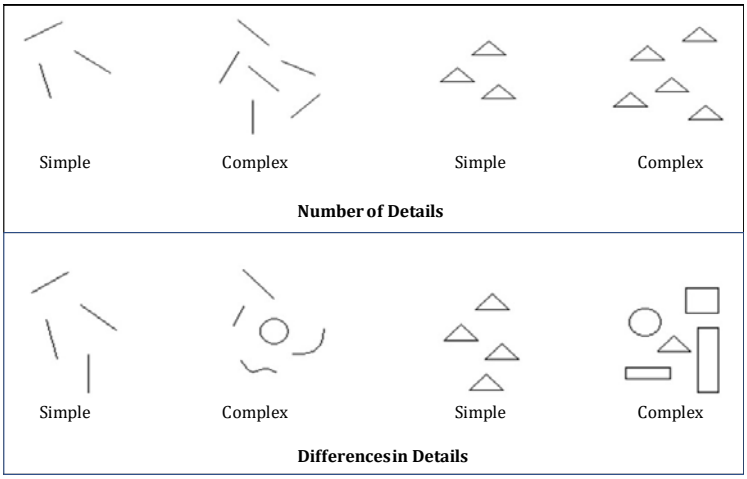

Figure 3. Number and differences (Drawings by the Author).

According to Rapoport (1990), the individual receives easily perceived information from the environment at a usable rate. Too little information causes sensory deprivation, too much information causes sensory overload (Rapoport, 1990). The increasing number of details and the formal differences of the details increase the visual complexity. Some variables that provide spatial complexity in urban spaces are explained as follows (Rapoport, 1977):

- Differences in building facades
- Use of different textures and materials
- Color variety
- Buildings of different heights
- Different windows
- Differences in the horizontal (in numbers)
- Differences in vertical
- Recesses and protrusions on building facades

- Size variety
- Entrance doors in different positions
- Shades and fringes of different patterns
- Different stair designs
- Mobility of roofs

Streets are an essential element of a city and residential area, and the perceptibility of street views affects the residents' quality of life. High-quality designed streets help create urban vitality while also contributing to strengthening social interaction, increasing outdoor activities and improving people's health (Ye *et al.,* 2018). Streets, defined as linear urban areas surrounded by buildings, are used for movement and activities. The critical parts of the visual elements of the streets can be defined as commercial signs along the street, the skyline, pavement, lighting, street furniture, landscape, and facades of buildings. These elements, which are visually in a hierarchical connection, represent the order of the street view. Two criteria are used to describe the order of street views: “visual complexity” and “visual diversity”. Visual complexity expresses both the connections and diversity of visual components, while Visual diversity expresses only the diversity of visual components. Therefore, visual complexity is more significant than visual diversity because it can explain both the diversity and the connections of visual components (Gunawardena *et al.,* 2015). Xavier and Portella (2012) evaluated the street’s visual complexity through factors such as skyline, facade details, facade arrangements such as eaves, awnings, balconies, and color diversity. They found a positive relationship between the satisfaction level of individuals and the visual complexity on the street. The variables affecting the visual complexity of the street are listed as follows (Xavier & Portella, 2012):

- Skyline: The symmetry of the skyline, the number of endpoints in the skyline, the symmetry of buildings, building heights, building widths, type of roofs
- Facade details: Architectural style, number of floors, components that make up the facade texture, revetments, and components
- Façade decorations: Door and window type and number, density
- Color diversity: Color variety and number on building facades

Studies show that three formal variables affect the visual complexity and perception of individuals on the street. These are skyline, façade details, and decorations (Burden, 1994; Ching, 2014; Groat, 1982; Stamps, 2000). According to A. Jacobs & Appleyard (1987), narrow buildings on the street increase the complexity level of the street compared to wide buildings. It means that the increase in the number of buildings on the street causes increasing the street’s visual complexity (A. Jacobs & Appleyard, 1987). Visual complexity analyzes in urban spaces often focus on the complexity of building facades. However, in assessing visual quality, the complexity of the skyline has a critical role in individual satisfaction and preference (Heath *et al.,* 2000; Nasar & Terzano, 2010). On the street, the differences in the roof forms of the adjacent buildings,

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the density of the landscape, and furniture elements provide complexity on the skyline (Heath *et al.,* 2000). There is a positive relationship between the level of individual's satisfaction and the street skyline's visual complexity, such as symmetry of the skyline, the number of peak points on the skyline, symmetry of buildings, building heights, building widths, mobility of roofs (Portella, 2007; Xavier & Portella, 2012).

Enclosure

Enclosure is one of the basic principles of urban design. It varies by differences in the height of vertical elements such as buildings surrounding open space and the distance between vertical elements (Kahraman & Cubukcu, 2017). Streets, defined as linear urban areas surrounded by buildings, walls, and landscape elements used for movement and activities. The enclosure of the street is defined by two variables: the height of vertical elements surrounding the street and street width. The ratio of building heights to street width is defined as the enclosure ratio of the street (Carmona *et al.,* 2003; Ewing & Handy, 2009). The degree of enclosure affects the viewpoints of people. The feeling of the enclosure is closely related to the continuity of the elements in the space (Ewing & Handy, 2009). According to Carmona *et al.* (2003), as the height of the buildings on the street increases, the sky moves away, and the feeling of closure increases. In these streets, people's perception is negatively affected (building height/street width=4:1). Perceptually, the most positive sense of enclosure occurs on streets with an enclosure ratio of 1:1. Also, streets with an enclosure ratio of less than 1:2 have a low level of perceptibility (Carmona *et al.,* 2003). According to Alexander *et al.* (1977), the street width should not be more than the building's height for the enclosure to affect human perception at a maximum and positive level. In addition, buildings not higher than four floors affect human perception positively by providing the connection between the upper floor of the building and the street (Alexander *et al.,* 1977). A. Jacobs (1993) suggests that the ratio of heights of buildings to the width of street should be at least 1:2. In low-density urban areas, facades are less important in defining the street and trees play a critical role. Trees located on both sides of the street bring the height and width ratio to human scale. Trees support the perception of closure, especially in wide streets. Enclosure, which is at an optimal ratio, increases visual complexity in space by reducing the distance between components and people and creates a sense of confidence in the individual (A. Jacobs, 1993). According to Gehl (2010), to improve the visual quality and perceptibility of the streets, the street width should not be more than 10 meters, and the buildings surrounding the street should not be higher than 4-5 floors (Gehl, 2010).

FRACTAL GEOMETRY

The term "fractal" is derived from the Latin verb "frangere" which means broken and irregular. Along with this disorder and fragmentation, also

objects that exhibit repetitive patterns are identified. A regular structural complexity emerges in these objects, with designs resembling themselves and appearing on increasingly more minor scales. This self-similarity is measured by the parameter of fractal dimension, which is the common feature of all fractal structures. The degree of irregularity in fractal structure quantifies by fractal dimension (D), and this quantitative value reveals the main features of its structure. It explains the degree of complexity and the number of details through scales. On 2-D surfaces, the fractal dimension value is calculated in the range of 1<D<2. As the complexity of the texture increases, the D value moves closer to 2 (Mandelbrot, 1982; Peitgen et al., 1993; Spencer, 2009). Fractal dimension refers to how the complexity of a form varies with the scale on which it is measured. The fractal dimension of an object expresses the space-to-full ratio by the self-similarity method, which becomes a bit more than a 1-D line, but a bit smaller than a 2-D surface. Fractal dimension measures include Hausdorff dimension and the box-counting dimension (Shen, 2002). Fractal dimensions of lines with different complexity show in Figure 4.

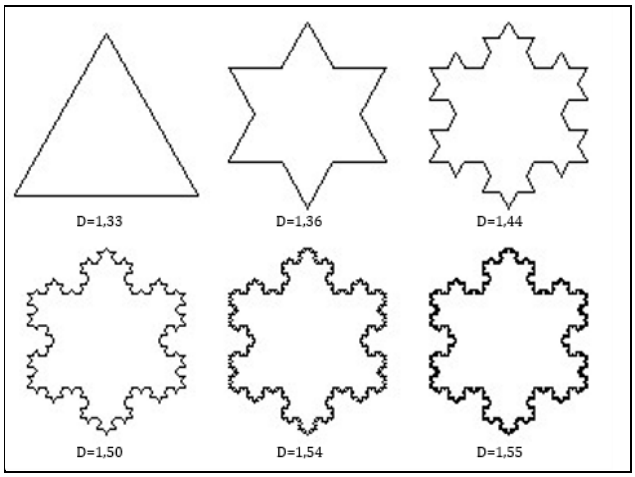

Figure 4. Fractal dimensions of lines with different complexity (Drawings by the Author).

According to Figure 4, the fractal dimension approaches two as the complexity of the lines increases. The box-counting method based on a grid analysis is often used in fractal dimension calculation. In this approach, the image is covered with a grid made of squares of size r, and then how many boxes of the grid are covering part of the image is counted. Then the same thing is done by using smaller boxes (Jiang & Liu, 2013). Fractal dimension is calculated through the following Equation (1):

Equation (1)

$$D = \lim_{r \to 0} \left[\frac{\log N_r}{\log \frac{1}{r}} \right]$$

In this equation, N is the number of boxes that contain something black, r is the length of the side of the squares, and D is the fractal dimension.

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Fractal dimension increases when more boxes have information (Li *et al.,* 2009). In the formal analysis of the space, the concept of "Golden ratio" is a classic and old approach, but fractal geometry offers a new approach. Repeats itself on an ever-reduced scale is the most significant feature of the fractals. Fractal objects are organized, complex, and hierarchically ordered structures with self-similarity parts. A fractal structure is the hidden harmony of nature founded on a form of scale symmetry, and we can find a series of scales at each scale of a complex object (Alexander *et al.,* 1977; Batty & Longley, 1994; Mandelbrot, 1982; Mesev *et al.,* 1995; Salingaros, 1999).

The Complexity of Street Skyline

The legibility and perceptibility of urban vista affect the visual quality. Visual perception in urban spaces consists of recording the skyline of the space in memory as a mental image. Skylines are three-dimensional cityscapes that have a significant role in urban design studies. According to Bostancı & Oral (2017), urban skylines can be evaluated in three classes: traditional skyline, modern skyline, and a combination of these two skylines. Skylines of traditional cities are perceptually complex and rich and clearer, and more legible than skylines of modern cities (Bostancı & Oral, 2017). Different methods have been used in the objective evaluation of skylines that affect the aesthetics and visual quality of the city. Bostancı & Ocakçı (2011) offered an objective method in the urban skylines' aesthetic and visual quality evaluation in their study conducted in Istanbul's various urban areas. In this study, the aesthetic value was transformed into numerical value by adapting the visual codes of the design components that form the city skyline. As an evaluation method, the entropy method was used in this study. The entropy method examines the amount of information of the coded data. In this approach, the aesthetic qualities of cities are examined in two groups as "Formal" and "Symbolic". While formal aesthetic qualities are defined by the concepts of "diversity", "harmony" and "clarity", symbolic qualities are defined with their "meaning" and "function" concepts. In this study, the coded information from different skylines was compared with each other. As a result, it was determined that the skylines representing the historical cityscape of Istanbul have more aesthetic value than other urban spaces. The study emphasized the usability of the entropy method in the aesthetic evaluation of the city skylines (Bostancı & Ocakçi, 2011). In the research by Akdağ & Bostancı (2013), a study was conducted on high rise buildings in the Central Business District of Istanbul to evaluate the aesthetic qualities of the city skyline. In this study, GIS models were made in the selected area, and skylines of the past, present, and future were extracted by visual analysis. The resulting skylines were finally analyzed by the Entropy method based on formal aesthetic properties. Then, the Entropy method used in the aesthetic evaluation of Skylines was adapted to GIS (Akdağ & Bostancı, 2013). Some studies have focused on the concept of optimal complexity. In addition to the entropy method,

the fractal method was also used in the urban skyline evaluation. In visual quality analysis, organized complexity has been defined as a fundamental characteristic that all perceivable and vibrant cities have in common (J. Jacobs, 1961; Salingaros, 2000). Many researchers have tried to find a simple visual order that counteracts the organically evolving complexity of urban, and they have attempted to impose Euclidean geometry to explain it. Today, however, cities that grow organically appear to have an optimal complexity, and their disorders appear to be a superficial view of a deeper order, and fractal geometry which is the language of nature and organic formation, is a tool that can explain this disorder mathematically (Batty & Longley, 1994). The transition from order to disorder is defined by fractal geometry. In cities designed with a fractal approach, the individual's perception is positively affected, and the human-environment relationship is strengthened (Salingaros, 2010; Taylor, 2006). According to various studies, there is a positive relationship between individual judgment regarding visual quality and fractal dimension expressing the level of complexity (Cooper & Oskrochi, 2008; Cutting & Garvin, 1987). In Stamps (2002) study, the fractal dimension of the skylines of spaces consisting of buildings with different heights was calculated. Then, a comparison was made between the fractal dimension of the skylines and participant preferences. According to the study results, skylines with a high fractal dimension were preferred with a high ratio (Stamps, 2002). In the study conducted by Hagerhall *et al.* (2004), the relationship between the preferences of participants and the fractal dimension of the skyline was examined. As a result, it was determined that there is a positive relationship between individuals' preferences and fractal dimensions. The density of landscape elements caused fractal dimensions to be high. Also, the number of participants liking these images was high (Hagerhall et al., 2004). In Cooper's (2003) study, the fractal dimension of the street skyline was compared with the characteristics of the street. In the study, it was determined that the mobility of the roofs of the buildings, the intersection of the landscape with the skyline, and the level of enclosure of the street affect the fractal dimension of the skyline of the street. As a result, the mobility on the roofs of the buildings, the enclosure of the street and the density of the vegetation caused the fractal dimension of the skyline of the street to be high (Cooper, 2003). The study by Chalup *et al.* (2009) aimed to reveal the relationship between the complexity of the skyline and the physical features of the street. As a result, it has been determined that the intersection of the landscape elements on the street with the skyline causes the fractal dimension of the skyline to be high (Chalup *et al.,* 2009).

RESEARCH METHOD

This study aims to evaluate the street's enclosure ratio through the street skyline's complexity with the perceptual and objective method. For this purpose, images of streets with different enclosure ratios were used from London and Chicago cities. There are two important reasons for choosing

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sample cities: 1. London streets have a traditional skyline type, and Chicago streets have a modern skyline type. In terms of the richness of the dataset, two cities with different street skylines types were preferred. 2. In this context, to test the hypothesis, street samples with various enclosure ratios between 1:2 and 4:1 were analyzed by creating a rich data set. Forty-two street images taken with "Google Instant Street View" from both cities were used in the analysis. The images were taken from the middle point of the streets on the vertical and horizontal axis (+). While taking the images, attention was paid to ensure that parameters such as scale, resolution, zoom ratio, and angle of view were the same in all images.

Dependent and Independent Variables

In this section of the study, the factors that affect the street skyline's fractal dimension were determined as independent variables. The fractal dimension of the street skyline was also defined as the dependent variable. Dependent and independent variables are shown in Table 2.

Table 2. Dependent and independent variables

Dependent variable	Independent variables
Skyline's fractal dimension	Number of buildings with different heights
	Number of peak points on building roofs
	Intersection of furniture elements with skyline
	Intersection of landscape elements with skyline
	Enclosure ratio of street

Measurement of the independent variables

In this section, the quantitative values of the independent variables were calculated. The measurements of independent variables as the characteristics were performed for each of the streets. The measurement system is given in Table 3. The number of buildings with different heights is calculated by counting through the street images. For calculating the number of peak points on building roofs, breakpoints on building roofs are counted from street images. Since the mobility in traditional building roofs is high, this number can be more. Whether the landscape and furniture elements on the street intersect with the skyline is evaluated through the street images. For calculating the enclosure ratio of the street, the number of floors of the buildings is counted, and the number of floors is multiplied by 3, assuming that the floor is the standard 3 meters, at the same time, the street width is measured with the ruler tool in the "Google Earth" program, the ratio of the obtained building height to the street width is used as the enclosure ratio of the street in the analysis. Average building height is used for streets with buildings of different heights.

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Table 3. The measurement system

Independent variables	The measurement methods
Number of buildings with different heights	This variable was calculated by counting the number of buildings with different heights through the images.
Number of peak points on building roofs	This variable was calculated by counting the number of peak points on the building roofs through the images.
Intersection of furniture elements with skyline	This variable was evaluated whether the furniture elements intersect with skyline in the images (intersection = 1, non-intersection = 0)
Intersection of landscape with skyline	This variable was evaluated whether the elements of landscapes intersect with the skyline in the images (intersection = 1, non-intersection = 0)
Enclosure ratio of street (Building height/ Street width)	"Street width" and "building height" were calculated through the "Google Earth" program, and then the enclosure ratio of the street was measured as the ratio of building height to street width.

Calculation of the dependent variable

In this section of the study, the calculation method and values of fractal dimension of street skylines defined as dependent variables are explained. Primarily, the skyline of the streets was determined by Photoshop program for each image. The images were adjusted on the 2D plane, and attention has been paid that there is no deformation or clipping in determining the street skyline line. The fractal dimension of the street skyline was calculated by the box-counting method in "HarFa" program (Zmeškal et al., 2001). According to the research results, other software programs calculate the fractal dimension with a limited number of box sizes. Therefore, the HarFa program, which allows many calculations with all possible box sizes (2,3,4,5, ..., max), was preferred. The pixel size of all images used in fractal dimension calculation kept the same. For preventing erroneous measurements, the fractal dimension of each street skyline was calculated 30 times, and the average value of these measurements was used in the analysis as the street skyline's fractal dimension (D). The street images, skylines, and fractal dimensions of street skylines were shown in Table 4.

Table 4. Street images, skylines, and the fractal dimensions

Street images, skylines, and the fractal dimensions of street skylines			
			
412 N Clark St.	127 W Medison	76 W Jackson	W Erie St.
D = 1,03	D = 1,04	D = 1,05	D_s = 1,06
			
S Wacker St.	65 E Monroe St.	100 N La salle St.	N La Salle St.
D = 1,07	D = 1,08	D = 1,10	D = 1,10

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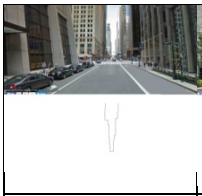
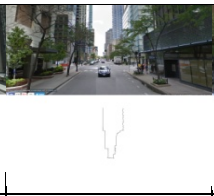
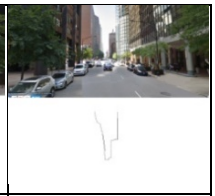
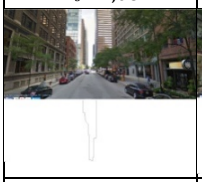
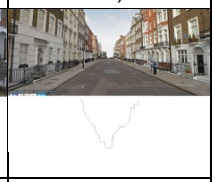
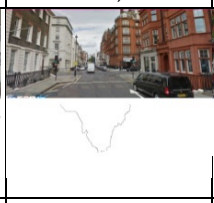
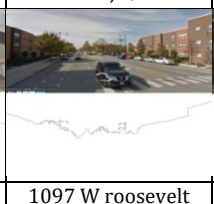
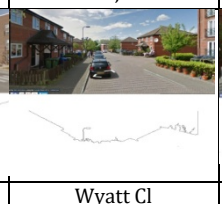
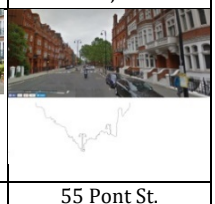
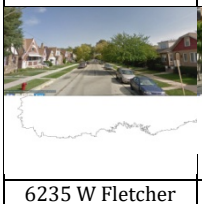
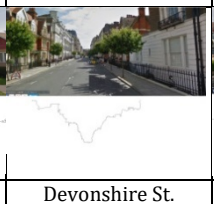
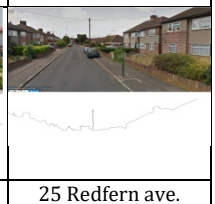
			
67 W Madison St.	410 E Ontario St.	W Ohio St.	228 E Erie St.
D_s = 1,06	D_s = 1,07	D = 1,11	D = 1,11
			
E Ohio St.	2N State St.	6 Mabley St.	25 Queen Anne St.
D = 1,13	D = 1,14	D = 1,18	D = 1,19
			
17 Rannock	69 Brook St.	38 Chapel St.	22 Rannock Ave.
D = 1,20	D = 1,21	D = 1,21	D = 1,21
			
81 Wimpole St.	37 Harley St.	19 Short St.	33 Old Park
D = 1,19	D = 1,20	D = 1,22	D = 1,22
			
96 Wood ln.	1097 W roosevelt	Wyatt Cl	55 Pont St.
D = 1,23	D = 1,23	D = 1,24	D = 1,24
			
6235 W Fletcher	Devonshire St.	74 Chatsworth st.	25 Redfern ave.
D = 1,25	D = 1,26	D = 1,26	D = 1,26
			
29 B319 St.	237 Philip Ln.	102 Murchison St.	37 Hatchard st.
D = 1,25	D = 1,25	D = 1,27	D = 1,27

17 King St.	1434 S Central	213 Percy	Piccadilly St.
D = 1,28	D = 1,29	D = 1,29	D = 1,30

2249 S Kostnerst.	3 Parliament St.
D = 1,30	D = 1,31

Descriptive statistical analysis of calculated fractal dimensions was given in Table 5. The minimum fractal dimension was calculated as 1,04, and the maximum value was 1,31. The average of fractal dimensions was calculated as 1,193. Also, the distribution plot of fractal dimensions obtained was shown in Figure 5.

Table 5. Descriptive statistics

	Min.	Max.	Mean	Std. Deviation	Variance
Fractal Dimension (D)	1,040	1,310	1,193	,08365	,007

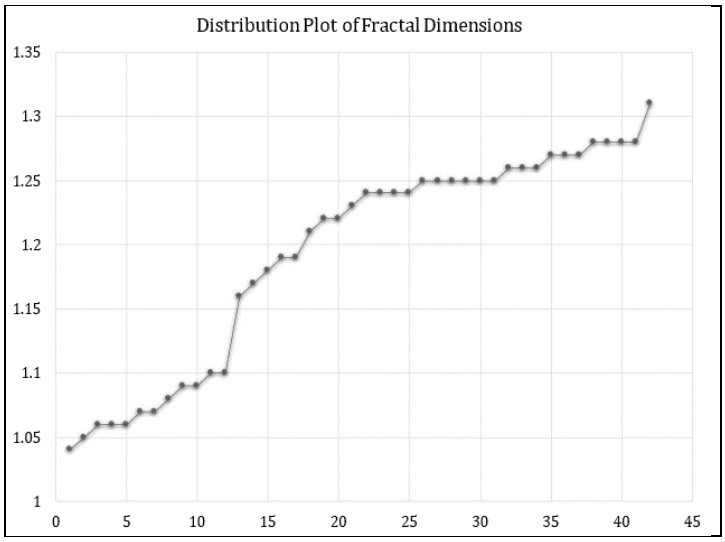


Figure 5. Distribution plot of fractal dimensions

Evaluation of the Relationship Between Dependent and Independent Variables

Correlation analysis

In this section of the study, Pearson's correlation analysis was performed between dependent and independent variables, considering having a normal distribution of the data. SPSS 26 program was used for statistical

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analysis. In correlation analysis, the coefficients were examined at p <0,01 significance level. The coefficients obtained from the correlation analysis are shown in Table 6.

Table 6. The result of correlation analysis

Correlation							
		Number of peak points on building roofs	Enclosure ratio of street	Number of buildings with different heights	Intersection of furniture elements with skyline	Intersection of landscape with skyline	Skyline' s fractal dimension
Number of peak points on building roofs	Pearson Correlation	1,000	-,644*	,606*	,428*	,352	**,648***
	Sig. (2-tailed)		,000	,000	,005	,022	,000
	N	42	42	42	42	42	42
Enclosure ratio of street	Pearson Correlation	-,644*	1,000	-,720*	-,758*	-,586*	**-,816***
	Sig. (2-tailed)	,000		,000	,000	,000	,000
	N	42	42	42	42	42	42
Number of buildings with different heights	Pearson Correlation	,606*	-,720*	1,000	,612*	,484*	**,531***
	Sig. (2-tailed)	,000	,000		,000	,001	,000
	N	42	42	42	42	42	42
Intersection of furniture elements with skyline	Pearson Correlation	,428*	-,758*	,612*	1,000	,407*	**,561***
	Sig. (2-tailed)	,005	,000	,000		,007	,000
	N	42	42	42	42	42	42
Intersection of landscape with skyline	Pearson Correlation	,352	-,586*	,484*	,407*	1,000	**,642***
	Sig. (2-tailed)	,022	,000	,001	,007		,000
	N	42	42	42	42	42	42
Skyline's fractal dimension	Pearson Correlation	**,648***	**-,816***	**,531***	**,561***	**,642***	1,000
	Sig. (2-tailed)	,000	,000	,000	,000	,000	
	N	42	42	42	42	42	42

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

According to correlation coefficients, there are significant relationships between the fractal dimensions of the skylines and street characteristics at p <0,01 significance level with different coefficients. There are significant and positive correlations between "Number of peak points on building roofs", "Number of buildings with different heights", "Intersection of furniture elements with skyline", "Intersection of landscape with skyline" as independent variables and "Skyline's fractal dimension" as the dependent variable at p <0,01 significance level statistically. Also, there is a significant and negative correlation between "Enclosure ratio of street" and "Skyline's fractal dimension" at p <0,01 significance level statistically, and the correlation coefficient was calculated as -0,816. According to the correlation result, the Pearson correlation coefficients and the impact level of characteristics on the skyline's fractal dimension are shown in Figure 6.

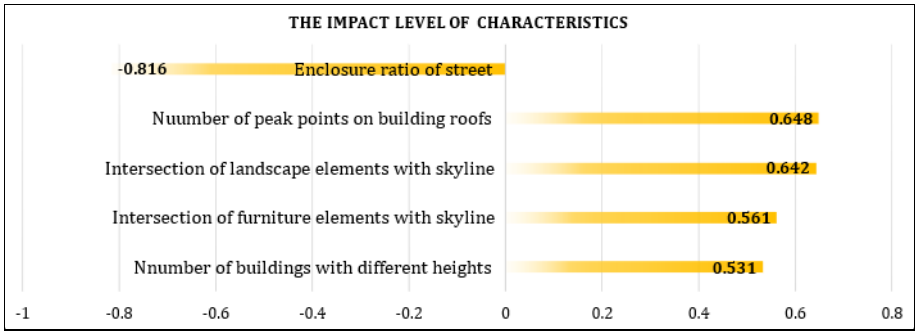

Figure 6. The impact level of characteristics

As a result, there is a strong negative correlation between the enclosure ratio of the streets and the complexity of the street skyline.

Regression analysis

After examining the effects of independent variables on the dependent variables, one by one with correlation analysis, the effect of the independent variables on the dependent variable was examined altogether with multiple regression analysis. According to ANOVA test, the regression model is statistically significant at P <0,05 level (F=21.350) and the regression model explains 71% of the independent variables in predicting skyline's fractal dimensions at P <0.05 significant level (R2 = 0,71).

Table 7. The result of regression analysis

Coefficients[a]							
	B	Std. Error	Beta	t	Sig.	95.0% Confidence Interval for B	
						Lower Bound	Upper Bound
(Constant)	1.195	.112		10.635	.000	.967	1.423
Number of peak points on building roofs	.037	.015	.287	2.482	**.018***	.007	.067
Enclosure ratio of street	-.080	.017	-.821	-4.721	**.000***	-.115	-.046
Number of buildings with different heights	.036	.014	.325	2.527	**.016***	.007	.064
Intersection of furniture elements with skyline	-.013	.022	-.078	-.587	.561	-.058	.032
Intersection of landscape with skyline	.028	.018	.167	1.590	.121	-.008	.064

a. Dependent Variable: Skyline's fractal dimension
*. Correlation is significant at the 0.05 level

According to the result of regression analysis, As the number of buildings with different heights on the street and the mobility of buildings roofs increase, the fractal dimension and complexity of the street skyline increases. However, as the enclosure ratio of the street increases, the fractal dimension of the street skyline decreases.

DISCUSSION

It has been determined that the enclosure ratio of the street has a negative effect on the complexity of the street skyline. As the enclosure

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ratio of the street increases, the complexity of the street skyline decreases.

According to Figure 7, as the enclosure ratio increases from 1:2 to 4:1, the complexity in the skyline, thus the perceptibility and visual quality of the street, decreases.

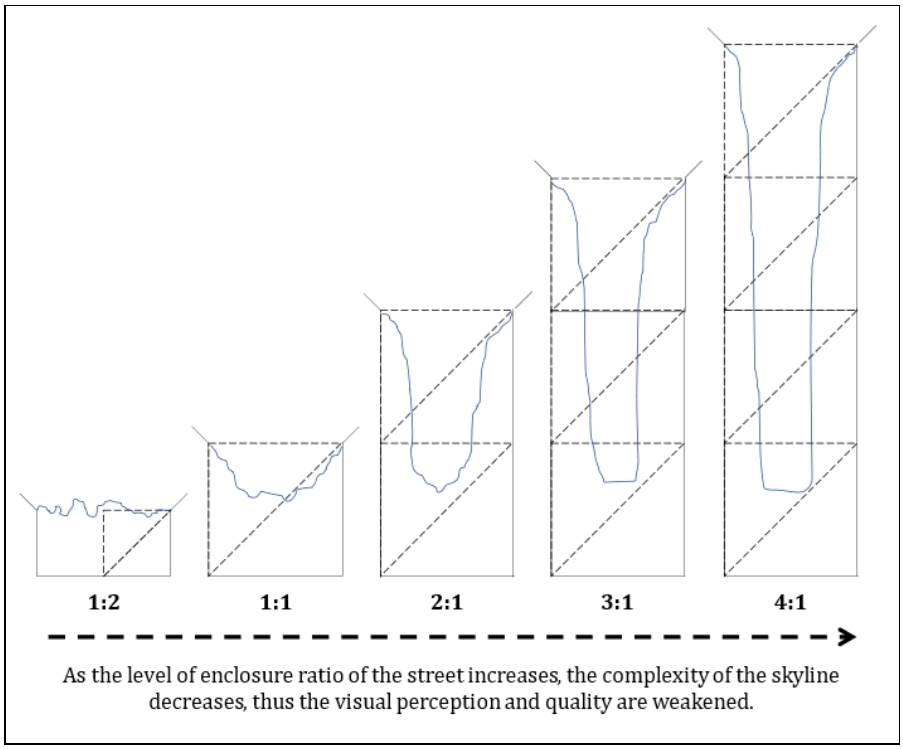

Figure 7. Comparison of enclosure ratio and skyline's complexity

CONCLUSIONS

To design livable and desired cities, answering how people perceive urban spaces and revealing the factors that affect this perception are of great importance. The most important part of spatial perception is visual perception. In this context, the visual quality of the space and its effect on the perceptual process stands out as a critical issue. Visual quality is directly related to perceptual urban design principles. Visual quality is high in spaces designed with a high visual perceptibility. "Enclosure" and "Complexity" are two urban design principles that significantly affect the perceptibility of space. The fractal method is used as an objective and, at the same time, perceptual evaluation method to assess complexity in urban spaces. However, the perceptual evaluation of the enclosure in the space is realized only by subjective methods. This study aimed to perceptually evaluate the enclosure ratio of the street through the complexity of the street skyline with the fractal method. For this, street images from London and Chicago cities were analyzed. First, the street skylines were determined on the images, and then the fractal dimensions of the skylines were calculated. After that, the enclosure ratio of the streets was calculated quantitatively, and its relation with the fractal dimensions of the street skylines was evaluated. According to the result, as the enclosure ratio of the street increased, the fractal dimension of the

street skyline decreased. As the enclosure ratio increases from 1:2 to 4:1, the complexity in the skyline, thus the perceptibility and visual quality of the street, decreases. In urban design studies, it is essential to reveal information about what factors increase the visual quality and perceptibility of streets. This study offered an objective and perceptual evaluation method in assessing the enclosure ratio of streets. Also, defining the enclosure ratio at an optimal ratio in street design will increase the visual complexity of the street skyline, thus increasing the visual quality and perceptibility of the street.

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CONFLICT OF INTEREST
No conflict of interest was declared by the authors.

ETHICS COMMITTEE APPROVAL
Ethics committee approval was not required for this article.

LEGAL PUBLIC/PRIVATE PERMISSIONS
In this research, the necessary permissions were obtained from the relevant participants (individuals, institutions and organizations) during the survey, in-depth interview, focus group interview, observation or experiment.

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Resume

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Location Site Selection Preferences of Construction Firms that Offer Second Homes to Foreign Investors: The Case of Trabzon

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Abstract

Purpose

Being necessarily proactive, spatial plans should consider national and global developments. In Turkey, after legislative amendments of the 2000s, legal obstacles for foreign investment in house-ownership were eradicated, raising a significant demand for second homes. If the current planning process does not turn this demand into an opportunity, it will probably be one of its main threatening factors. This study aims to uncover the criteria affecting the locational choices of construction companies for their project area in supplying second homes for those investors, and rank them according to their importance.

Design/Methodology/Approach

A three-stage AHP was utilized. First, the objectives, criteria and sub-criteria affecting the locational choices of construction companies were determined and a hierarchical structure was set. Secondly, pairwise comparisons were made with the company officials. Thirdly, the relative and general weights of the criteria and sub-criteria were calculated and locational preferences for the project area were uncovered. The city of Trabzon, where the second home supply for the citizens of the countries in Arabian Peninsula increased after 2012, was chosen as the case.

Findings

It is concluded that the development plan decisions are very effective in the locational selection of the project areas. The most important criteria in the selection process are found to be the nearby plan decisions, high unit/m^2 sale price of flats, and plan decisions on the parcel, in turn. Moreover, the ones for the sub-criteria were found to be having nearby a CBD plan decision, development order, and having a nearby recreational area plan decision, in turn.

Research Limitations/Implications

Although there are many such construction companies, only two company officials volunteered to participate, yet the study still provides a basis for future work and an awareness for international dynamics of the city.

Originality/Value

The criteria affecting the locational choices of construction companies for their project area in supplying second homes for foreign investors were revealed and ranked. Pairwise comparisons in AHP were made simultaneously with the participants using a videoconference application, considering the risk of Covid-19. The study contributes to housing supply literature and guide spatial plans by introducing locational preferences of the firms.

Keywords: *AHP, housing supply to foreigners, location site selection, second home*

INTRODUCTION

Ersoy (2017) states that spatial planning should be a future-oriented design, that it should be done in order to achieve certain objectives/goals and that it should create a systematic action sequence. It is expected that spatial plans prepared with 15-20-year objectives predict and direct the housing supply and demand within the market mechanism in order to have the right information infrastructure. Otherwise, the process which is left to free market conditions may cause unplanned and unforeseen situations to arise in the designs, objectives/goals and action sequences of the current spatial plans. These unplanned and unforeseen developments may result in changes that will cause the plan become obsolete, or the sector produces its own solutions within the market mechanism. In both cases, this is a failure of the planning and the plan in a sense, as an urban development has emerged which the plan did not foresee.

Homes that foreigners buy outside of their own country are called second homes. Second home is defined in the Glossary of Urban Science Terms as "a unit of residence that people use in their vacations or short-term trips apart from their homes where they live permanently" (Keleş, 2009). The main characteristics of the second homes that make them different from the first houses where households live permanently are said to be: The duration of use, frequency of use, their functions (suitability for recreational purposes such as entertainment, resting, having a holiday, etc.) (Karaaslan and Yalçıner Ercoşkun, 2005) and their location. In general, second homes are located on the coasts where the tourism sector is developing and in regions with high natural qualities (Coppock, 1977; Huang and Yi, 2011; Kaltenborn and Clout, 1998; Nepal and Jamal, 2011; Overvag and Berg, 2011) and are located close to urban settlements (Bakırcı, 2007; Gündüz, 2003; Mizan, 1994).

There have been two important turning points in the legal amendments about foreigners' acquisition of real estates in Turkey. The first of these is the removal of the article which prohibited foreigners from acquiring real estates in villages from the Village Law in 2004. The second is the abolition of the principle of reciprocity in 2012, which had been in the Land Registry Law since the foundation of the In terms of foreigners' acquisition of immovable properties, the principle of reciprocity means if Turkish citizens have the right to acquire immovable properties in one country, the citizens of that country also have the right to acquire immovable properties in Turkey. In 2012, this principle was abolished and the authority to determine which country citizens could buy houses in Turkey was given to the Council of Ministers. From that year on, the citizen of countries that were not granted the right to acquire immovable properties in Turkey were granted the right to acquire immovable properties in Turkey. With the granting of this right, the citizens of the countries in the Arabian Peninsula started to buy high quantities of houses in Turkey. Table 1 shows the number of houses purchased by foreigners between 2015 and 2020 by country. While the total number of

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second homes purchased by foreigners between 2015 and 2017 was around 20,000, it doubled in 2018, and reached approximately 41,000 in 2020 despite the pandemic. Iraqi citizens are those who bought the most second homes; in general, the citizens of the Arabian Peninsula demanded second homes; and the citizens of Germany and England from among European countries were among the top ten in the ranking. It is estimated that some of the foreigners who bought second homes in Turkey bought second homes in Turkey due to the security concerns in their own countries.

Table 1. Number of houses purchased by foreigners between 2015 and 2020 by country (Turkish Statistical Institute (TURKSTAT), 2021)

2015		2016		2017	
Iraq	4228	Iraq	3036	Iraq	3805
SaudiArabia	2704	SaudiArabia	1886	SaudiArabia	3345
Kuwait	2130	Kuwait	1744	Kuwait	1691
Russia	2036	Russia	1224	Russia	1331
Un.Kingdom	1054	Afghanistan	1205	Afghanistan	1078
Germany	869	Un.Kingdom	827	Azerbaijan	942
Azerbaijan	815	Germany	714	Un.Kingdom	794
Iran	744	Iran	664	Iran	792
Afghanistan	656	Azerbaijan	610	Germany	772
Ukraine	608	Ukraine	484	Egypt	587
Other	7147	Other	5997	Other	7291
Total[1]	22991	Total[1]	18391	Total[1]	22428
2018		2019		2020	
Iraq	8205	Iraq	7596	Iran	7189
Iran	3652	Iran	5423	Iraq	6674
SaudiArabia	2718	Russia	2893	Russia	3078
Russia	2297	SaudiArabia	2208	Afghanistan	1929
Kuwait	2199	Afghanistan	2191	Azerbaijan	1279
Afghanistan	2084	Kuwait	1903	Germany	1265
Germany	1866	Germany	1723	Kuwait	1231
Jordan	1362	Jordan	1596	Yemen	1181
Azerbaijan	1250	Yemen	1564	Kazakhstan	1171
Un.Kingdom	1237	Un.Kingdom	1353	Un.Kingdom	1126
Other	13174	Other	17517	Other	15175
Total[1]	40044	Total[1]	45967	Total[1]	41298

[1] TURKSTAT explains that the difference in the total number of houses purchased by foreigners in Tables 1 and 2 is due to the fact that different nationalities can buy the same house.

Before 2012, rather the citizens of European Union member states bought individual sections in the Aegean, Mediterranean and Marmara coasts in Turkey (Görer Tamer, Erdoğanaras, Yüksek and Güzey, 2010). A large part of the total number of houses sold to foreigners in Turkey between 2013 and 2020 was in Istanbul and Antalya provinces (Table 2). Antalya is the province where most houses were bought between 2019 and 2014, and İstanbul is the province where most houses were bought between 2019 and 2020. Before 2012, Turkey was rather preferred by the EU citizens, and with the legal amendments some previously undemanded provinces started to be preferred. Of these, Yalova, Trabzon and Sakarya provinces have become prominent. Due to the pandemic (Covid-19) in 2020, the house demand of the citizens of the countries in the Arabian Peninsula in these provinces was interrupted; however, it is anticipated that this demand will continue in the future. Estimating,

directing and turning the investments into opportunities in order to meet this demand is a planning problem; for, if the current plans do not turn this into an opportunity, there is a risk that this will turn into an element that will threaten the current plans.

Table 2. Number of houses bought by foreigners between 2013 and 2020 by provinces (TURKSTAT, 2021)

2013		2014		2015		2016	
Antalya	5548	Antalya	6542	İstanbul	7493	İstanbul	5811
İstanbul	2447	İstanbul	5580	Antalya	6072	Antalya	4352
Aydın	1112	Aydın	1191	Bursa	1501	Bursa	1318
Muğla	1053	Muğla	1051	Yalova	1425	Aydın	871
Mersin	545	Bursa	954	Aydın	1107	Yalova	822
Bursa	375	Mersin	783	Sakarya	833	Trabzon	810
Yalova	284	Yalova	765	Muğla	830	Sakarya	657
İzmir	194	Sakarya	512	Trabzon	778	Muğla	632
Ankara	175	Ankara	369	Mersin	717	Ankara	623
Sakarya	103	Trabzon	225	Ankara	599	Mersin	580
Other	345	Other	987	Other	1475	Other	1713
Total	12181	Total	18959	Total	22830	Total	18189
2017		2018		2019		2020	
İstanbul	8182	İstanbul	14270	İstanbul	20857	İstanbul	19175
Antalya	4707	Antalya	7938	Antalya	8951	Antalya	7735
Bursa	1474	Bursa	2720	Ankara	2539	Ankara	2746
Yalova	1079	Ankara	2133	Bursa	2213	Bursa	1340
Trabzon	978	Yalova	2063	Yalova	1696	Yalova	1321
Aydın	826	Sakarya	1366	Sakarya	1247	Mersin	1313
Ankara	817	Trabzon	1344	Muğla	957	İzmir	908
Sakarya	770	Aydın	1070	Trabzon	935	Samsun	880
Muğla	634	Mersin	1022	Samsun	885	Sakarya	864
Mersin	600	Samsun	956	Aydın	837	Muğla	745
Other	2167	Other	4781	Other	4366	Other	3785
Total	22234	Total	39663	Total	45483	Total	40812

In this study, AHP from Multi-Criteria Decision-Making Support Systems (MCDMSS) was employed to determine the building site preference priorities of construction companies that build and sell second homes for Arab Investors.

In the first stage, by using the literature and the characteristics of the field of work, the objectives, criteria and sub-criteria affecting the location preferences of the two construction companies that supply houses to the citizens of the countries in the Arabian Peninsula were determined, and a hierarchical structure was created in accordance with the AHP technique. The first level of this hierarchical structure contains the goals, the second level contains the objectives, the third level contains the criteria and the fourth level contains the sub-criteria. In the second stage, pairwise comparisons were made in accordance with the AHP. These pairwise comparisons were made by one official from each of the two construction companies under the supervision of the authors of the present study. In the third stage, the relative and general weights of the criteria and sub-criteria were calculated and the project area location site selection preferences were revealed.

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LITERATURE REVIEW

In the literature, there are studies that deal with the issue of second house acquisition by foreigners from different perspectives. These studies mostly focus on foreigners who want second houses, on the characteristics of the demands, and on the effects of the second home acquisition on the area. A limited number of studies have been conducted on the relationship between second home location selection of foreigners and spatial planning.

Studies focusing on the demand for second house acquisition by foreigners generally focused on the characteristics of foreigners and the reasons for acquiring a second house and established their relationship with migration (Breuer, 2005; Farstad and Rye, 2013; Müller, 2002; Müller and Roger, 2011; Norris and Winston, 2010). It is possible to categorize studies on the effects of second house acquisition as economic, social and physical effects. Studies investigating the economic effects mostly examined the changes in house prices and the contribution of foreigners to the local economy (Avcı, Avcı and Şahin, 2008; Bohlin, 1982; Guest and Rohde, 2017; Karakaya and Turan, 2006; Paris, 2017; Südaş and Mutluer, 2008; Wokker and Swieringa, 2016). In studies on social impacts, studies were conducted on how foreigners' second house acquisition affects local identity and the relations between local people and foreigners (Casado-Diaz, 2009; Gustafson, 2008; Hall and Müller, 2004; Nudralı, 2007; O'Reilley, 2001; Rye, 2011). Studies examining the physical effects focused on the protection of natural areas, on the change of existing construction, and on the relationship with urban planning (Alipour, Olya, Hassanzadeh and Rezzapouraghdam, 2017; Bakırcı, 2007; Erdoğanaras, Güzey, Görer Tamer and Yüksel, 2005; Görer Tamer *et al.,* 2010; Gündüz, 2003; Mizan, 1994; Rovira Soto and Clave, 2017; Zoğal and Emekli, 2018). In the literature, while there are limited studies on the second house location selection of foreigners (Gauder, Houssard and Orsmond, 2014; Lipkina, 2013), there are more studies on the location selection of second houses (Burby III, Donelly and Weiss, 2007; Kaltenborn and Clout, 1998; Li and Fan, 2020; Manaugh and El-Geneidy, 2013; Stewart and Stynes, 1995). In addition, studies on second house location selection are more demand-oriented and studies on supply are limited (Gallent and Tewdwr-Jones, 2001).

Studies conducted in Turkey usually focused on the Aegean and Mediterranean Regions, where the citizens of European Union countries acquired second houses (Avcı *et al.,* 2008; Bakırcı, 2007; Erdoğanaras *et al.,* 2005; Görer Tamer, Erdoğanaras, Güzey and Yüksel, 2006; Görer Tamer *et al.,* 2010; Karakaya ve Turan, 2006; Mizan, 1994; Nudralı, 2007; Südaş ve Mutluer, 2008; Yirik ve Baltacı; 2016). These studies mostly focused on the immigration of foreign pensioners and its effects. Studies on the citizens of Arab countries who have acquired the right to house acquisition in our country after 2012 and the cities where they have acquired second houses are limited (Alkan Gökler, 2021; Ünlü Öztürk and Yılmaz Bayram, 2021). This study aims to determine the criteria for the

project area location selection of the construction companies that supply second houses to foreigners and to rank them according to their importance. It is hoped that it will fill an important gap in the literature and will contribute to the planning practice.

RESEARCH METHOD

Field of Work

In this study, the urban region of Trabzon was chosen as the sample field of work (Figure 1). The urban region includes Ortahisar—the central district of Trabzon—, the district of Yomra in the east and the district of Akçaabat in the west. The urban region of Trabzon has developed in a linear macro form parallel to the coast and this development still continues.

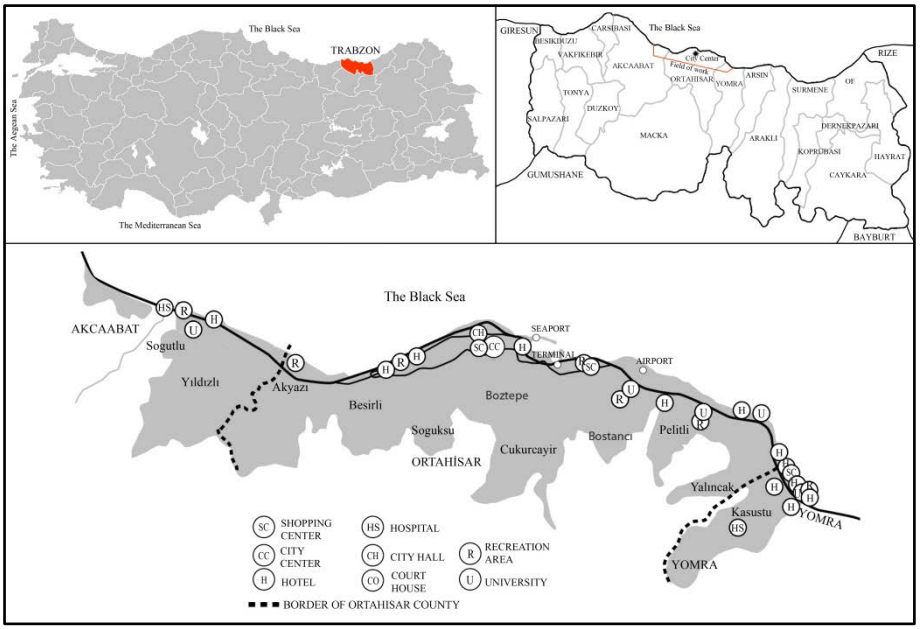

Figure 1. The location of the urban region of Trabzon – the field of work – within the country and the province.

Many construction companies have been building second homes for Arab investors in recent years in the urban region of Trabzon, and Arab investors buy houses. In Trabzon, during the years when the acquisition of houses of the citizens of the countries in Arabian Peninsula increased, the promotions and advertisements of house projects were made in Arabic. In terms of second home investments, the eastern border neighborhood of Ortahisar district, Yalıncak, and Kaşüstü neighborhood of Yomra district stand out (Ünlü, 2018).

Method

This study employed the AHP technique, one of the Multi-Criteria Decision-Making (MCDM) methods. MCDM is a decision-making support system that offers systematic methods in the analysis of complex decision-making problems. The stages of this analytical system consist of the following respectively: dividing the decision-making problem into small and understandable pieces, analyzing each piece, and attaining a

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result by combining the pieces within a certain logic (Malczewski, 1999). The MCDM techniques allow decision-makers to make an analytical decision in the evaluation, selection and ranking of alternatives (Voogd, 1983). MCDM techniques and Geographic Information Systems (GIS) were integrated with each other, and since the 1980s, this integrated system has been widely used in the distribution of environmental and natural resources, transportation, urban and regional planning, waste management, hydrology, and soultion of the problems in agriculture and forestry (Malczewski, 2006). The MCDM techniques are divided into two groups as Multi-Attribute Decision-Making (MADM) and Multi-Objective Decision-Making (MODM) techniques.

MADM is a decision-making support system in which many different criteria are used together for a single purpose (Carver, 1991; Voogd, 1983). Using different criteria together is one of the most important advantages of the technique. The MADM techniques are widely used in the preparation of a land suitability map for any type(s) of land use, or location selection of any facility (Dai, Lee and Zhang, 2001; Pereira and Duckstein, 1993), and in ordering and selecting a limited number of predetermined alternatives in planning (Carver, 1991; Türk, 2018; Zucca, Sharifi and Fabbri, 2007). AHP, Analytical Network Process, Vikor, Topsis, Mora, Electre, Promethee are some of the MADM techniques. The MODM techniques are operational/mathematical programming used to determine the optimum alternative when the alternatives are infinite and unlimited (Çelik and Türk, 2011; Silva, Alçada-Almeida and Dias, 2017; Türk and Çelik, 2013; Türk and Zwick, 2019).

Developed by Saaty (1980), AHP is a flexible, useful, packaged software and is widely used in spatial planning problems (Banai-Kashani, 1989; Carver, 1991; Türk, 2018). Many criteria are effective in the project area location selection of construction companies that supply second houses to foreign investors. Most of these criteria do not have a measurement unit, and the measurement units of the criteria that have measurement units are not comparable with each other. AHP was used in this study as it allows to calculate the relative and general weight of the criteria by making a pairwise comparison of criteria that do not have a unit of measurement and have different units of measurement. Another advantage of AHP is that it offers an analytical and hierarchical approach to breaking down very complex decision problems into parts.

The AHP includes three principles and stages as decomposition, pairwise comparative judgment, and synthesis of priorities (Saaty, 1980; Malczewski, 1999). The first stage in AHP is to divide the decision-making problem into hierarchy. In general, the hierarchical structure is as follows: goals, objectives, criteria/attributes, sub-criteria and alternatives. Depending on the purpose of the study, the number of levels and order in the hierarchy may change. Because the purpose of this study is to rank the criteria and sub-criteria in order of importance, alternatives are not included.

The second stage is the pairwise comparisons of decision elements. Pairwise comparisons in the AHP are the main measure. In the pairwise comparison matrix, each criterion is compared with other criteria according to its component one level higher. When making comparisons according to the importance levels in Table 3, if the criterion in the row of the comparison matrix is more important than the criterion in the column, it takes a value between 1 and 9. Conversely, when the criterion in the column is more important than the criteria in the row, it takes a value between 1/2 and 1/9 (Table 3). As a result of the pairwise comparisons, the eigenvector corresponding to the largest eigenvalue of the matrix expresses the relative priorities of the criteria. Thus, a weight vector reflecting the relative importance of various criteria is obtained.

Table 3. Pairwise comparison scale (Saaty, 1980)

Level of importance	Interpretation	Explanation
1	Equal importance	Two activities contribute equally to the objective
3	Moderate importance of one over another	Experience and judgment moderately favor one activity over another.
5	Essential or strong importance	Experience and judgment strongly favor one activity over another
7	Very strong importance	An activity is strongly favored and its dominance is shown in practice
9	Extreme importance	The evidence favoring one activity over another is of the highest possible order of affirmation
2, 4, 6, 8	Intermediate values	Values between two consecutive judgments to be used when compromise is needed

When making pairwise comparisons, the scores given by the decision maker must be compatible with each other. To ensure the consistency of subjective perceptions and the accuracy of relative weights, two coefficients, the Consistency Index (*CI*) and the Consistency Ratio (*CR*), are used. To test the compatibility, CR is calculated for each comparison matrix. The consistency ratio is used to express the probability of random generation of matrix decisions (Saaty, 1980). The following formula is used to calculate CI.

$CI=(\lambda max-n)/(n-1)$

Here, *CI* denotes the index of consistency and shows the deviation from consistency. λmax is the biggest eigenvalue of the matrix, and n is the number of elements (criteria/subcriteria) in the matrix.

The CR is calculated with the following formula:

$CR=CI/RI$

Here, *RI* represents the random value index (Table 4). Table 4 shows the *RI* values according to different element numbers (n).

Table 4. Random value index (Saaty, 1980)

n: Random	1	2	3	4	5	6	7	8	9	10
Value Index	0	0	0.52	0.89	1.11	1.25	1.35	1.40	1.45	1.49

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A CR of 0.1 or less is a reasonable consistency level. Otherwise, a consistency ratio above 0.1 would require revision of significance levels in the matrix due to inconsistent evaluation. That 7±2 criteria/sub-criteria are at comparable level in each comparison matrix is indicated. If the criteria/sub-criteria are more than 9, it is recommended that they be divided into subgroups (Saaty, 1980).

The third step is the calculation of the overall (combined) weights. The relative weights of the levels that were calculated in the second step are combined to obtain the overall weights. For this, the relative weight of each criterion or sub-criterion must be multiplied by the relative weight of the relevant criterion or sub-criterion and the objective at each level in a hierarchical manner from the bottom to the top. These values show the relative weight of criteria or sub-criteria relative to the overall objective (Saaty, 1980; Malczewski, 1999). In the present study, a Microsoft Excel© template was developed to implement the AHP algorithm.

In this study, a three-stage process was used. In the first stage, the AHP hierarchy was established by revealing the criteria that affect the location preferences of companies that supply houses to foreign investors In the second stage, the decision-making elements in the AHP hierarchy were compared pairwise by the construction company officials who supplied housing to foreigners in the city of Trabzon. In the last stage, the general weights of the decision-making elements were calculated, and the effects of the criteria and sub-criteria on place selection preferences were revealed.

The first stage: Creating the AHP hierarchy

In line with the aim of the study, the goal at the first level of the AHP hierarchy was determined as "the project area location site selection preferences of construction companies that supply houses to Arab investors". The second level contains the objectives, and three objective have been determined by using the literature. These are (1) Consumer demand, (2) Development plan and developed site, and (3) Cost and profit. At the third level, there are criteria under each objective, and at the fourth level, there are sub-criteria under each criterion. Criteria and sub-criteria were determined by taking into consideration the relevant literature and the characteristics of the field of work.

Under the objective of consumer demand are the criteria of proximity to natural areas (Prx. to natural areas), view, presence of foreign investors in the region (Prs. foreign investor) and proximity to functions in the city (Prx. func. in the city). Under the criterion of proximity to natural areas are the sub-criteria of proximity to the sea, lake, stream, creek, forest and agricultural areas; Under the view criterion are the sub-criteria of sea view, city view and natural area view; under the criterion of proximity to functions in the city are the sub-criteria of proximity to shopping malls, touristic areas, the city center and the airport (Figure 2).

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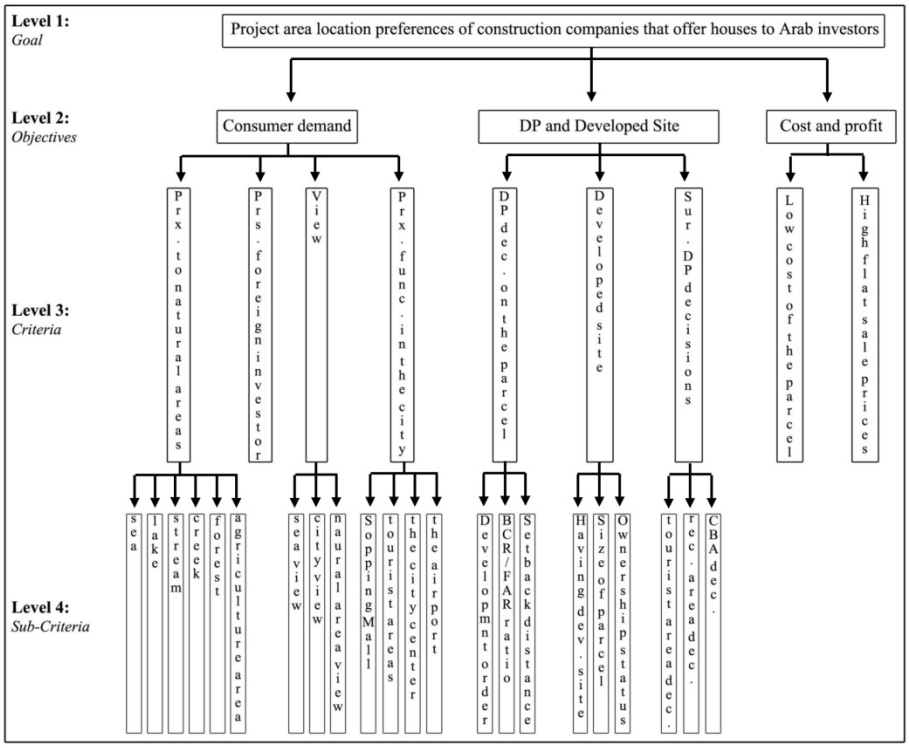

Figure 2. The hierarchy of project area site selection and preferences of construction companies that supply houses to Arab investors.

The locations demanded by foreigners for their houses are a guide for construction companies. In general, it is stated that proximity to water (sea, creek, and lake) and green (forest, agricultural areas, natural areas) is of great importance in the second home demands of foreigners (Casado-Diaz, 1999; Ünlü, 2018). In addition, foreigners usually prefer to buy houses in places they have visited and liked as tourists, and their experiences with the city affect them. In this context, proximity to touristic places also emerges as important for the choice of house site (Bakırcı, 2007). In addition to the specified criteria, foreigners mostly prefer to be close to their relatives and acquaintances when buying a house. In this respect, proximity to the places where foreigners that have previously acquired houses in the region live is also effective in the demand (Casado-Diaz, 1999; Hall and Müller, 2004). Another important point is said to be transportation connections. In the acquisition of the second home, the distance between the first and the second home determines the type of transportation and the duration of use (Bakırcı, 2007; Bell and Ward, 2000; Gündüz, 2003; Mizan, 1994). If the distance is short, private vehicles are used; as the distance increases, other means of transportation such as buses, trains and planes are preferred. In the acquisition of the second homes by foreigners, since they travel from one country to another, especially the places that are close to the airport become important. Because the officials that were interviewed stated that foreigners want to be close to areas such as shopping malls and city centers where they can meet their needs in the areas where they buy houses for touristic purposes, proximity to these two functions were also included in the hierarchy as sub-criteria.

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Under the development plan and developed site (DP and Developed Site) objectives are also the criteria of development plan decisions on the parcel (DP dec. on the parcel), developed site, and development plan decisions in its immediate surroundings about the parcel (Sur. DP Decisions). Under the criterion of development plan decisions on the parcel are the sub-criteria of development order, Building Coverage Ratio (BCR) / Floor Area Ratio (FAR) and set-back distances; under the developed site criterion are sub-criteria of having developed site on the parcel (Having dev. site), size of parcel and ownership status; under the criterion of development plan decisions in its immediate surroundings about the parcel; having a tourism area plan decisions in its immediate surroundings (tourist. area dec.), having a recreational area plan decision in its immediate surroundings (rec. area dec.), and having a central business area plan decision in its immediate surroundings (CBA dec.) were determined as the sub-criteria (Figure 2).

The development order in the current implementation development plan of the real estate to be projected is important in terms of the development rights granted to the real estate. These rights involve the BCR and FAR, which indicates the total construction area, and setback distance. In her study, Ünlü (2018) found that immovable with a FAR decision on the plan are preferred, especially in the implementation plan. On a parcel planned in FAR, because vertical development is permitted by reducing the BCR without changing the FAR, the yard becomes larger, and this allows the yard to be used for such common functions as parking lot, green area, pool, etc. The authorities that were interviewed stated that another reason for preference is that the immediate surroundings of the second homes that the foreigners will use for entertainment and holiday purposes has, with all its functions, a planned tourism area or a central business area or a recreation area. That an immovable has been implemented a a developed site in accordance with Article 18 of the Zoning Law No. 3194 indicates that the necessary public areas have been abandoned from the cadastral parcel to the public areas within the scope of the participation share of readjustment, the immovable will not be abandoned again, and the immovable has reached the stage of obtaining a building license. That an immovable property is owned by one person is an advantage over a multi-ownership in resolving a future dispute after the owner of the immovable has made a contract with the contractor. In this context, ownership status is also important (Çağla, 2007).

Under the cost and profit objective, there are such criteria as low cost of the parcel and high flat unit/m^2 sale prices. With these criteria, the investor makes a cost-profit comparison. While choosing the location of the housing area, the areas with low land costs are preferred primarily (Meyer and Gomez – Ibanez, 1981). Especially after the second half of the 20th century, with the development of transportation technologies, living close to the city center has become less important and low-cost lands in the periphery of cities have started to be preferred. In this context, low land prices are important for the choice of housing area. Another

important point is the high house unit price/m^2 after the project is prepared (Kocatürk Özcan, 2006).

The second stage: Pairwise comparisons of decision elements

Pairwise comparisons were made in accordance with the hierarchy created in the first stage. Pairwise comparisons were made by the construction company officials that produce second homes for Arab investors. Between 2012 and 2017, when foreigners' house acquisition was high in Trabzon, the companies that promoted housing projects on the internet and the number of projects they produced were determined (Ünlü, 2018). It was found that 75% of the housing projects were produced by only 6 companies and 25% by 31 companies. Then, 6 company representatives were contacted. Of the 6 companies, two agreed to participate in the study. An official from each of the two construction companies, who agreed to participate in the study, made pairwise comparisons, in the form of a group meeting, using a videoconference application. In the videoconference, the group was first informed about the aim of the study, the scoring system and AHP. Then, they made pairwise comparisons. In pairwise comparisons, the scores given by the group in agreement were entered into the comparison matrices simultaneously by one of the authors of the study. Pairwise comparisons were made by considering the related goal, objective and criterion at the next higher level.

The third stage: Calculation of priority values of decision elements

In the third step, first the relative weights of the objectives, criteria and sub-criteria, then the general weights of the criteria and sub-criteria were calculated. The relative weight of each criterion was multiplied by the relative weight of the respective objective in the higher hierarchy. Thus, the overall weight of each criterion was calculated. The relative weight of each sub-criterion was multiplied by the relative weights of the corresponding criterion and objective in the upper hierarchies, respectively. Thus, the overall weight of each sub-criterion was calculated.

RESULTS

The relative weights of objectives in the second level of the hierarchy were calculated by pairwise comparison. Of the objectives, the weight value of consumer demand was found to be 0.105, of development plan and developed site 0.637, and of cost/profit 0.258.

In the next step, the relative weights of the criteria under each objective at the second level were calculated (Table 5). Under the consumer demand objective, the criterion of view; under the development plan and developed site objective, the criterion of development plan decisions in its immediate surroundings about the parcel; and under the cost/profit objective, the criterion of high flat unit/m^2 sale price received the highest relative weights. At the third level, under each criterion, proximity to the

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sea, sea view, proximity to the city center, development order, ownership status and the having a central business area plan decision in its immediate surroundings are the sub-criteria that received the highest relative weights. These sub-criteria received at least more than half of the total score in each single pairwise comparison.

Table 5. Relative weights of objectives, criteria and sub-criteria

Objectives (Obj.)	Obj. weight	Criteria (Cri.)	Cri. weight	Sub-criteria	Sub-cri. weight
Consumer demand	0.105	Proximity to natural areas	0.046	Proximity to the sea	0.584
				Proximity to the lake	0.099
				Proximity to the stream	0.099
				Proximity to the creek	0.081
				Proximity to the forest	0.081
				Proximity to agricultural areas	0.056
		View	0.573	Sea view	0.731
				City view	0.081
				Naural area view	0.188
		Presence of foreign investors in the region	0.110		
		Proximity to the functions in the city	0.271	Proximity to shopping mall	0.243
				Proximity to tourist areas	0.049
				Proximity to the city center	0.607
				Proximity to the airport	0.101
Development plan and developed site	0.637	Development plan decisions on the parcel	0.243	Development order	0.818
				BCR/FAR ratios	0.091
				Set-back distances	0.091
		Developed site	0.088	Having a developed site on the parcel	0.055
				Size of parcel	0.290
				Ownership status	0.655
		Development plan decisions in its immediate surroundings about the parcel	0.669	Presence of an immediate surrounding having a tourist area planning	0.063
				Presence of an immediate surrounding having a recreation area planning	0.265
				Presence of an immediate surrounding having central business area planning	0.672
Cost and profit	0.258	Low cost of the parcel	0.125		
		High flat unit/m² sale prices	0.875		

It should be born in mind that the consistency index should be below 0.1 in pairwise comparisons. Since the consistency index was below 0.1 in all pairwise comparisons, there was no need to revise the pairwise comparisons.

In the next stage, the overall weight of each criterion was calculated. These weights were obtained by multiplying the relative weight of each criterion by the relative weight of the objective (Table 6). development plan decisions in its immediate surroundings about the parcel, high flat unit/m² sale price and development plan decisions on the parcel have been the criteria with the highest overall weights.

Table 6. Overall weight ranking of the criteria

Sequence	Criteria	Overall Weight
1	Development plan decisions in its immediate surroundings about the parcel	0.426153
2	High flat unit/m² sale prices	0.225750
3	Development plan decisions on the parcel	0.154791
4	View	0.060165
5	Developed site	0.056056
6	Low cost of the parcel	0.032250
7	Proximity to the functions in the city	0.028455
8	Presence of foreign investors in the region	0.011550
9	Proximity to natural areas	0.004830

In the last stage, the general (global) weight value of each single sub-criterion was calculated. The relative weight of a sub-criterion was multiplied by the relative weights of the corresponding criterion and objective in the upper hierarchies respectively, and thus the overall weight of each sub-criterion was calculated. As seen in Table 7, the sub-criterion of the 'having a central business area plan decision in its immediate surroundings,' the sub-criterion of 'develoopment order,' and the sub-criterion of the 'having a recreational area plan decision in its immediate surroundings' have the highest general weights. The total weight of these three sub-criteria is equal to 0.525925, which is approximately equal to the total weight of the remaining 19 sub-criteria. In other words, it can be said that these three sub-criteria are determinant in the choice of location of the project area. While the construction company officials were making the pairwise comparisons, they stated that foreigners want to meet their needs from the close environment. The findings of the study support the actual situation; because the construction companies that produce houses for Arab investors in Trabzon mainly prefer locations in Kaşüstü and Yalıncak regions (Ünlü, 2018). In the last 10 years, tourism facilities, shopping malls, functions requiring large area use and commercial areas have been built in the Kaşüstü and Yalıncak regions, and this region continues to develop as a sub-center (Figure 1). The proximity of the region to the city center, airport and sea has increased its attraction. On the other hand, the development order in the implementation development plan provides great flexibility to the construction companies in the projects to be realized and enables them to increase their profits. The construction company officials stated that in the parcels having a FAR planning, reducing the BCR permits vertical construction without changing the total construction area. In this case, they stated, such recreational areas as parks, swimming pools, sports fields etc. can be built on the unbuilt part of the parcel, which increases the attractiveness of the project. Regarding the ownership status, which is at the top of the general weight ranking, it was stated that the parcels owned by one person are preferred because there are difficulties with the joint-owned parcels both during the agreement period and afterwards.

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Table 7. Overall weight ranking of sub-criteria

Sequence	Sub-criteria	Overall weight
1	Having a central business area plan decision in its immediate surroundings	0.286375
2	Development order	0.126619
3	Having a recreational area plan decision in its immediate surroundings	0.112931
4	Sea view	0.043981
5	Ownership status	0.036717
6	Having a tourism area plan desicions in its immediate surroundings	0.026848
7	Proximity to the city center	0.017272
8	Size of parcel	0.016256
9	BCR/FAR ratios	0.014084
10	Set-back distances	0.014084
11	Naural area view	0.011311
12	Proximity to shopping mall	0.006915
13	City view	0.004873
14	Having a developed site on the parcel	0.003083
15	Proximity to the airport	0.002874
16	Proximity to the sea	0.002821
17	Proximity to tourist areas	0.001394
18	Proximity to the lake	0.000478
19	Proximity to the stream	0.000478
20	Proximity to the creek	0.000391
21	Proximity to the forest	0.000391
22	Proximity to agricultural areas	0.000270

The control mechanism of the administrations on the housing area location selection of the construction companies is the spatial plan. This study has shown that all the criteria and sub-criteria that affect the location selection of the construction companies that produce houses for Arab investors are directly or indirectly related to the spatial plans. It would be useful for city planners who are experts on spatial planning and politicians who are responsible for planning to make planning decisions by being aware of this fact.

DISCUSION AND CONCLUSIONS

Before 2012, mostly the citizens of European Union member countries bought second homes on the Aegean, Mediterranean and Marmara coasts. In 2012, the principle of reciprocity was abolished by the Council of Ministers, and therefore citizens of those countries that did not have the right to buy houses in Turkey were granted the right to buy houses. After this change, the citizens of the countries in the Arabian Peninsula began to buy large quantities of houses in Turkey. With this development, Arab investors bought many second homes in some cities such as Yalova, Trabzon and Sakarya. In these cities that are experiencing a new process, it is important to identify the demand and to direct this demand in spatial plans. Otherwise, the process that is left to free market conditions may cause unplanned and unforeseen spatial developments in the targets/purposes and action sequences of the current spatial plans.

The aim of this study is to determine the criteria and sub-criteria affecting the location preferences of construction companies that offer second

homes to the citizens of the countries in the Arabian Peninsula and to uncover their priorities. The works within this scope that shape the spatial plans will contribute to the awareness of the international dynamics of the city and the correct evaluation of these opportunities during the preparation of the plan.

The study unveiled the targets, criteria and sub-criteria affecting the location preferences of the companies that offer houses to foreigners and determined the priorities through weighing them by the construction company representatives. In the location preferences of the construction companies, the study found the following sub-criteria as determinants: development plan decisions in the immediate surroundings, high flat unit/m^2 sale price and the criteria for implementation development plan decisions for the parcel; presence of an immediate surrounding having central business area planning, development order, and presence of an immediate surrounding having a recreation area planning. This indicates that spatial planning decisions are important on the location preferences of companies. The findings of this study have shown that the development plan decisions are the main determining factor in the project area location selection of the construction companies. For this reason, while the development plans are being prepared, it is necessary to take into consideration the second house demand of the citizens of the Arabian Peninsula and the weights of the criteria in the project area location selection of the construction companies that meet this demand. Otherwise, the construction companies will continue to produce second houses for the citizens of the Arabian Peninsula in the areas with central business and recreation areas in the immediate vicinity, even if the current development plans do not foresee. On the other hand, the unplanned second house ownership of the citizens of Arabian Peninsula countries in the city may cause social and spatial problems, especially in the areas that are close to these second houses and in the city. It is necessary to produce plan decisions to reduce or eliminate these problems.

This study employed AHP from MCDMSS techniques. AHP is widely used in choosing and ranking among alternatives in very complex and multi-criteria spatial problems. For it has flexible, useful and package programs. In this study, AHP was used in ranking the criteria according to their importance by calculating the relative and general weights of the criteria and sub-criteria. Pairwise comparisons in the AHP were made by videoconferencing, taking into account the risk of Covid-19. Participants made the pairwise comparisons under the control of the authors as a group and simultaneously through videoconference very easily, in a short time, and without any problems. Within this context, preferring videoconferencing instead of face-to-face meetings reduces the risks of Covid-19 epidemic and provides great convenience in conducting the study.

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Determining and ranking the location selection criteria of Arab investors who buy or want to buy houses with the methodology used in this study is also important for planning studies.

CONFLICT OF INTEREST

No conflict of interest was declared by the authors.

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ETHICS COMMITTEE APPROVAL

Ethics committee approval was not required for this article.

LEGAL PUBLIC/PRIVATE PERMISSIONS

In this research, the necessary permissions were obtained from the relevant participants (individuals, institutions, and organizations) during the interviews.

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Resume

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Research Article

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Evaluation of Crime Prevention Theories through Environmental Design in Urban Renewal: A Case Study of Ankara- The Vicinity of Hacı Bayram Mosque

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Abstract

Purpose

The aim of this study is to obtain novel results in current conditions by evaluating the built environment with Crime Prevention through Environmental Design (CPTED) principles, in the prevention of crime in urban space.

Design/Methodology/Approach

The methods of this study; identification of CPTED theories, principles and implementation tools and CPTED principles are evaluated on a particular space due to the fact that the relationship between crime and space varies according to place-specific factors. Therefore, the vicinity of the Hacı Bayram Mosque was determined as the case study area and the physical-spatial characteristics of this area, which is a part of the historical, cultural, religious and tourism centre of the city of Ankara, were defined. Then, the transformation process of the area into a focus of crime and the crime data of 2009-2010 were evaluated with Crime Intensity Analysis to determine the crime types, rates and space-time relationship. It was evaluated whether crime data and CPTED principles were taken into account in the built environment created by the implementation of the 2010 urban design project in the renewal process of the case study area. Finally, with the inferences obtained for the development of CPTED principles and implementation tools, suggestions for the built environment in the study area were developed.

Findings

CPTED principles applied in urban design projects should be developed with factors such as time-space interaction in the built environment, change of crime types. Values to be preserved in cultural heritage sites and areas adjacent to sacred sites are not obstacles to the implementation of CPTED.

Research Limitations/Implications

The lack of crime data for the area after 2010 is the most important limitation of this study.

Social/Practical Implications

The methods and results of this study will contribute to the creation of safe urban spaces and to the planning literature and practices.

Originality/Value

It has been determined that the effectiveness in the time-space relationship, of the CPTED principles adopted in urban design projects, may decrease after the implementation.

Keywords: *Crime, security, crime prevention through environmental design, the vicinity of Hacı Bayram Mosque, the city of Ankara*

INTRODUCTION

Security is one of the conditions of a sustainable city (Spadaro & Pirlone, 2021, p.1). Currently, global urban spaces where traditional and local values are denied appear (Papps & Winkelmann, 2000, p.54). The economic crisis especially during the Covid-19 pandemic, has made security a vital phenomenon by accelerating economic problems and criminal tendencies. According to basic economic models regarding crime (Dursun *et al*, 2011, p.127); unemployment, which is one of the most prominent macroeconomic variables affecting crime, is parallel to the increase in crime rates. (Witte & Tauchen, 1994; Yıldız, *et al*, 2010, p.16; Terande & Clement, 2014, p.131). Unemployment creates a foundation for crime in social, moral and religious means (Dolu, 2015). Therefore, the relationship between crime and the place where it's committed, should be revaluated with precautions against crime (Eck & Weisburg, 1995, p.4-7). This is one of the important spatial policies not only for the creation of new urban spaces but also for the urban renewal processes focused on the sustainability of historical and cultural heritage areas that have turned into ruins (Çöteli, 2016, p.553). The theories and principles of Crime Prevention through Environmental Design (CPTED), which is a strategy to prevent crime in urban areas, must be taken as a basis on these processes. In this article, the study area of Hacı Bayram Mosque, which is one of the historical, cultural and sacred places of the city of Ankara, has been selected, taking into account the spatial variability of crime. The renewal process has started with the transformation of this area into a crime centre in the 1990s. The built environment created by the implementation of this project together with the urban design project made specific for its renewal is analysed according to CPTED principles. Thus, the aim of this study is to examine the effectiveness of CPTED in the process of preventing and reducing crime in urban spaces.

CONCEPTUAL FRAMEWORK

Prevention of crime in the city, minimizing the fear of crime and criminal incidents are the most principal and effective components of creating sustainable urban spaces. Determining the interaction between the location of crime and the types of crime is a precondition to preventing crime. Information about crime and relevant tendencies associated with space are obtained through crime maps. Crime geography studies show that crime and violence vary in different parts of the city according to socio-cultural, economic and built environment characteristics (Göppinger, 1971). Generally, areas where crime rates are high and continuous are located in commercial, administrative and religious centres where the population density of the city is high and human mobility is constant (Ataç, 2007, p.18). These places where crime is focused are defined as "hot spots". These hot spots can be explained under three types: "crime generators" (shopping and entertainment centres, office gathering areas, stadiums and the like.), "crime attractors"

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(unsafe parks, transit corridors, lost areas and the like) and "facilitate the occurrence of crime" (shopping malls, squares and the like) (Ataç, 2007, p.18; Brantingham, & Brantingham, 1995, p.10). In these regions where crime rates are high, physical, functional, spatial collapse and social transformation and/or the disintegration of social structure are generally observed. These regions gradually turn into crime centres and spread crime and the fear of crime starting from their immediate surroundings. This situation changes depending on the local social balances and the ability of the built environment to prevent crime. Hence, the types and rate of crime specific to the space gains importance in the physical restructuring of urban space in preventing crime. Among the priorities of urban planning CPTED is today's most common implementation tool (Crowe, 2000, p.46).

CPTED Theories

The CPTED theory has been on the agenda since the mid-20th century (Lynch, 1960; Jacobs, 1961; Angel, 1968; Newman, 1972; Jeffery, 1977; Gardiner, 1978; Poyner, 1983; Coleman, 1985). Newman (1973), one of the pioneers of this theory, defines the "Defensible Space" and states that "making the residential areas of cities liveable and controllable by reconstructing them can only be done by a community sharing a common space, not by the police." In other words, in order for the urban space to be defensible, citizens must be able to watch after each other, own the place where they live, and take an active role in ensuring security by communicating with each other and with the police forces when there is a security problem. CPTED, which aims to prevent crime, defines design strategies based on the space where crime is committed rather than the criminal. Thus, human labour, equipment and operating costs are also reduced in crime prevention (Brantingham & Brantingham 1981; Cozens 2008; Cozens *et al,* 2005). However, with this theory's emergence, a series of criticisms related to the crime space have also been developed (Adams, 1973; Hillier, 1973; Kaplan, 1973; Bottoms, 1974; Mawby, 1977; Mayhew, 1979; Booth, 1981; Poyner, 1983). With such criticism, the 2nd generation CPTED theory was developed with improvements to the 1st generation (traditional) CPTED theory. This theory predicts that crime can be prevented by creating friendship between individuals and community spirit (Saville & Cleveland, 1999). This content was developed by practitioners and policymakers and expanded with social and economic factors alongside physical improvement (Cozens *et al*, 2001). Throughout the process, risk assessments, socio-economic profiling (Saville, 1996; Plaster Carter, 2002), and active community participation have been added to this context (Sarkissian & Perglut, 1994; Sarkissian & Walsh, 1994; Saville, 1995; Sarkissian *et al,* 1997).

With the 2nd generation CPTED, it is claimed that crime is deterred by optimizing surveillance opportunities, clearly defining physical space boundaries and creating a safe "image" through urban design and

administration (Cozens & Love, 2015). This theory is based on the fact that criminals have a higher potential to be caught when they are under constant and careful observation by law-abiding citizens. Thus, CPTED is thought to be more effective in developing more practical and long-term solutions (Geason & Wilson, 1990; Saville & Cleveland, 1999).

As a result of research on how citizens react to crime and security in the urban space (Leclerc & Wortley 2014; Gajos *et al,* 2016; Gilderbloom 2016), 3rd generation CPTED has been developed with the evolving synthesis of the interaction between space and crime. The development of the "dream of a sustainable, green city" as an urban design strategy has also been a theoretical bridge in conceptualizing and operationalizing the 3rd Generation CPTED. Thus, this theory has been strengthened along with the principles of the first two generations. (Cozens, 2016; Fennelly & Marianna, 2018).

In summary, 1st generation CPTED, developed in the 70s, had a great impact on criminology with a situational approach to reducing crime. Later, during the early 2000s, the 2nd generation CPTED combined the social structure and its actors in society as the key to both crime reduction and community harmonization. In 3rd generation CPTED, user satisfaction has also been accepted as the component that reinforces security. (Mihinjac & Saville, 2019, p.6; Arabi *et al*, 2020). In this study, in the prevention of crime in the city, all CPTED theories and practice principles, tools and success are evaluated with the principle of spatial variability.

Principals and Implementation Tools of the CPTED

Newman's (1973) basic principles of space design at CPTED are Surveillance, Access Control to Space, Maintenance, Territoriality and Activity Support.

Surveillance*:* Natural surveillance facilities include any action that increases residents' chances of observing others (Lab, 2000). These actions can be developed by Natural, Organized and Mechanical Surveillance methods (Wekerle & Whitzman, 1995; Crowe, 2000).

Informal/Natural Surveillance: The ability of an individual to observe the environment where they live and feel that they are observed increases the feeling of security and decreases an individual's fear of being affected crime. Thus, residents can recognize each other and distinguish between strangers or potential criminals. This can be achieved by design principles that allow frequent encounters in urban spaces, such as common and street entrances, lighting systems, obstructive landscape elements, and transparency of the area (Jeffery, 1971; Newman, 1973). In addition, windows facing squares, doors opening to the street on the ground floor, shop windows and similar transparent facades deter criminals in the urban space. In Jane Jacobs's work titled "The Death and Life of Great American Cities", published in 1961, the concept of "Eyes on the Street" is explained in which people watching the outside from inside

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of a building ensure that people outside the building feel safe (Jacobs, 1961).

Formal/Organized Surveillance: It is the participation of individuals employed by an institution, such as security guards, police patrols and guards, in natural surveillance activities with lawful limits. Organized surveillance, when supported by local stakeholders such as merchants, can be a very powerful type of surveillance. Merchants can play a crucial role in reporting possible criminal activities and suspicious behaviour to the police (Kubilay, 2009).

Mechanical Surveillance: It is a type of surveillance supported by mechanical and physical systems such as Closed-Circuit Television (CCTV) and appropriate lighting. CCTV is a highly effective tool in reducing crime and improving the sense of security (Lab, 2000). Lighting systems that are widely used in mechanical surveillance are effective in increasing the duration of natural surveillance.

Access Control: It is the ability to control incomers and outgoers' access to restrict and block access to venues and illegitimate users. This is considered as "set of measures" that show criminals that the risk is high and force the target (Lab, 2000). These measures can be explained by design principles and elements such as defining the difference between public and private spaces, reducing the number of entrances and escape routes, using unbreakable glass, using fences and walls surrounding the area, and preventing access to roofs.

Territoriality: Sense of belonging increases the motivation of users to claim rights in the field by enabling them to own the space (Newman, 1973). With spatial design that will create a sense of belonging, individuals' control of the space they feel that belongs to them will lead to less crime being committed (Armitage, 2014). Thus, the potential criminal will immediately perceive this new spatial effect and avoid taking risks (Gündüzöz, 2016, p.359).

Maintenance and Operation: Continuous care, belonging and constant nuse in urban spaces is the most effective tool in crime prevention. When these tools are underestimated, especially in the public space, the space becomes outdated and becomes the place of residence of unwanted persons and/or potential criminals. Thus, whether intentional or not, unrepaired damage will result in misuse of space, which will increase the tendency to crime (Wilson & Kelling, 1982; Sarkissian Associates Planners, 2002).

Activity support*:* Activities that encourage pedestrian use in urban spaces prevent and reduce crime. In the urban space, existing or planned activities, pedestrian flow, space permeability and transparency will enable the space to be lively and dynamic, while also allowing surveillance. As a result, the activities will be a deterrent to criminal acts while increasing the community value of the space. Therefore, spatial design that enables social activities will increase security (Wilson & Kelling, 1982).

METHOD AND IMPLEMENTATION APPROACH

The five consecutive phases of this study are described below. Firstly, in the first phase, the CPTED theories and principles focused on spatial arrangement were determined by a literature review. Secondly, due to the fact that the relationship between crime and space varies according to the specific conditions of the place, the environment of Hacı Bayram Mosque was determined as the study area, and the built environment was defined. Then, the process of transformation of the study area into a crime focus and data (crime regions, types and rates, space-time relationship) gathered from police stations in 2009-2010 were evaluated with Crime Intensity Analysis (Kernel Analysis) and crime intensive -hot spots- were determined (Figure 4). Thus, physical, functional, spatial slum, social transformation, disintegration and dissolution of the social structure are defined as a hot spot in the study area. As a result, the crime generator and crime attractor character of the area has been analysed. Fourthly, the built environment created by the implementation of the urban design project during the process of renovation of the area was examined critically to determine whether it is in accord with CPTED principles in preventing and reducing crime. The implementation of this project was examined in a holistic approach, both individually and according to their interaction with each other, according to the principles of CPTED and design principles. Finally, with the CPTED, suggestions have been developed with the inferences obtained for the development of these principles and implementation tools.

In this study, the socio-cultural and economic structure change has been given importance in the limited framework of this article with its dimension reflected on urban space.

THE CRIME EVENTS AROUND HACI BAYRAM MOSQUE AND ITS VICINITY BEFORE RENOVATION

The study area is located in the vicinity of Hacı Bayram Mosque, in the historical city center of Ankara, in the Hacı Bayram District, on the hill that has been considered sacred since the founding of the city, between Hükümet Street and Hacı Bayram Veli Street. The study area is an area of 13 hectares in the north-west of Ulus Square, where the main transportation arteries of the city (Atatürk Boulevard-Çankırı Street and Hisar Park-Anafartalar Avenues) intersect. In this area, there are Hacı Bayram Mosque and Shrine and Temple of Augustus and Rome, retail trade and gastronomy units and foundation buildings surrounding the square and square in the south (Figure 5-6). There is Ahi Yakup Mosque in the northeast of the area and Ahi Tuna Mosque in the south. It is within walking distance to many public institutions (1st and 2nd Assembly Buildings, Ankara Governor's Office, Ankara Revenue Office, Customs Undersecretariat) and commercial buildings (Anafartalar Commercial Complex, City Bazaar).

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The Urban Position and Importance in the Historical Process

The ancient core of the city of Ankara (Ancyra) is a military garrison located within the castle dated to the Hittite period (15th-12th centuries BC). In the Phrygian period (8th-3rd century BC), the city was established on a hill (930 m.) located to the northwest of the castle. On this hill which is named to be a sacret place, it is thought that the temple attributed to Kybele, the mother goddess of the Phrygians, was renovated in the name of Men the Moon God. With the domination of the Romans (25 BC) and the city becoming the capital of Galatia (Asian Minor), a new temple was built on the ruins of this temple and dedicated to the founder of the Roman Empire and the first Augustus emperor, Julius Caesar Octavian (64 BC - 14 AD). In the middle of the 4th century, when the Byzantine regime converted pagan temples into churchs, the The Augustus Temple was converted into a church in 362. At the beginning of the 15th century, adjoining to the north-west wall of the temple, a mosque was built in 1428 in the name of Hacı Bayram Veli, who founded Ankara-based Bayramiye cult in 1412 as the first local Sufism school of the Ottomans, and his tomb in 1430 (Kara, 1990, p.280; Bayramoğlu, 1989, p.11). From this date forward, the sacred hill began to be known as Hacı Bayram District.

Since the Ottoman Empire (1356-1923), the religious centre function of Hacı Bayram District with its residential and commercial areas developed due to its proximity to the city centre and administrative centre. In the 1960s, multi-storey buildings contradictory to the urban texture around the Hacı Bayram Mosque, were started to be built with the Regional Floor Plan. Nevertheless, the historical texture was preserved in the Hacı Bayram district and around the Ulus square until 1990 (Figure 1). Since 1990, the judiciary has continuously cancelled the conservation and renewal plans for the Ankara-Ulus Historical City Centreof 2000, 2007 and 2010, which includes the Hacı Bayram District. During the period when these plans were in effect, some renovation work was carried out around the Hacı Bayram Mosque.

1924 **1930s** **1950s** **1982**

Figure 1. Hacı Bayram Mosque and Its Vicinity (Kültür Varlıkları ve Müzeler Genel Müdürlüğü Fotoğraf Arşivi, 2016)

According to the Ulus Historical City Center Conservation Improvement Development Plan, a huge square was built in the place of 44 demolished historical residential buildings in front of the Hacı Bayram Mosque and Augutus Temple in 1990. An extensive second regulation was initiated by the declaration that Ankara Historical City Center as a “renovation site,”

in line with the Council of Ministers' decree, dated 08.08.2005 and numbered 2005/9289, within the framework of Renovation Law dated 2004 and numbered 5366. In 2006, within the conservation development plan pertaining to the renovation site, it was decided that the mosque would be enlarged, the square would be re-organized, and new non-residential buildings would be implemented (covering 51% of the area) around the square where demolished buildings used to stand. From 2006 to 2011, projects regarding single construction scale, street reclamation, and those relating to public spaces were partially applied. Including 254 buildings, these applications changed the physical and social structure of the historical city center at an unprecedented scale.

The fact that, at the sacred hill, two shrines of different beliefs stands adjacent represents the multicultural structure of the city of Ankara (Figure 2). As such, remains of the Augustus Temple and the Hacı Bayram Mosque and tomb were registered as immovable cultural assets in 1972, and in 2008, these shrines, along with the historical residential texture surrounding them, were registered as protected urban areas. Moreover, Hacı Bayram Mosque and Augustus Temple were included in the World Temporary Cultural Heritage List in 2016 (Gültekin & Canbolat, 2019, p.259).

Figure 2. Hacı Bayram Veli Mosque and the Temple Augustus

The Transformation of the Area into a Crime Center

Along with the historical trade center that became dilapidated due to migration to the new (modern) city established by the modernity project of the Republic and migration from the country into the city in the 1950s, this area underwent economic, social, and physical deposition causing an increase in incidents of crime. Until the renovation and restoration work initiated in 2004, this area transformed into a crime center – not used on days other than those sacred for Muslims. This is verified by the fact that the area of the Hacı Bayram Mosque and its vicinity was identified as one of the five subareas with high crime density based on the crime data, from the years 2009-2010, of Anafartalar and Demirfırka Police Stations assigned to the area (Figure 3, B Subarea).

According to 2009-2010 crime data, intensive human mobility arising from easy access to the area and inadequacy of pedestrian spaces have facilitated crime in Area B (Hacı Bayram Mosque and its Vicinity). That the area is not utilized at night and becomes deserted and that spaces like

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coffee houses and alehouses bordering the area are populated by the unemployed and the homeless have created a crime attractor. Buildings vacated in 2009 for renovation that have not yet been demolished have provided criminals the opportunity to escape and hide (crime generator).

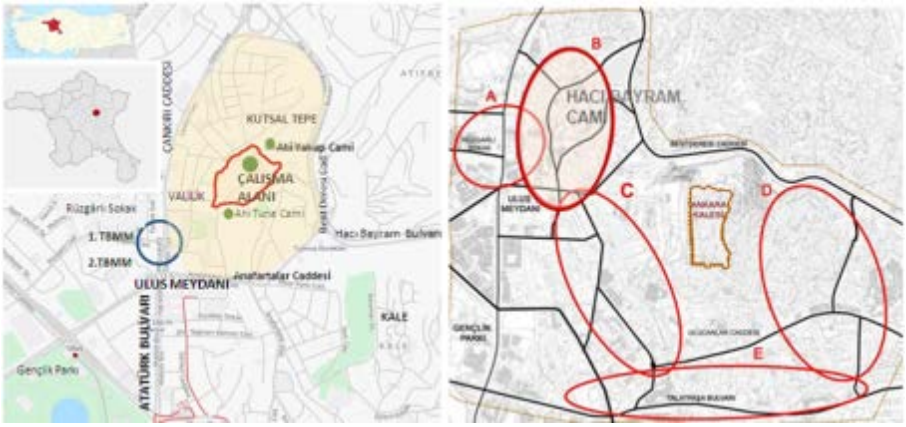

Figure 3. The Urban Location of the Hacı Bayram Mosque's and Ankara Historical City Center – Areas with High Crime Density – 2010

Types of Crime

The relationship between street-based crime data, pertaining to the years 2009-2010 obtained from police stations, and the space has been determined through Kernel Analysis. It has been observed that, in the area under scrutiny, crime types, such as pickpocketing, fraud, damage to property, burglary of commercial spaces and places of business, harassment, threat and insult, and injure, were high in density (Figure 4).

Figure 4. The Synthesis of Criminal Events in the Study Area (Intense Crime Areas) (Prepared according to the crime map data (Aksoy 2011))

Temporal Distribution of Crime Incidents

On Wednesdays, Fridays, and Saturdays, incidents of harassment injure, and pickpocketing have been frequent on Çankırı Avenue where places of entertainment are located; on Saturdays and Sundays, incidents of

pickpocketing, burglary, and fraud have been frequent on Rüzgarlı Street which is the center for construction supplies sale. On week days, incidents of pickpocketing, harassment, and burglary have increased on main transportation routes where trade units are located. Due to the fact that this area is heavily used on Fridays, for Friday prayers, human mobility increases on Fridays as well as when funerals are held. This has transformed this area into a location of crime attractor and crime generator (Table 1).

Table 1. The Distribution of Crime Types According to Days of the Week (Aksoy, 2011)

Types of Crime	Day							Total
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	
Injure	2,2%	3,1%	3,2%	3,1%	3,6%	1,8%	1,6%	18,5%
Pickpocketing	2,0%	1,1%	0,7%	3,1%	2,7%	1,3%	1,4%	12,2%
Arson	0,4%	-	-	0,2%	-	-	0,4%	0,9%
Threat	1,6%	1,6%	0,7%	1,4%	1,3%	0,5%	1,3%	8,5%
Harassment	1,3%	0,9%	0,2%	0,9%	0,2%	0,5%	0,5%	4,5%
Auto Burglary	0,5%	1,6%	1,8%	0,7%	1,1%	0,7%	0,7%	7,2%
Auto Theft	0,2%	0,2%	0,5%	0,4%	0,7%	0,5%	0,7%	3,2%
Damage to Property	0,5%	0,5%	0,5%	-	0,9%	0,7%	0,4%	3,6%
Gambling	0,2%	-	0,4%	0,2%	0,0%	-	-	0,7%
Insulting Officers on Duty	0,2%	0,4%	0,2%	0,2%	0,7%	-	0,4%	2,0%
Prostitution	0,4%	0,2%	-	-	0,2%	0,2%	0,4%	1,3%
Home Burglary	0,2%	0,5%	0,4%	0,4%	0,5%	-	-	2,0%
Fraud	2,0%	1,3%	1,1%	1,1%	1,6%	2,2%	0,5%	9,7%
Other Crimes	2,0%	1,3%	2,3%	0,7%	1,6%	1,8%	2,0%	11,7%
Business Place Burglary	1,6%	1,6%	2,5%	2,9%	1,8%	2,5%	1,1%	14,0%
Total	15,1%	14,2%	14,6%	15,1%	16,9%	12,8%	11,3%	100,0%

It has also been determined that, in the vicinity of the Hacı Bayram Mosque, unresolved crimes (at a 57% rate) are high, and frequent after 21:00.

THE EVALUATION OF THE BUILT ENVIRONMENT IN THE VICINITY OF THE HACI BAYRAM MOSQUE ACCORDING TO CPTED PRINCIPLES

In line with the Conservation and Renovation Urban Design Project for the Hacı Bayram Mosque and Its Vicinity, dated 2010, the current built environment in the area under scrutiny consists of the mosque, the square that provides opportunities for worship, trade and social life around the shrine, and new or renewed buildings of different functions surrounding the square. When the area is evaluated according to CPTED's basic principles of spatial design;

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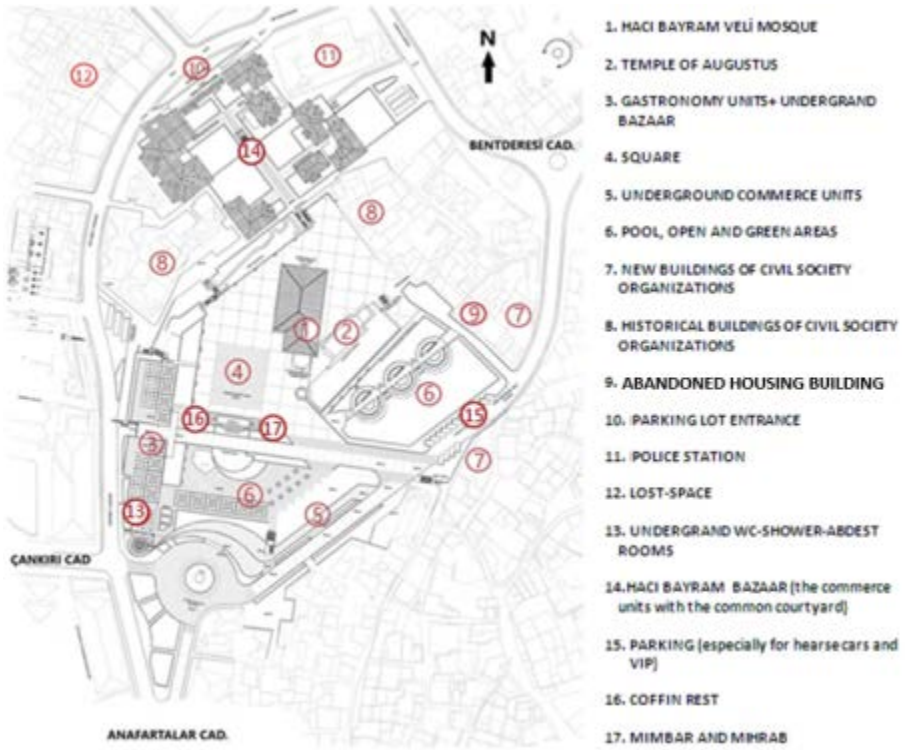

Figure 5. Renovation Urban Design Project of Hacı Bayram Mosque and Its Vicinity

Figure 6. Hacı Bayram Mosque and Its Vicinity

Surveillance

For the purpose of increasing the image value of the Mosque and the Temple, the square in the area is paved with firm ground and is transparent (Figure 5, 6, No. 4). As such, it facilitates the comfortable use and surveillance of Muslims' worship and religious rituals, and visitors of the Augustus Temple. There exists a pool and limited green space behind seating units (Figure 5, 6, No. 6). No planting that would obstruct surveillance or create hidden corners has been applied. Seating units in the area are at a level that would not be hampered by the height of the plants or the lower branches of the trees (Figure 7-a). However, the tight bushes and trees provide opportunities for hiding and block lighting, thereby contradicting with CPTED principles (Figure 7-b, c). It is

necessary that bushes and trees with wide crowns be regularly trimmed in such a way that they would not hinder surveillance.

Figure 7a. Seating Units

Figure 7b-c. Bushes and Trees

Natural Surveillance: The fact that windows, storefronts and doors of new (Figure 5, No. 7) and traditional (Figure 5, No. 8) buildings with retail commerce and gastronomy function or those utilized by non-governmental organizations open to the square or courtyards expedites surveillance (Figure 8-a). That seating units confining the square face the square (Figure 8-a, b) increases surveillance.

Figure 8a. Gastronomy Units

Figure 8b. Seating Units and the Square

The un-built, undefined area and/or lost space adjacent to the area creates a security risk. This 2-hectare-space, between Hükümet Avenue, surrounding the area in the northwest and Telgraf Street, running parallel to this Avenue, and Bostancılar Street in the north, is bordered by

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high walls (Figure 5, No. 12). Devoid of esthetics and forming mass effect, these walls obstruct surveillance, thereby triggering the fear of crime and providing criminals with an opportunity to hide as a crime generator. Due to the lack of supervision and surveillance at times when this space is used for parking, it provides the basis for crime as a crime attractor (Figure 9).

Figure 9. A View of the Un-Built Space from the East and the North

That there is only one building in use within the space (Figure 5, No. 9) and that all other buildings are well-kept and new increases the sense of security. Yet that this abandoned building is surrounded by high walls provides incentive for crime. Detailed conversations held with shopkeepers and visitors in the area have revealed that this desolate building provides grounds for drug use and sexual harassment. Vaulted entrances and underground commerce units (Figure 5, No. 3, 5) and wet volumes (Figure 5, No. 13), all distanced from security cameras and lighting elements, are also defined as spaces enabling crime (Figure 10).

Figure 10. Vaulted Entrances, Stores Opening to Vaulted Arcades, and Wet Volumes

Surveillance is provided by the underground parking lot exit (Figure 11) directly opening up to the Hacı Bayram Market (Commerce Units) courtyard and the glass walls around this space (Figure 5, No. 11; Figure 10). Architectural elements located in front of the gastronomy units opening to the square and seating units that refine the difference of public space, and their heights at eye-level ease natural surveillance (Figure 12).

Figure 11. Underground Parking Lot Exit

Figure 12. Gastronomy Unit Seating and Separating Elements

Formal/Organized Surveillance: The area is supervised by private security personnel during the day and by watchmen at night. Closed-circuit security cameras with angles overseeing the area are located on lighting elements (Figure 13). These camera systems are also utilized during the pandemic to identify those who break the rules. Moreover, the (New) Anafartalar Şehit Kamil Arslan Police Station northwest of the area that came into service in 2013 provides supervision and surveillance (Figure 5, No. 11).

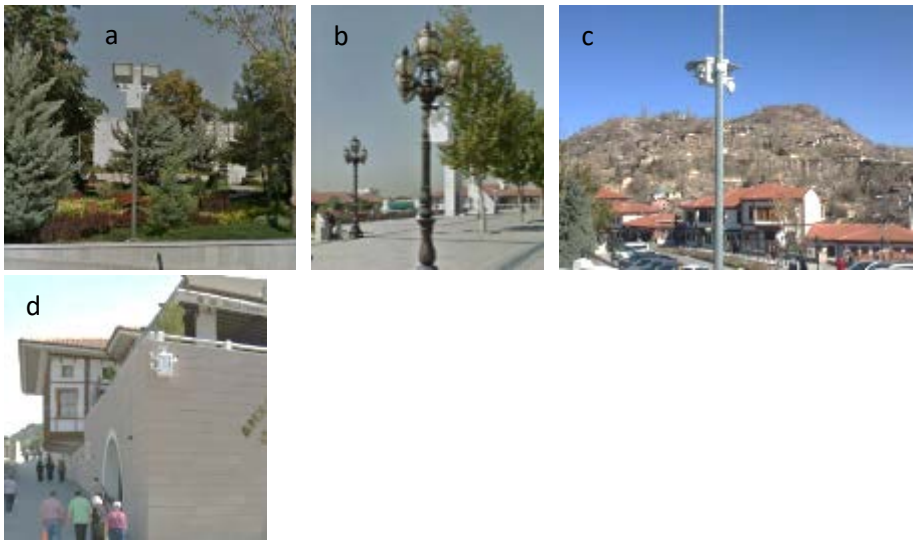

Figure 13. Closed-Circuit Security Camera System and Lighting Elements

Mechanical Surveillance (lighting): It is known that crime and the inclination to commit crime is prevented through lighting in urban space (Jeffery, 1977; Newman, 1973). The ease with which spaces open to public are used at night decreases the fear of being exposed to crime. Hence the level of lighting increases the sense of security. For this reason, the type of each lighting element (LE) in the area has been identified. The LEs in the area are, 1- lamp posts (Figure 13-a), 2- decorative LEs (Figure 13-b), 3- LEs on building facades (Figure 13-d), and 4- LEs within landscaping. When these LEs are evaluated according to their light quality and light level, the light level of lamp posts of 3 to 5 meters of height is 15 meters. Nonetheless their forms and positions do not provide maximum lighting (Figure 14-a). Decorative LEs have low lighting quality as they have yellow light color and cast light at 360 degrees for approximately 5 meters (Figure 14-b). The level of lighting for LEs on building facades is 7.5 meters, and they adequately illuminate the square and the pedestrian spaces (Figure 14-c, Figure 15). These LEs not only

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increase the recognition and night-time visibility of the area but also create a secure environment. Lighting elements within landscaping do not serve this purpose as they are situated on the ground and illuminate a space of approximately 1.5-2 m^2.

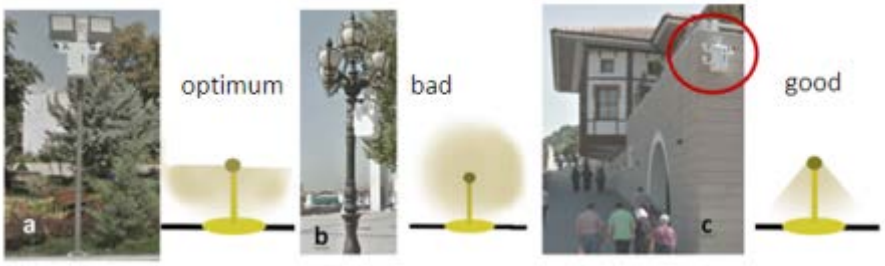

Figure 14. The Light Quality and Lighting Level of Lighting Elements in the Area

Furthermore, the telecommunication tower in the area functions at the same time as a lighting element, illuminating a wide section with white light (Figure 13-c, Figure 16). Yet the lighting quality of the tower is reduced as it is located next to the green area with trees and bushes. This leads to insecurity in the green area.

Figure 15. Facade Lighting-Hacı Bayram Mosque

Figure 16. Telecommunication Tower

The level of lighting in an area depends on the number of lamps and light quality. Hence every one of the lighting elements in the area has been marked on the map, and whether the lighting in the area is adequate has been identified through photographs taken at night. As can be seen in Figure 17, sections in which non-governmental organization and foundation buildings are located (Figure 5, 6, No. 7, 8) and vaulted arcades and outdoor parking lots (Figure 10) are not directly illuminated, and are therefore, relatively, dark. Shopkeepers and users also complain about this situation.

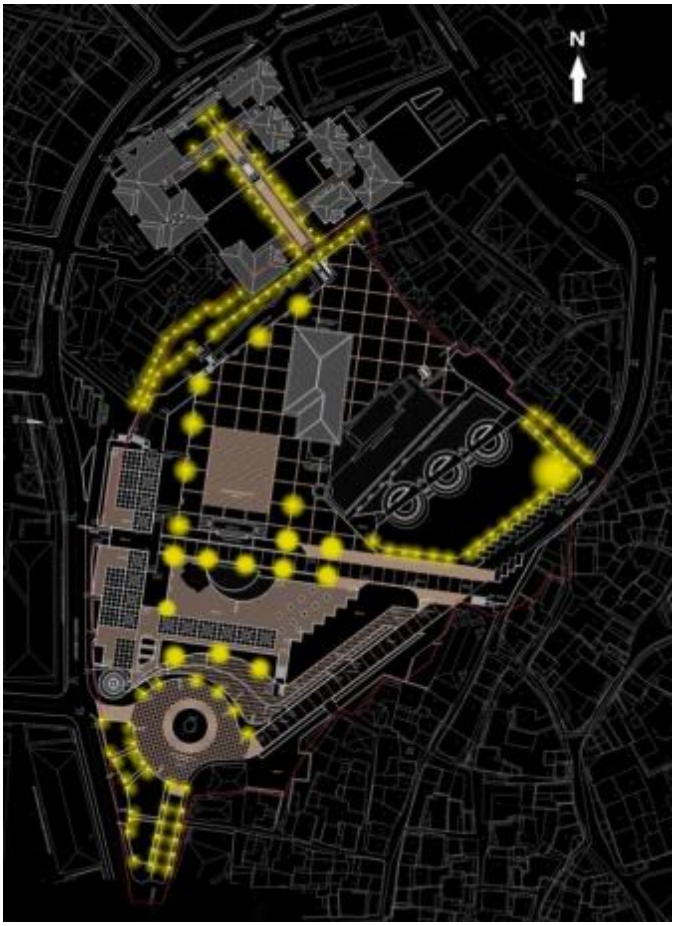

Figure 17. Analysis of Night-Time Lighting

Access Control

Complicating Goals: In the area under scrutiny, pedestrian entrance is provided through Bentderesi Avenue in the north, Anafartalar Avenue in the south, and Hürriyet Street in the west. Entrance of cars is through Hürriyet Street via Bentderesi Avenue and ends at the underground parking lot (Figure 5, 6). In addition, there are two outdoor parking lots in the area (Figure 5, 6). These multiple entrances and high accessibility have complicated providing security. Furthermore, as a precaution to complicating the target against crime, that only some windows at the ground level have iron bars (Figure 18-a) and that there are no security measures at doors (Figure 18-b, c) provide a medium for crime (Figure 18-a). In most of the buildings, no crime-preventing elements on windows or doors has been detected (Figure 18-b, c).

Figure 18. Building Entrances and Windows

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Addresses and Numbering: There exist adequate signs and markings indicating street names and building numbers in the area. While this provides spatial orientation, it also eases supervision.

Territoriality

As an urban design principle, the sense of belonging that influences human behavior enhances ownership of the environment and use of public spaces with ease, thereby bettering natural surveillance and supporting security (Wekerle & Whitzman, 1995). Sacred for Muslims, Hacı Bayram Mosque and Tomb are places that constitute the sense of belonging in the area under scrutiny. Despite the fact that worship and religious rituals emotionally prevent crime, the crowded environment provides opportunities for crime. The clustering of various urban functions (commerce, gastronomy, and the like) the floor covering, and the defining of urban spaces by lighting elements and plant materials form risks for potential criminals, thereby preventing crime. Signs of spatial possession, such as fences, leaning walls, and natural or artificial separators, are also elements that deter crime.

Maintenance and Operation

Non-governmental Organizations and Foundations in the area support the liveliness and cultural identity of the location, especially the maintenance of the green areas. Moreover, the fact that there are two municipal companies carrying out the maintenance, cleaning, and supervision of the area and preventing vandalistic actions increases security. Thus, this well-kept and administered location, comfortably utilized and filled with sounds of people, children, birds, and water, discourages crime.

Activity Support

Mixed-use in urban space is a significant factor in constituting security as it offers permeability and transparency, as well as activity variety. The most important and well-known historical, cultural, religious, and touristic destination of the city of Ankara, the Hacı Bayram Mosque vicinity is a pedestrian space through its various uses (Figure 5, 6) connected to its sacredness. Nevertheless, this location, where there are various urban activities carried out during the day, is deserted at night. Hence, while people feel secure during the day, the direct opposite occurs at night. It is observed that variety of utilization is deemed vital since planned activities throughout the day have a role in the possession of space.

EVALUATION AND RESULTS

The strongest emotion people would like to feel in a built environment is security. Preventing or reducing crime is an effective tool for creating a sense of security in the city. Based on the characteristics, functions, and

users of the urban space, the relation between crime and space is variable. Therefore, CPTED principles are widely followed in the disciplines of urban planning and urban design for their efficacy in providing security.

Historical sacred spaces are fundamental and indispensable locations in both cultural tourism and urban life. Human density, in relation to the urban activities offered, and mobility increase hiding opportunities and the potential for committing crime. It is for this reason that the area to be scrutinized was determined as Hacı Bayram Mosque, a historical, cultural, and religious center and identity space for the city of Ankara. The built environment formed during the renovation process, which was initiated by the transformation of the location into a crime center, has been evaluated according to CPTED principles, and the following conclusions have been drawn:

- Sustainability is a quality that people can attain at a more secure location. This quality changes according to the cultural, social, and economic dynamics of the geography of the area. However, when the strong relation between crime and space in providing security is taken into consideration, principles and strategies suggested by CPTED should be deemed significant and applied in the disciplines of urban planning and urban design.
- The fact that the area is deemed a World Cultural Heritage and a cultural and sacred space that should be preserved at the national level is not a barrier to the application of CPTED principles to prevent and reduce crime or to form secure urban spaces.
- As public spaces attract human mobility, thereby constituting high potential for crime, CPTED principles must be applied.
- Just like in the area under scrutiny, sacred spaces do provide prevention of crime by the intense religious feelings they stir, but the dense human mobility and use on holy and religious days offer opportunities for crime.
- For the purpose of forming secure spaces, it is obligatory to follow CPTED principles also in areas adjacent or within walking distance to these locations, as much as in these spaces where human density, which provides the grounds for crime, is relatively high.
- Considering CPTED principles only during the day would cause risks for the night-time security of the area. Although the area under scrutiny is a public space deserted at night, the inadequacy of lighting results in security risks and facilitates crime. The potential to commit crime is high in dark and enclosed spaces.
- During landscaping, the plants and trees should be considered based on their sizes, in relation to the opportunity to escape that they would offer when fully grown, thereby aiding crime opportunities.

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- CPTED principles applied in the built environment, in accordance with space and time relation, should be evaluated at regular intervals, and necessary interventions should be implemented.
- Surveillance cameras appropriate for CPTED principles have also played a vital role in the supervision of urban spaces during the pandemic.

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CONFLICT OF INTEREST

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Ethics committee approval was not required for this article.

LEGAL PUBLIC/PRIVATE PERMISSIONS

In this study, necessary permissions were obtained from the relevant participants (individuals, institutions and organizations) for the data used.

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Resume

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Examination of Prestigious Mass-Housing Identity via The Slogans: Cases in Izmir, Turkey

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Abstract

Purpose

The paper aims to make a critical examination of the current prestigious mass-housing projects through the promotional slogans to understand the relationships between the promotional and architectural strategies.

Design/Methodology/Approach

In the research, the archive-based surveys were conducted by utilizing the framework of the case study method. The data were collected from the websites and electronic catalogues of the cases and analysed comparatively to reveal the messages given by the promotions and manifested in the architectural formations.

Findings

The study makes categorizations for the slogans and architectural services of the cases, and proposes that the promotional and architectural identities of the projects refer to a template that provides the sale guarantee, and therefore, cannot be broken easily to present the alternative living manners.

Research Limitations/Implications

The study is limited with the 20 similar-scale projects with independent sections of more than 50 households, addressing to the high-income level with the prestigious or luxurious qualities, and built, used, or under construction in the period covering 2015-2021, in Izmir city-centre and peripheries.

Social/Practical Implications

In social respect, the findings point out the common interdisciplinary genes creating the templates of the consumer society by manifesting that the high price is related to the services provided within the housing settlement but not the quality of architectural solutions.

Originality/Value

The paper tries to uncover the possible effects of the slogans in shaping the mass-housing identity for the high-income level, and reveal the close relationship between the consumer society and promotion of architecture, which results in selling housing projects at high prices with the same promotional and architectural templates.

Keywords: *Architectural identity, consumption, housing slogans, mass-housing, promotional strategies*

INTRODUCTION[1]

Housing projects constitute the most dynamic, intense, and controversial area of design in architecture, and are always in demand naturally. The meaning of the housing is formed by the images, and associations taking place in our personal or social memory (Öymen Gür, 2000). Architectural typologies, design qualities, constructional solutions, affordability problems, urban considerations, and social interactions continuously shape and/or transform the identity of local housing, and in turn, are shaped by those ever-transforming housing identities. This almost organic reflection between housing and society keeps the discussions on the agenda of architecture, urban design, politics, and economics of countries, and redefines the roles of the parties. Changing expectations of the inhabitants are effective as strong as the regulations designed by the local governments (Bilgin, 1996). It is majorly the inhabitants' tendencies to set the rules in housing design, which converts the inhabitants into indirect designers of their housing. The role of the architect becomes limited by the ready-made designs of the housing templates which are frequently applied in almost every typology to fulfil the inhabitants' expectations, without risking the sales guarantee (Bilgin, 1994). Accordingly, housing becomes a product/commodity, the inhabitant becomes the consumer/buyer, and the architect turns into a producer/merchant in the mechanized understanding of the housing production (Bilgin, 2002; Özüerken, 1996). In this framework, concerns about selling and promoting housing transform the act of design into a mechanism working with marketing strategies.

By focusing on the current mass-housing cases in Izmir, the study examines the relationships between the architectural design and promotional strategies of the so-called *prestigious* or *luxurious* projects addressing the high-income level, and thus, how the modern housing identity changes in line with the changing demands as reflected by the slogans. The cases cover the 20 mass-housing projects built and/or under construction, after 2015, in Izmir city-centre and peripheries. In this framework, how the living and designing manners in the consumer society change the residential identity fundamentally constitutes the critical base at the theoretical background of the study. While selecting the cases, isolated, in other words, gated sites were preferred to narrow the scope of research. All cases serve for residential use; however, in the mixed-use projects, only the parts having residential use were examined. In terms of the scale, the projects with independent sections of more than 50 households were chosen.

The common descriptive keywords for every case were decided to be *prestigious* and *luxurious* as the qualitative limitation. The projects indicate overtly or covertly the same label of *prestigious* or *luxurious* in the promotional descriptions. The qualities of being *prestigious* or *luxurious* have been and will be transformed continuously under the changing tendencies of the society and technologies, however, the consumption culture will always create the most desired object to label it

[1] An extended and comprehensive version of this article is available in Chapters 2, 3, and 4 of the master's thesis "Effects of Marketing Strategies on Prestigious Housing Identity: a Study on Mass-Housing Examples in Izmir City Center," presented to the Yaşar University (Kuru, 2021).

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as *prestigious* or *luxurious*, and to sell it to sustain. In the process until now, the acceleration of globalization dynamics and the universalization of new consumer goods and patterns in media have also played an active role in the housing sector of Turkey (Keyder, 2006). Within this respect, the manifold meanings of mass-housing and prestigious/luxurious housing in a local culture reflect the identity of the local society per se. Therefore, to comprehend the housing identity of local culture, we may begin with the analyses on the meanings referring to this identity.

MASS-HOUSING AND PRESTIGIOUS HOUSING AS THE TERMS CONSTRUCTING THE CURRENT RESIDENTIAL IDENTITY

The mass-housing projects have been increasing in *quantity*, in Turkey, since the enactment of the Mass-Housing Law in 1984; but especially after the 1990s, the *living quality* could gain importance in the housing sector (Sey, 1994). The qualities of affordability, the minimized duration of construction, and structural safety have resulted in a gradual increase in users' demands for this housing typology. The served qualities have always been varied in terms of the spatial program—although the architectural qualities have been limited with the *ordinary* through the mass-housing history (Bilgin, 1994; Sey, 1984). The mass-housing projects still correspond to the majority of user-demands, but currently, those projects are generally planned as the gated communities in the periphery of the city centre equipped with the facilities in the sites to meet the personal and social needs of the inhabitants. Especially, the projects designed for the high-income groups fulfil more needs of the inhabitants, which explains the increase in the prices—though these needs are also questionable. As generally recognized, the non-residential areas should meet the biological, social, and psychological needs that people cannot fulfil inside the house (Es & Akın, 2008), which, recently, also become relevant for the mass-housing projects of the high-income group. In addition to being a residence, mass-housing is a mass-produced product subject to the total-quality perception (Altaş Esin & Özsoy, 1998). After being a *global-scale commodity*, the quality of mass-housing projects, therefore, has always been related to its capacity to fulfil the needs of its users—like the qualities of other commodities (Feigenbaum, 1991).

Mass-housing is defined by Hasol (2005) as "the term used to describe a large number of housing units built with social and physical infrastructure." According to the *Dictionary of Urbanology Terms*, "it is a large-scale housing and resettlement initiative that meets the housing needs of a large number of families, carried out by public or private organizations such as a housing association, housing development partnership or housing banks" (Keleş, 1998). On the other hand, in the Mass-housing Law in Turkey, the *mass-housing* is defined as follows:

"The whole of 750-1000 dwellings to be built in settlements with a land area of at least 15 hectares, which will be newly opened and at least 200 in places where the zoning plan was approved and ready for construction

before the date the law came into force, and their common facilities and areas and workplaces" (Law No. 2487 dated 8.7.1981).

As a consequence of the consumption culture, by the end of the twentieth century, the mass-housing typology has been integrated with the conceptions of social segregation, and the gated communities emerged by this integration as a frequently applied mass-housing type addressing the homogeneous groups in the society (Blandy & Lister, 2005). The gated communities gave rise to the concept of prestigious housing, and the concept of housing was converted into a *commodity* providing their buyers with *prestige* indicating *social status* in society (Blakely & Snyder, 1997). It refers to an identity produced for a homogenous high-income group, and the sustainability of this identity is guaranteed by the level of *luxury*.

Therefore, the phenomenon of luxury has always been at the top of the design criteria in the housing sector (Nicolae et al., 2009), as it points out the economic conditions of its buyers, and as the most important criterion constructing the social identity (Lee & Young, 1996). The luxury providing prestige has become a housing quality per se, which needs to be examined conceptually, as the middle-income group has reached the economic freedom to care about the quality of their lives (Berry, 1994). The high-income groups in every society have always the opportunity to choose their lifestyles, therefore, there has always been a quality of living environment and preference suitable for them. The concept of luxury developing day by day, by gaining different meanings (Chuon et al., 2017) has turned into an image, and also crystallized in line with the preferences of middle-income level recently. However, regarding the current tendencies, it seems that the concept of luxury generally refers to a level that is minorly higher than the economic flexibilities of income groups.

In Turkey, the luxury residences are categorized regarding the opportunities offered by the gated communities—which, as a housing typology firstly seen in Istanbul, have been transformed through time regarding the user demands of especially the upper- and middle-income groups. These opportunities are shaped by the users' expectations about their income status and psycho-social identity (Nicolae et al., 2009). The housing design qualities, in this sense, are also defined by the expectations as manifested in details and material qualities in the architectural scale, and the settlement design in the urban scale. The facilities and social environment provided by the concept of luxury, in turn, determine the expectations of the users and make these expectations reflect on the residential spaces themselves by also shaping the contemporary housing identity. The spatial characteristics are supported by the architectural qualities of the projects which are also the indicators of the users' demands for luxury housing and for supporting their psychological and social identities with a certain level of living standard in the urban environment (Kwan et al., 2004).

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The label of *prestigious* for the high-income gated-community projects in Turkey is attached generally by regarding the size, whether there are additional rooms/spaces/components with special functions, smart technologies, technical structure, security systems, landscape design, social facilities, materials, workmanship, and resistance for earthquakes. That is, as status indicators when we examine the architectural features of the gated communities for the high-income group, the qualities leading to the consumption of the luxury comprise especially the mentioned functional, technological, and psychological aspects, which can be summarized in a list as follows:

1. Additional rooms/spaces/components with special functions: a.) parents' bathroom (although this space continues to be a common spatial property in all high-income projects as an indicator of the changing lifestyle, they have ceased to be an attractive feature); b.) laundry room; c.) cellar; d.) Turkish bath; e.) ironing room; f.) specially designed kitchen; g.) decorated circulation area; h.) windows up to the ground to enlarge the viewing capacity; i.) ergonomic quality; j.) aesthetic quality with odour and ambient vibrations.
2. Smart technologies and technical structure to control the apartment facilities both at home and outside: a.) the hot water service provided by solar energy systems that convert sunlight into electricity; b.) air conditioning/climatic infrastructure used with heating and cooling systems; c.) floor-heating systems, which is also to prevent visual pollution because of the air conditioners under the windows; d.) shutter systems with different adjustments regarding each window type; e.) water purification systems; f.) smart lighting; g.) acoustic quality; h.) technological equipment for energy saving.
3. 7/24 security systems: a.) high-level security on site with visible-invisible systems; b.) camera viewing screens; c.) alarm devices; d.) security walls around the residences; e.) 24-hour security guards.
4. Landscapes designed by landscape architects: a.) the integration between nature and gated housing units by the way of large terraces and gardens designed as living flora; b.) water elements and ornamental pools; c.) recreation areas; d.) urban furniture for recreation and resting; e.) no leftover spaces between the building blocks.
5. Social facilities: a.) the social spaces functionally designed to support the social activities; b.) privileges in residential sites to serve facilities in higher standards; c.) an outdoor swimming pool of specified size; d.) tennis courts; e.) running and walking tracks; f.) bicycle paths; g.) children's playgrounds; h.) sports fields of various sizes and numbers; i.) garage and parking lots; j.) indoor social facilities in the basements of the housing or in different building masses: indoor swimming pool, fitness centre, Turkish bath, and sauna, etc.; k.) the gastronomic facilities: cafes and restaurants; l.) health services.
6. Materials and workmanship: a.) use of high-quality materials in applications; b.) use of high-quality equipment in interior spaces; c.) the high-quality workmanship.

7. Resistance for earthquakes (especially after the 1999 earthquake, constructional problems were given more importance in Turkey, and the housing projects were designed following the renewed earthquake regulations): a.) strength of structures; b.) strength of ground with meticulous ground studies; c.) ground improvement by the method called jet grout or by piling under the columns in the foundation, in case the floor does not have the desired strength.

Regarding the current promotional strategies of the luxurious projects, it is the lifestyle, after all, that is marketed and consumed as an integral part of the design package highlighting the high-quality residential services and products. The luxury residences provide prestigious lifestyles to the users with a rich variety of facilities as the indicators of the users' social and economic statuses (Özgüven, 2008). However, the cultural, psychological, and physiological conditions of the users also play determining roles in indoor environment quality (Fabi et al., 2012). In this sense, living in prestigious residences and districts provides psychological satisfaction for the inhabitants as well as providing a peaceful life in a homogeneous society, even in the city centre, yet away from the crowds. The mass-housing turns into an expression of belonging to a prestigious class, and the prestigious envelope has the power of manipulating the psychology of the high-income user positively, which can be associated with the consequences of the consumer society.

PRESTIGE IN THE CONSUMER SOCIETY

Consumption as the very seminal concept shaping the "dynamics in human history" (Bocock, 1993) has resulted in not only quantitative but also qualitative changes. However, modern society generally has negative connotations, which may be associated with the adverse perspectives of the capitalist dynamics of Modernization leading to the consumption of identities at the end of the twentieth century. As referring to the societal mechanisms, its definition has complex layers: the consumption phenomenon is explained as an effect that initiates production to meet the needs of the society in the traditional sense, and also defined as an outcome in which the consuming individuals are guided by its economic, social and psychological effects (Featherstone, 2007).

Debord (2002) states that consumption becomes a *lifestyle* in our age. It subjugates both individuals and societies with its own rules and orientates individuals. Consumption has been in the process of transformation into a *show* day by day. Individuals, who are as if the captives of the modern world, think that they can reach happiness by simply consuming more in an ever-transforming mechanism providing them the ability to choose (Slater, 1997). However, in the current situation, it is very hard to explain the increase in consumption by only referring to the basic characteristics of the act of consuming; consumption is more than the sum of its components with its newly introduced symbolic identities.

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Baudrillard (1998) defines the consumption pattern of the new form of society as a universal and consistent system of indicators created by certain rules and codes, of which aims are not related to providing basic needs of individuals through goods and services. In this system, needs and desires leave their places to social values and classifications. It points out the current associations between the living manners and the values of the used products, which, in turn, may transform the very *living manner* and even the *taste* into a *commodity* (Bourdieu, 1984).

In a similar perspective, Bocock (1993) defines consumption not only as a utility process but as a socio-cultural value process in which signs and symbols are also involved. Consumption emerges as a psychological, social, cultural, and economic reason, or a result of these reasons that support the development of the individual's sense of self in an individualization process (Bauman, 2000). Symbolic meanings, again, are attributed to consumption objects. While the consumption objects contribute to the formation of social classes with the benefits that they provide for the fulfilment of the needs and desires, they also serve as an indicator in the establishment of interactions between individuals by both the *idea* and *act* of consuming (Baudrillard, 2002).

Warde (1991) identifies consumption with *communication* between individuals, *participation* in social classes, and *socialization* concepts; it becomes a tool for these procedures. According to Kotler & Keller (2006), socio-cultural and personal factors in the formation of consumer identity influence consumers' psychological interactions in the decision-making phase, and even, in buying and consuming procedures. Consumption, in this sense, emerges as an idea and action adopted by individuals in all areas of life (Baudrillard, 2002); hence, there have been historical, social, cultural, economic, and political events, and their consequences having connections with the dynamics of consumerism.

In this sense, housing as a social, cultural, and architectural entity has also been influenced by consumerism especially regarding its relationships with the served facilities and urban context. While undertaking the phenomenon of *collective consumption* of the 1970s, Urry (1995) points out the "spatial inequalities through sustaining much lower housing densities in richer areas" by referring to and neatly summarizing the related criticisms of Castells (1983), Dunleavy (1980), and Saunders (1990):

"It was argued that many services, especially housing, are not necessarily provided 'collectively' and can and should be privatised and individualised; that services are not necessarily 'urban' and as populations have undergone counter-urbanisation it has been realised that some of these can be located elsewhere; that what develops is a sociology of services which would have little to do with developing an 'urban' sociology; that the spatial distribution of activities is not to be regarded as determined by the social structure; and that the urban is in fact also crucially affected by changing relations of production, not just of collective consumption" (Urry, 1995).

This widened critical lens focused on the 1970s consumption dynamics also helps us clarify today's identity of the housing environment. The spatial inequalities in the urban scale have been the consequences of the privatization of the services, which destroyed the collective logic of providing them in urban environments and caused counter-urbanization. Though this did not help the development of urban sociology, it paved the way for the emergence of the gated communities as an extreme version of privatizing collective consumption. The detachment of the collective consumption from the urban fabric has led to the attachment of facilities in satellite gated housing projects in the periphery of the city. This new attachment has become the prerequisite feature for the preference of segregated typologies. Therefore, while the accessibility was intentionally decreased by the detachment (from the urban), the concept of attainability emerged by the attachment (of the services), which, according to Pickvance (1985), is a consequence of spatial proximity as one of the three characteristics of the urban environment. The spatial proximity with the attainability of the services/facilities has been restructured in the gated communities and corresponded to the most important marketing strategy of today's housing identity.

In this sense, especially for the development of the current housing identity, the concept of *marketing*, after the consumer society, has played an important role in shaping this very identity, and set many of the rules even in architectural respect. The American Marketing Association (AMA) defined marketing in 1985 as follows: "Marketing is the activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners, and society at large." Nevertheless, the segregated and gated communities are also the results of the marketing strategies, which aimed at dividing the society into homogeneous income levels to facilitate consumption procedures, as also stated by Willis (1990):

"The early history of marketing was precisely about separating consumer groups into socio-economic categories so that products could be aimed at them more exactly. Modern marketing, however, has moved on from delineating socio-economic groupings to exploring 'new' categories of lifestyle, life stage and shared denominations of interest and aspiration. This is a crucial move since it attempts to describe market segments not from an 'objective' point of view, but from the point of view of the consumer. Far from being the passive victim of commercialism's juggernaut, the consumer has progressively been recognised as having substantial and unpredictable decision-making power in the selection and use of cultural commodities."

Therefore, the scene of marketing in the modern age is set by the consumers' perspective by considering their lifestyles to provide them with further to be consumed. In this sense, leading the marketing strategies is about leading the consumers' changing demands. By following a Kantian tradition, Bourdieu (1984) allocates the flexibility of consumption to the wealthy segment:

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"The struggles to win everything which, in the social world, is of the order of belief, credit and discredit, perception and appreciation, knowledge and recognition—name, renown, prestige, honour, glory, authority, everything which constitutes symbolic power as a recognized power—always concern the 'distinguished' possessors and the 'pretentious' challengers."

The signs of prestige or luxury are indispensable characteristics shaping today's housing market in Turkey. The changes in consumers' demands about obtaining prestige, especially, transform the identity of high-income mass-housing typology in architectural respect. Keeping the architectural pulse of the changing marketing strategies in the high-income mass-housing projects can only be possible by analysing the cases produced with the identities labelled as prestigious or luxurious. The promotional slogans and visuals may lead us safely in the way of such analysis.

A READING OF THE RESIDENTIAL IDENTITY IN THE CONSUMER SOCIETY

The architectural identity of the housing projects in the consumption society can also be analysed by examining the promotional representations of the projects. As it can be seen in all of the cultural products of a society, the dynamics and traces of that very culture crystalize in the architectonics of the housing projects, as well. The promotional representations of the housing projects, in that respect, reflect the ever-changing culture of the consumption society in their common architectural genes. Therefore, to understand these genes and the common qualities, the promotional representations in both visual and verbal contexts can be comparatively analysed and categorized. The rest of the paper attempts to undertake this examination by referring to the meanings of prestige and luxury as well as the consumption strategies in the housing market.

In the framework of the examination, the 20 mass-housing projects which have been implemented—or under construction—in Izmir city-centre and the periphery since 2015, and addressed to the high-income level inhabitants were selected as the cases to figure out the qualities related with the prestige or luxury. The settlement and constructional identifications of the cases are presented comparatively in Table 1 to introduce the projects regarding the common and differing contextual qualities and quantities. Furthermore, based on the promotional catalogues of the cases, the analyses were undertaken in 3 axes comprising 1) the comparative readings of the services and facilities provided in the housing settlements (Table 2), 2) the verbal and visual representations of the promotions based on the slogans and project images (Table 3), and 3) the semantic analysis of the slogans to uncover the direct and indirect messages (Table 4).

Table 1. Contextual identities of the cases[2]

	Project title	Location	Construction started	Construction completed	Number of blocks	Number of stories	Number of housing unit
1.	AllSancak	Konak	2020	Dated 2023	3	24	1069
2.	Altın Orman	Bornova	2017	2021	3	34	1215
3.	Avcılar Effect	Bornova	2015	2017	3	9	203
4.	Avcılar Exclusive	Bayraklı	2019	2021	2	10	104
5.	Avcılar Prestige	Bornova	2015	2017	2	8	270
6.	Dap Kule İzmir	Bornova	2017	2021	2	32	707
7.	Folkart Incity	Bornova	2017	2019	8	29	700
8.	Folkart Life	Bornova	2016	2018	8	15	830
9.	Folkart Vega	Konak	2018	2021	4	38	843
10.	Goldiva Familya	Bornova	2017	2020	3	14	328
11.	İzka Port	Bayraklı	2018	2020	1	34	144
12.	Mahall Bomonti	Konak	2016	Dated 2022	12	58	466
13.	Modda Suites	Bayraklı	2018	2019	1	8	72
14.	My Way Deluxe Alsancak	Konak	2017	2020	1	8	111
15.	Narova	Bornova	2014	2019	2	6	114
16.	Narova 3rd Stage	Bornova	2017	2019	2	7	124
17.	Narova 4th Stage	Bornova	2017	2019	1	9	120
18.	Ontan Bayraklı	Bayraklı	2015	2016	1	18	259
19.	Paradiso Buca	Buca	2017	2019	1	18	60
20.	Teknoen Altındağ	Bornova	2017	2019	1	16	96

[2] The information is taken from the online catalogues of the projects' websites. See consecutively AllSancak, 2021; Altın Orman, 2021; Avcılar Effect, 2021; Avcılar Exclusive, 2021; Avcılar Prestige, 2021; Dap Kule İzmir, 2021; Folkart Incity, 2021; Folkart Life, 2021; Folkart Vega, 2021; Goldiva Familya, 2021; İzka Port, 2021; Mahall Bomonti, 2021; Modda Suites, 2021; My Way Deluxe Alsancak, 2021; Narova 3rd Stage, 2021; Narova 4th Stage, 2021; Narova, 2021; Ontan Bayraklı, 2021; Paradiso Buca, 2021; Teknoen Altındağ, 2021. The visual and analytical data in all of the Tables in this paper are taken from these sources unless otherwise stated.

In Table 2, the services and facilities of the 20 cases are given in almost a similar hierarchy in terms of their appearance orders in the promotional online catalogues/websites. That is, the images of the most preferred facilities/services are located on the front pages, while the images of less preferred facilities/services are located on the back pages. Besides, the numbers denote how often the related images are included in these catalogues. Accordingly, the facilities and services of outdoor swimming pool (60 times), café (23 times), fitness centre (15 times), site security (13 times), children's playground (13 times), car parking (12 times),

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sports fields (12 times) and indoor swimming pool (11 times) seem like the standards since they are provided most frequently and in more than half of the projects. The facility of the swimming pool—whether outdoor or indoor—appears 71 times in total, which demonstrates that the most highlighted part of the *prestigious* mass-housing identity mainly comprises the swimming service.

On the other hand, the visuals of the distinguishing features such as the sauna, LEED certificate, library, primary school, and pet hotel are either rarely encountered or only included verbally without any visual; thus, given at the end of the promotional information, which means that these facilities/services were added to the catalogues only to mention their existence as an attractive quality to increase the price. Nonetheless, the inclusion of, especially, the sauna, library, pet hotel, and primary school also corresponds to a question of *use* and *needs* to be answered by considering the real necessities of the users. The existence of a library containing an insufficient number of books and magazines may not contribute to the intellectual satisfaction of the inhabitants, and inevitably become useless over time.

On the other hand, in Table 3, the slogans in verbal respect, and the logos with the initial images at the catalogues in visual respect give clues about the general dispositions of the companies in housing design as well as the target audience and their *expectations*. When we look at the slogans especially, we can perceive that some basic and common qualities are frequently repeated in every expression. Regarding these qualities, a categorization based on the frequently mentioned terms may also be proposed to figure out the backbone dispositions forming the housing identity by the way of marketing strategies. These dispositions are coded with colours in the *slogan* column of Table 3: accordingly, the red is for the *status* words, the orange is for the *experiences* provided in the project, the purple is for the words targeting users' *psychology*, the blue is for the *urban* identity presented as a trademark, the green is for the *financial* connotations, and the grey is for the *architectural* approaches. These categories can be commented further as follows:

1. Status-based: the terms to highlight the social status gained by the *prestigious/luxurious* qualities provided in the project;
2. Experience-based: the terms to point out the new *lifestyles* or importance of the well-living experiences provided in the project;
3. Location-based: the terms to show the importance of *being at the centre* of the city in terms of the accessibility to the urban facilities as well as highlighting the urban identity of Izmir by implying its distinguishing geographical and natural qualities;
4. Psychology-based: the terms to manipulate the psychology of the potential users by implying the importance of their *personal* preferences;
5. Architecture-based: the terms to address the *spatial qualities* of the projects or the concepts of the projects;

Table 2. Comparison of the services and facilities provided in the housing settlements with the frequencies of the related images in the catalogues (0 shows the facilities/services excluded visually from the catalogue/website though provided in the project)

Project Title	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	TOTAL
	AllSancak	Altın Orman	Avcılar Effect	Avcılar Exclusive	Avcılar Prestige	Dap Kule İzmir	Folkart Incity	Folkart Life	Folkart Vega	Goldiva Familya	İzka Port	Mahall Bomonti	Modda Suites	My Way Deluxe	Narova	Narova 3rd stage	Narova 4th stage	Ontan Bayraklı	Paradiso Buca	Teknoen Altındağ	
Outdoor Swimming Pool	6	2	2	2	1	1	5	4	3	5	4	1	3	1	3	9	7	1			**60**
Cafe	3		2	3	1			2	4			1		3	1			1		2	**23**
Fitness Centre	1	1		2	1	1	1	1	1	0	0	1			1	2	0	1	0	1	**15**
Security	0	1	1	1	1	0	0	1	1	0	0	0	0	1	0	1	2	0	1	2	**13**
Children's Playground	3	0					1	0	1	2		1			1	1	2	1			**13**
Car Park	2	1	1	0	0	0	0	1	1	0	0	0	0	0	1	1	2	1	1	0	**12**
Sports Fields	3	0					3			4		1			1						**12**
Indoor Swimming Pool	1			1	2		3	1	2									1			**11**
Bicycle & Running Path	2	0			0		2	0		3					0	2					**9**
Mall	2	1		3								1			1						**8**

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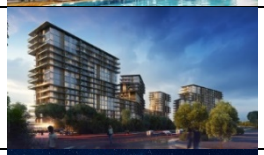
Multipurpose Hall		0		1		0	0	1	0			2									**4**
Mini Cinema	1						1		1	0		1									**4**
Kiddie Pool	0	1			0		1	0	0						1	1					**4**
Sauna		0		0	1	0	0	0	0			0						0			**1**
LEED Certificate												1									**1**
Library							0	1	0												**1**
Housekeeping								1					0								**1**
Primary School	1																				**1**
Guest Car Park	1	0	0																		**1**
Pet Hotel		1																			**1**
Yoga & Pilates Area	0																				**0**
Infirmary									0												**0**
Storage		0																			**0**
Dry Cleaner								0					0								**0**

6. Finance-based: the terms to invite the potential users for saving and even earning money by the way of the project as an *investment*.

This categorization logic was also applied to the slogans by dividing these expressions, and coding the terms with colours regarding the directly or indirectly given messages in Table 4.

Table 3. Comparison of the verbal and visual representations of the promotions based on the slogans and project images (slogans were translated from Turkish)

Project title		Slogan	Logo	Initial image
1.	AllSancak	*A Privileged Life in the Centre of Izmir…*	allsancak	
2.	Altın Orman	*The Game-Changing Life Project of Izmir*	ALTINORMAN	
3.	Avcılar Effect	*A Project by which Opportunity Turns into Investment…*	AVCILAR EFFECT	
4.	Avcılar Exclusive	*This Life is You in Exclusive! Because You are as Special as This City!*	AVCILAR EXCLUSIVE	
5.	Avcılar Prestige	*A Prestigious Living in the Centre of Life by Avcılar Construction [Company]*	AVCILAR PRESTIJ	
6.	Dap Kule İzmir	*The Pearl of Izmir with Its Large Balconies with Views*	DAP YAPI	
7.	Folkart Incity	*The Best State of Living in Izmir, Folkart Incity…*	FOLKART CITY IN	
8.	Folkart Life	*Accessible Luxury*	FOLKART Life	
9.	Folkart Vega	*Bright as the Stars, Unique as Izmir*	FOLKART VEGA	
10.	Goldiva Familya	*Your Dreams are at Its Basis[/ Foundation]*	Goldiva familya	

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11.	İzka Port	*Everything is Left Behind Now...*	İZKAPORT	
12.	Mahall Bomonti	*The Place You Want to Be*	MAHALL BOMONTİ İZMİR	
13.	Modda Suites	*Light-Filled, Spacious Places where Less is More...*	MODDA SUITES	
14.	My Way Deluxe Alsancak	*Living Alsancak is Different, Living in Alsancak is Completely Different...*	D·E·L·U·X·E	
15.	Narova	*Buy One, Live Thousand*	narova bir al bin yaşa	
16.	Narova 3.Etap	*Life is Beautiful with Pomegranate, Flower, Love. Life is Beautiful Together*	narova bir al bin yaşa etap 3	
17.	Narova 4.Etap	*The Smell of This Neighborhood is Familiar, its Texture is Different...*	narova bir al bin yaşa etap 4	
18.	Ontan Bayraklı	*As Beautiful as Izmir, as Valuable as Izmir*	ONTAN BAYRAKLI	
19.	Paradiso Buca	*Your Story Begins with Buca Paradiso*	URHANLAR PARADISO	
20.	Teknoen Altındağ	*High Status High Earnings*	TEKNOEN ALTINDAĞ	

Table 4. Analyses of the direct and indirect messages in the slogans

	Project Title	Status	Experience	Location	Psychology	Architecture	Finance
1	AllSancak	*Privileged*	*Life*	*Centre of Izmir*	-	-	-
2	Altın Orman	*Game-Changing*	*Life*	*Izmir*	-	-	-
3	Avcılar Effect	*Opportunity*	-	-	-	-	*Investment*
4	Avcılar Exclusive	*Special*	*This Life*	*This City*	*You*	-	-
5	Avcılar Prestige	*Prestigious*	*Living*	*Centre of Life*	-	-	-
6	Dap Kule İzmir	*Pearl*	-	*Izmir*	-	*Large Balconies with Views*	-
7	Folkart Incity	*Best State*	*Living*	*Izmir*	-	-	-
8	Folkart Life	*Luxury*	-	-	-	-	*Accessible*
9	Folkart Vega	*Bright as the Stars; Unique*	-	*Izmir*	-	-	-
10	Goldiva Familya	-	*Dreams*	-	*Your*	*Basis[/Foundation]*	-
11	İzka Port	-	*Everything is Left Behind*	-	-	-	-
12	Mahall Bomonti	-	-	-	*You Want to Be*	-	-
13	Modda Suites	*Less is More*	*[Less is More]*	-	-	*Light-Filled, Spacious Places; [Less is More]*	-
14	My Way Deluxe Alsancak	*Different; Completely Different*	*Living*	*Alsancak*	-	-	-
15	Narova	*Thousand*	*Live*	-	-	-	-
16	Narova 3rd stage	*Beautiful*	*Life; Pomegranate, Flower, Love*	-	*Together*	-	-

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17	Narova 4th stage	*Different*	*Smell of This Neighbourhood*	-	*Familiar*	*Texture*	-
18	Ontan Bayraklı	*Beautiful; Valuable*	-	*Izmir*	-	-	-
19	Paradiso Buca	-	*Paradiso*	-	*Your Story Begins*	-	-
20	Teknoen Altındağ	*High Status*	-	-	-	-	*High Earnings*
Total times of mention:		**16**	**13**	**9**	**6**	**4**	**3**

As seen in Table 4, in the status-based expressions, the concepts of *opportunity*, *pearl*, *luxury*, *thousand*; the adjectives of the *privileged*, *game-changing*, *special*, *prestigious*, *best state*, *unique*, (completely) *different*, *beautiful*, *valuable*, and *high status*; and the phrases of *bright as the stars*, and *less is more* were used. Some of these terms denote metaphoric implications (pearl, thousand, game-changing, different, bright as the stars, and less is more) while the majority of them are direct messages about the social status to be gained (opportunity, luxury, privileged, special, prestigious, the best state, unique, beautiful, valuable, high status). However, this category has the highest frequency of references with 16 in total. In terms of the experience-based reading, the use of the words of *life* (4 times), *living* (3 times), and *live* (1 time) are seen frequently (8 times out of 13 mentions in total) with the implication to the importance of having a new living experience or lifestyle by the project. Besides, the metaphoric connotations by the use of the phrases such as *everything is left behind*, and *less is more*; and the concepts of nature (pomegranate, flower), feeling and sensory perception (dreams, love, smell of this neighbourhood, paradise) also point out the experience qualities provided by the cases.

In the psychology-based analysis, on the other hand, we see 4 references as implicit expressions by the word of *you(r)* per se; the adjective of *familiar* (for triggering the sense of belonging); the term of *together* (to connote the unity and love); and the phrases of [somewhere] *you want to be*, and *your story begins*. In each of them, there is an emphasis on the importance of the personal and psycho-social preferences of the potential users. The urban qualities comprise the other strategies used in the marketing of the projects. Living in the *centre* mentioned directly and indirectly 3 times (centre of Izmir, centre of life, and Alsancak as the most popular neighbourhood in Izmir city-centre), having the accessibility of nature provided in the settlements while at the same time living in the city as mentioned 8 times (this city, and Izmir), and in this way, having the availability of the urban/social activities in the isolated environments keeping the crowds outside are the main foci points of the location-based references.

Unfortunately, the architectural references are less in number (only 4 times in total). The phrases of *large balconies with views*, *light-filled, spacious places*, and *texture* [of the neighbourhood] are mentioned, while the personal dreams of the users are placed at the *basis* (also meaning foundation in Turkish) of the architectural project. Besides, the prominent motto of *less is more* by Ludwig Mies van der Rohe is directly quoted in one of the projects to imply both the experience- and status-based gains of the potential users as well as pointing out the architectural understanding. However, as learned from the interviews with the designers, rather than showing a minimalist perspective, the motto was used with a misperception about its meaning to denote that the project provides the maximum status/comfort with a minimum investment/effort. Though not frequently used (3 times in total), the finance-based words demonstrate the intention to make the potential buyers think about their economic situations both now and in the future by mentioning the concepts of *investment*, *accessible* [luxury] (affordability), and *high earnings*.

In this analysis, it is obvious that all of the cases have different slogans, although the meanings and messages are similar. While some of them are stated overtly, some are pointed out covertly. In general, more than half of the projects promote *the dream of a new and distinguished lifestyle* in their slogans by giving reference to prestige or luxury with a promise of taking the lifestyle and living standards to the next level. But when the facilities are examined in Table 2, it is seen that the most preferred ones are outdoor swimming pool, café, fitness centre, site security, children's playground, car parking, sports fields, and indoor swimming pool, which are the services proposed for changing the lifestyles, and introducing the users with the high standards. Nevertheless, it is debatable how the users living in these gated mass-housing projects change their lifestyles by only using the outdoor and indoor swimming pools, living in a secure site, and parking their cars in a separate parking lot. When we also read the visual content of the projects (see Table 3) together with the verbal ones, the situation does not change: the emphasis is always on the facilities and services of which frequencies of use and need are debatable, too.

The logos in Table 3 are specially designed for the projects, though the design considerations are different. While all of them have stylistic fonts seen frequently in architectural representations, only three of them (Dap Kule İzmir, Mahall Bomonti, Teknoen Altındağ) contain architectural images—and one of which reflects directly the exterior façade of the project (Teknoen Altındağ). Like in the slogans, the other important theme, the urban identity of Izmir, is also considered in one of the logos (İzka Port), while the natural elements in the project settlement are demonstrated in three of them (Narova, Narova 3rd Stage, Narova 4th Stage). In these examples, we see that the main logo of the construction company was adapted according to the project by making minor changes following the theme of the project. The logos and the exterior design of the projects are very similar to each other as if they have been produced

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regarding other templates. Although housing is the oldest and most common architectural typology, it is very rare to see some references to high-quality solutions of architectural design, in different axes of promotional design. The *architectural design* per se is converted into a product and commodity to be consumed, and thus, having a price that symbolizes its owners' social statuses—though this fact is not frequently highlighted in promotional respect.

CONCLUSIONS AND RECOMMENDATIONS

The paper tries to figure out and analyse the relationships between the promotional strategies and architectural identities in the 20 mass-housing cases produced for the high-income level, in Izmir city-centre, since 2015. Accordingly, all of the promotional strategies highlight the new and distinguished lifestyles to be obtained by having the product and services. Because of this wide consensus, the facilities provided in the settlements and housing blocks correspond to a *template* in terms of the promotional and architectural designs. The same services are sold with the same emphases in almost the same architectural envelops—high-rise blocks with smart technologies, and various indoor and outdoor facilities—the necessities of the majority are debatable.

In terms of figuring out the main layers of the promotional strategies that are planned to meet the luxury demands of the target user group, we may denote that they mainly comprise the status-, experience-, location-, psychology-, architecture- and finance-based dynamics. Nevertheless, the architectural qualities and settlement facilities/services imposed by the promotions may not correspond to the real needs of the inhabitants, since, for example, a library full of an insufficient number of books may not refer to the real expectation of the inhabitants. The idealist vision about meeting all the needs of inhabitants under the same complex is stemming from the basic disposition which had shaped the very first department stores—or shopping centres—of the industrialization period in the nineteenth century, under the influence of capitalist and consumerist dynamics. In this respect, we may even claim that the maintenance of this ideal, today, converts housing as the oldest architectural typology into an almost *shopping centre* based on marketing; the promise of meeting all needs under the same complex creates a new housing identity which can be called *store housing* (or *shop housing*) as a hybrid conception. The limitation coming from the isolation/gatedness in the city centre also increases the effect and feasibility of this *store housing* typology.

The *prestigious* mass-housing identity in Izmir since 2015 has been shaped by this template of *store housing* as echoed in the similar foci of the slogans and settlement services. The architectural template of each case is reflected in the promotional template of each case. Furthermore, it is seen that there is not an attempt of research in the housing sector to provide *different cultures of living* by the way of architectural design. Therefore, this research may also compensate for a lack related to the

probable relationships between the architectural conceptions and promotional strategies in housing literature, propose a new basis for the theoretical readings of housing studies in Turkey, and point out the importance of setting a new design agenda to provide new cultures of living by suggesting new design solutions for the architectural offices. Not only for the high-income level but also for the rest of the society, alternative design proposals for indoor and outdoor spaces should be developed, progressed, and evaluated comparatively to enrich the experience quality in all of the housing projects.

In this respect, the mentioned architectural facilities (namely, the outdoor swimming pool, café, fitness centre, site security, children's playground, car parking, sports fields, and indoor swimming pool) are undertaken as the frequently used symbols/layers of *prestige* or *luxury*, and they are especially linked to the experience- and status-based promotional approaches with a specific emphasis on the *new and dream lifestyle*. On the other hand, the slogans (verbal context) and promotional images (visual context covering the logos and 3D renders) producing the spatial atmosphere of the prestigious mass-housing projects are consistent with each other. They both help the actors shape the housing identity with the same emphases. One cannot find a facility that is mentioned in verbal and visual respects in the catalogues/websites but is not provided in reality, in the housing settlement. Furthermore, when the practices of marketing and architecture intersect on a template, it has the potential of shaping the residential identity. This intersection per se is the identity of housing in most of the cases, for the cases refer to the overly adopted hybrid identity of the current prestigious mass-housing which is to be called *store housing* inviting the consumers to a continuous shopping while inhabiting, which will demonstrate their social status based on economic levels and sustain it by the emphasis on elitism/prestige.

Based on the outcomes of this study, it may also be examined whether there is the same problematic situation in the housing projects addressing different income groups. Besides different housing typologies may be analysed within a similar approach, and what kind of results can be obtained in different geographies may also be investigated. Some further evaluations may be provided by the questionnaires conducted with the inhabitants, and a review may be constructed by interviewing with the local government representatives. However, it is most probable that, in all of these further researches, the strength of the unifying power of the consumer society will continue to be manifested in both the architectural and promotional faces of the consumption culture—though, for sure, there will also be attempts to see the problems and seek for the alternative design-solutions to provide rooms for different preferences and lifestyles of the inhabitants, to break the templates with the unusual architectural and promotional qualities.

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LEGAL PUBLIC/PRIVATE PERMISSIONS

In this research, the necessary permissions were obtained from the relevant participants (individuals, institutions, and organizations) during the survey and in-depth interviews.

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Resume

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Biophilic Approach to Design for Children

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Abstract

Purpose

In recent years, design approaches that offer sustainable solutions have been preferred widely. Although these sustainable design approaches provide solutions for physical context, they are not able to solve the problems on psychological side of this situation. These psychological problems have been observed both on adults and children. This research aims to examine the benefits of enabling children who spend their time in built environments to experience nature through Biophilic Design.

Methodology

140 children between the ages of 3 and 5 from two different pre-school institutions participated in the study. Participation criteria were to be volunteer, a pre-school student, and accessible. The pictures drawn by the children in reply to the question 'What is nature like?' were analysed by using content analysis and cognitive mapping method. The data obtained from the study were analysed and the results were presented as median, mean values ± standard deviations (SD), numbers, and percentages. The compliance of the total score to normal distribution according to age and gender independent variables was examined by the Kolmogorov-Smirnov test. Non-parametric tests were used in the analysis, $p<0.050$ was considered statistically significant. In addition, semi-structured interviews were conducted with the teachers of the participants.

Findings

According to the age groups, the scores of the older age group were found to be significantly higher than the younger age group ($p=0.000$). When the relationship between total score and gender was examined, no statistically significant difference was found ($p=0.074$).

Research Limitations/Implications

In the study, even though the necessary permissions were obtained to carry out planned studies with preschool students, due to the prejudices of teachers and administrators, the work that was wanted to be carried out with children was made difficult in some cases.

Originality

Study originality; in the context of Biophilic Design, is owed to the age range of the chosen focus group, and with the help of this study, the emphasis on what biophilic design can add to the lives of children.

Keywords: *Biophilic design, design for children, nature*

INTRODUCTION

Since the beginning of humanity, nature, which has been a shelter, an educator, and a guide for human being, has become increasingly inaccessible to people due to the requirements of new modern life and concrete jungles that are increasing day by day. However, the need for being in touch with nature subconsciously remains alive. This is not the case for adults only. After the industrial revolution, mass production has become widespread. Since more and more families start sending their children to kindergartens because both parents have been working, this development affects children significantly. As it is difficult to control children's activities when they are outside, they are restricted to stay indoor spaces when they are away from their parents. The literature review process of this investigation has shown that it is important for children to be in touch with nature. Being away from nature negatively affects the future of children and, according to research, causes problems such as learning difficulties, distraction, and anxiety in children. To claim that the connection between children and nature is getting weaker day by day, a fieldwork was conducted to evaluate children's perception on nature. As the result of the study, the perception of children on nature was found weak because of spending more time in indoor places and built environment. As the solution to the situation, biophilic design was suggested. This is why biophilic design approach was thoroughly examined in the context of children spaces selected as the focus group.

LITERATURE REVIEW

The concept of biophilia was first introduced in 1964 by German-born American philosopher and psychoanalyst Erich Fromm. In his book "The Heart of Man", he summarized the concept of biophilia as the instinct to love and empathize with living things and everything related to life (Fromm, 1964). The concept was revisited in 1984 by the American biologist Edward Osborne Wilson in his book "Biophilia". Wilson, on the other hand, defined the concept of Biophilia as the drive to attach to other lifestyles (Wilson, 1984). This empathy and attachment drive towards life dates back to the beginning of human history and there is an instinctive connection between people and other life forms (Downton *et al*., 2017).

The biophilia hypothesis was offered as a design approach in 2005 by Stephen Kellert in the book titled "Building for Life". The main purpose of this design approach is to reflect the natural environment to the built environment through the design criteria. In the literature review conducted before the study, it was seen that the studies mostly focused on the psychological, physiological, and economic effects of biophilic design on humans. One of the biggest reasons why the author deals with the subject of biophilic design in the context of children in this article, which has been extracted from the thesis, is that he reached the conclusion that there are not enough studies currently done, and another is his belief that the chosen subject will make a great contribution to children.

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Biophilic Design

Today, thanks to the development of technology and modern building systems, it is an indisputable reality that life is getting easier day by day. Unfortunately, these developments have caused people to consider themselves to be superior to nature, and the inheritance and experiences we receive from nature have begun to lose value (Roös, 2016). The effect of the losing value returns to people as unsustainable energy, depletion of resources, air and water pollution, climate change, waste generation, unhealthy indoor and outdoor environments. (Kellert *et al.*, 2008). Biophilic design, originally meaning the love of nature, has been put forward as a solution to transform this negativity into a positivity and to strengthen the relationship between people and nature.

The purpose of biophilic design is to offer people better experiences in all areas of life psychologically and productively by answering these three questions: how will buildings affect the natural environment? How will nature affect people's experiences and passions? and how can continuous and mutual benefit between these two phenomena be achieved? (Kellert *et al.*, 2008)

As with any design approach, biophilic design has its own criteria as well. These are environmental features, natural shapes and forms, natural patterns and processes, light and space, place-based relationships and evolved human-nature relationships. Each criterion has its own elements, and the aim of each element is to provide the intended human-nature relationship to the users of the built environments. Equipped with the known characteristics of the natural world, this list consists of several aspects such as imitation of the natural world, the integration of properties found in nature into the built environment, the quality of the relationship between light and space, the combination of culture and ecology (Kellert *et al.*, 2008). Including these aspects in the built environment has the potential to enrich nature and humanity (Kellert *et al.*, 2008).

Since the dawn of humanity, nature has played an important educational role. Thanks to the facts and other living things it hosts; people have learned to survive and have been able to improve what they get from nature with the help of their observation skills. Observed creatures and phenomena are summarized with nine elements under the heading of environmental features. These are; colour, water, air, sunshine, plants and animals, fire, view, natural materials and ecosystem. The use of environmental features is the incorporation of elements that already exist in nature with the designed environment. These elements also support the continuation of people's existence. For example; water is one of these elements. Throughout our history, civilizations have always been shaped according to water resources. Water, which constitutes 70% of our body, is the most important substance after oxygen for our survival. As it is known, the sound and image of water support visual aesthetics by giving people peace and tranquillity (Hildebrand, 2000). The built

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environment containing water images is preferred to the natural environment that does not contain water images (White *et al*., 2010).

Natural shapes and forms, the second criteria of the biophilic design, consist of eleven elements. These are organic forms, botanical motifs, biomimicry, shells and spirals, shapes resisting straight lines and right angles, biomorphology, geomorphology, egg, oval and tubular forms, simulation of natural features (Sayuti *et al*., 2015). These elements include the presentation and simulation of the natural environment on building facades and interior spaces (Kellert *et al*., 2008).

Natural patterns and processes that play an important role in the evolution and development of human being is the third criterion of the Biophilic Design Criteria. For biophilic design, reflecting the reactions and experiences that are acquired from the nature in the built environment design process is as important as reflecting the environmental features and natural shapes and forms. The elements of natural patterns and processes are sensory variability, information richness, growth, change, aging, dynamic balance and tension, ratio and scales, bounded spaces, central focal point, fractals, integration of parts to wholes, and linked series and chains (Sayuti *et al*.,2015).

The subject of light and space, which is the fourth criterion of the Biophilic Design, consists of the elements of natural light, filtered and diffused light, light and shadow, reflected light, light pools, light as shape and form, warm light, spatial variability and harmony, and inside-outside spaces (Sayuti *et al*.,2015). People see and perceive their environment thanks to the visual perception of brightness. In order for visual perception to be flawless in any space, the quantity and quality of lighting must be created in accordance with the characteristics of the environment in question (Demircioğlu & Yılmaz, 2005). Therefore, one of the most important factors in the perception of space is the phenomenon of light.

The fifth biophilic design criterion is place-based relationship. This element implies the successful evolution of culture with ecology in the geographical context. The attachment of humans to places creates a need for territorial control aiming to maintain control and security over resources throughout the evolution of species. Local familiarity and homesickness are the needs that most people feel deeply (Kellert *et al*., 2008). Place-based relations have eleven elements. These are geographical connection, historical connection, ecological connection, cultural connection, indigenous material, landscape orientation, landscape features that define the built structure, landscape ecology, avoidance of placelessness, the spirit of the place, the integration of culture and ecology (Sayuti *et al*.,2015).

The sixth and final criterion of biophilic design is the evolutionary human-nature relationship. The criteria mentioned before are based on the physiological connection of humans with nature.

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Table 1. Biophilic Design Criteria (Sayuti *et al.*, 2015)

Environmental Features	- Colour - Water - Air - Sunshine - Natural Materials	- Plants and Animals - Fire - View - Ecosystem
Natural Shapes and Forms	- Organic Forms - Botanical Motifs - Biomimicry -Shells and Spirals -Shapes Resisting Straight Lines and Right Angles - Biomorphology	- Geomorphology -Egg, Oval and Tubular Forms - Simulation of Natural Features
Natural Patterns and Processes	- Sensory Variability - Information Richness - Age, Change and The Patina of Time - Dynamic Balance and Tension - Integration of Parts to Wholes - Bounded Spaces	- Transition Spaces - Hierarchically Organized Ratios and Scales - Lurks Series and Chains - Fractals
Light and Space	- Naturel Light - Filtered and Diffused Light - Light and Shadow - Reflecting Light - Warm Light	- Light Pools - Light as A Shape and Form - Spatial Variability - Inside – Outside Spaces
Place-Based Relationship	- Geographic Connection - Historical Connection - Ecological Connection - Cultural Connection - Landscape Orientation - Landscape Features Defining Building Form - Indigenous Materials	- Avoiding Placelessness - Spirit of Place - Integration of Culture and Ecology - Landscape Ecology
Evolved Human- Nature Relationships	- Prospect and Refugee - Order and Complexity - Change and Metamorphism - Security and Protection - Exploration and Discovery - Fear and awe	- Curiosity and Enticement - Information and Cognition - Attraction and Beauty - Affection and Attachment

The evolutionary human-nature relationship is about how people have nature in their inner world and what nature means to them. In other words, evolutionary human-nature relationship focuses on fundamental aspects of the internal human relationship with nature (Kellert, 1997). The elements of the evolutionary nature-human relationship criteria are

prospect and refugee, order and complexity, change and metamorphosis, security and protection, exploration and discovery, fear and awe, curiosity and enticement, information and cognition, beauty and attraction (Sayuti *et al*.,2015).

Implication areas of biophilic design

It is possible to experience and apply biophilic design to many different scales. By considering biophilic design strategies at very early stages of the design processes, opportunities regarding building layout, architectural form, interior layout, interior design and landscape can be more easily obtained. Enabling users to correlate spaces visually, ecologically, historically and culturally, with the help of biophilic design criteria at different scales, will help them to adopt and protect the built environments. These scales can be summarized under four headings as urban design, architecture, interior architecture and industrial design. Under the title of biophilic design application areas, the relationship of biophilic design with these four different scales will be exemplified.

One of the examples that can be given in the context of the use of biophilic design in urban scale, which is the first subtitle of biophilic design application areas, is to provide open spaces by leaving gaps between buildings. In this way, it is possible to prevent people from being exposed only to structures, and to ensure that they have areas where they can interact with nature more closely. In addition, when these pre-planned open areas are left during construction with respect to the natural environment, the protection and utilization of local trees and vegetation will be ensured. In addition to providing low costs, this may ensure that the damage to the natural life from the constructional work can be minimized.

Another biophilic decision that can be made on an urban scale is to create pathways for walking and cycling in these spaces in order to define and make sense of the spaces to be left around the buildings.

Applying green walls to the facades of buildings and green roofs to the top of the buildings will not only ensure that nature is preferred over artificial materials as an insulation material, and also, they can be proofs that more environmentalist approach is preferred since rain and snow water can reach the soil filtered by the green walls and roofs (Çorakçı, 2016).

When it comes to the biophilic design applications at architectural scale, some of the most common applications can be listed as: shaping the facades focusing on the natural view, making maximum use of daylight, using movable spaces on the facades, preferring green roof applications, preferring organic shapes and forms, including water as a design element in the building, and referring to the feeling of spaciousness and security in the design. Such design decisions on an architectural scale can increase the sense of nature on users, increase the efficiency of the buildings and put depth and diversity on the designed spaces.

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Choosing Biophilic Design as a design strategy in interior architecture scale brings out some advantages such as increasing work efficiency of the users, accelerating their healing processes, making them feel closer to the nature and keeping them away from the stress factors. Using pot plants, indoor gardens, natural building materials, pictures with natural views as part of the design, and designing living or working places in such ways that they can look outside the windows or interior gardens and they can make the most of natural light are some of the examples that will meet biophilic design criteria in interior architecture scale.

The last scale is the industrial design scale. As in other scales, the priority of Biophilic Industrial Design is directly or indirectly to give the users the connection to the nature that they need with the help of the design products they may use in the built environment. Although it is still developing and still not fully mature, industrial design scale continues its progress under different sub-headings. These subheadings are indoor air cleaners, materials and processes are sustainable energy production and interconnected household appliances.

Effects of biophilic design

Humanity owes their present achievements to the correct evaluation of what nature has given to them. Nature has always been a shelter for people, and a teacher and a way of therapy when appropriate. As biological creatures, humans have not fully adapted to today's sterile technological cities psychologically, physiologically and emotionally (Burns, 2005). This is one of the reasons why stress level on people increases. Many studies show that one of the most powerful ways to overcome stress is to increase people's contact with nature, which seems less accessible today. With the help of natural contact, it is possible to reduce the effects of many situations that negatively affect our lives. Biophilic design as a design trend is seen a design approach that can help human being in this sense. As Wilson and Kellert emphasized in their book Biophilia Hypothesis, feeding the innate love and connection with nature in humans can not only help people go beyond the basic needs such as food, but also become fundamental for human well-being in urban life (Kellert & Wilson, 1993). While examining the effects of biophilic design, it is possible to collect the data found under different classes. These classes are psychology, physiology, environment and economy.

According to the biophilia hypothesis, the main reason for the positive effects of exposure to nature is the biological bond between man and nature (Wilson, 1984). Disengagement from nature, which is one of the negative effects of the modern world, unfortunately weakens the human-nature relationship. The achievement of this relationship can be demonstrated by the Attention Repair Theory (ART) and Stress Healing Theory (SRT) in the Environmental Psychology literature (Joye, 2012). According to ART; attention deficit can be repaired by exposure to natural environments (Fan & Jin, 2013). According to Kaplan, just displaying pictures of nature is sufficient for increasing a person's cognitive

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function, mental state and working capacity (Berman *et al*., 2008). On the other hand, there are some possible negative effects of attention fatigue. Some of them are to make the wrong decisions, to lose the personal control mechanism, even to become obese (Hare *et al*., 2009).

Another benefit of the biological bond between humans and nature is, according to SRT; contact with the non-threatening natural environment during stress will reduce the stress level compared to the built environment (Zajonc, 1980). The power of nature, advocated by ART and SRT, is one of the examples that positively affect people in the built environment in a psychological context thanks to the biophilic design.

Deficiency of any environmental representation of the nature not only disturbs people in a psychological context, but can also lead to physiologically negative symptoms and reactions (Söderlund & Newman, 2015). In the past, biophilic design was used consciously or unconsciously to ensure that people are positively affected psychologically and physiologically by imitating the communication with nature in built spaces to contribute to people. For example, as the architectural theorist Christopher Alexander states in his book "A Pattern Language" published in 1977, reflecting and transporting the pattern language of nature to the built environment makes people feel more alive and more human (Alexander, 1977). Nowadays, Biophilic Design applications are discussed by designers in order to exhibit this approach in their designs consciously and to affect the users better in a physiological context.

Biophilic Design can physiologically help humans in many ways such as low blood pressure, reduction in symptoms, accelerated healing and improved physical fitness. According to the findings obtained by medical doctors Park and Mattson as a result of their study with 90 patients who were undergone appendicitis surgery, it has emerged that the plants used in the hospital environment are an affordable and complementary medicine for patients who are in recovery phase after the surgery. It was determined that patients with plants in their rooms demanded fewer painkillers, their blood pressure was more regular and they were more satisfied with their hospital rooms (Park & Mattson, 2008). The effects of global warming, one of the biggest problems of today, are increasing day by day due to the decrease in green areas, the decrease in biodiversity, water and air pollution, unplanned urbanization, the formation of urban heat islands and the increase in energy consumption. It is possible to minimize these negative effects with the correct application of biophilic design at different scales. The decrease in green areas, which is one of the results of unplanned urbanization, causes other negative consequences. There are many benefits of using green facades and roofs as green areas has many benefits as well as being a solution to these problems. One of these benefits, thanks to the controlled use of vegetation, it is possible to manage waterway pollution with the help of vegetation's water absorption and absorption ability. In addition, the cleaning of the soil, whose water holding capacity is increased due to the fact that the water

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that the soil cannot absorb during rainfall is brought to the soil by planting, is another of these benefits. Control of rainwater flow as a result of vegetation used on the roof and facade will also reduce floods (Ostendorf *et al.,* 2011). The efficiency of rainwater utilization varies according to the climate, seasons, plant types that are used, roof slope and substrate depth. Providing the appropriate combination of all these elements can increase this efficiency by 70% (Schroll *et al*., 2011). Vertical green walls and green roofs also have a minimum footprint and contribute significantly to the aesthetics of the urban environment. They have the potential to meet the water required for their maintenance through the recirculation of the wastewater they recycle due to the reduction of rainwater flow (Burrows & Corragio, 2011).

There are also economic effects of biophilic design. These are increase in employee productivity, accelerated recovery in patients, and increase in product sales in stores. Today efficiency costs are 112 times higher than energy costs in the workplace. Thanks to the investments in efficiency, it is possible to save 2000 $ per employee a year. This situation is similar not only to workplaces, but also to hospitals whose patients recover faster, to factories with increased efficiency, to schools that improve exam results, and to stores that increase sales (Browning *et al*., 2012). Another example of economic impacts of biophilic design, by the integration of biophilic approach in urban scale, is possible to conserve resources, optimise energy water and waste systems, which in return will affect the users in a positive way economically (Thomson & Newman, 2021).

The importance of biophilic design for children

The reason for biophilic design to become more and more important is the side effects of modern life daily routines. Because of these increasing daily routines after school activities for children, the time spent indoors have become longer, and technological devices have been used more and more. Also, the anxiety level of parents for their children's security has raised. These are the reasons that weaken the bond between nature and children because children are spending less time in nature. This situation as a conclusion, starts a chain reaction which leads people to become estranged to nature. Increase in obesity, vitamin D deficiency, hyperactivity and attention deficit disorder occurs in children as other results (Faber *et al*., 2006). Another effect of being diverged from nature on children is the way they become afraid of and uninterested in nature (Berg & Medrich, 1980). To avoid this, using natural elements in built environment can be a solution (Day, 2007).

Biophilic design gives people the opportunity to communicate with nature and understand the local cycles of nature at the urban scale as well. Bringing these cycles to children's perceptions contributes to their social and physical development (Ginsburg, 2007). On the other hand, it has been observed that families who spend time in nature prefer these areas for their children and themselves, and they feel safer when they are

in these areas (Kuo & Sullivan, 2001). As biophilic design provides benefits for adults, it also provides several benefits for children as well. These are improvement in their self-esteem level, development of motor skills, increase in cognitive functioning and attention capacity (Wells *et al*., 2003).

It is possible to make the space more convertible by using biophilic design elements. If the children have the opportunity to convert and transform the materials that are used in a space by them, this would make the children gain independence (Derr & Lance, 2012). Allowing children transform the built environment they use can bond them with the idea of nature. Because nature is the place where they can be completely free to play with anything they want as much as they want. It is possible in nature for rocks to become thrones and for bushes to become rockets (Derr, 2001).

METHOD

Since the focus group of the study is students between the age of three and five, and since the interviewees are not capable of understanding the notion of biophilia, the people to be interviewed for the semi-structured interview were selected from their teachers. The reason for choosing semi-structured interview method is to be able to explain the questions during the interview process and to inform the interviewee where necessary (Berg & Howard, 2015). Another reason for the semi-structured interview is that the order of pre-prepared questions can be changed during the interview according to the flow of the interview, and the possibility of better communication with the respondents thanks to the flexibility of the interview language. Questions can be left more open-ended than the standardized interview type, and therefore the interviewees are expected to provide more detailed information (Derr, 2001).

The teachers selected for the interview were selected from Safranbolu district of Karabük Province in the context of convenience sampling, thanks to the author's ease of access to people and information (Yamane, 2009). Pre-school education units in Safranbolu are divided into two groups as state-owned institutions and independent private institutions. Branch selection has been determined as state institutions and the reason for this is that there are more students in these institutions due to socio-economic reasons. The schools of the teachers interviewed were chosen by simple random sampling from random sampling methods. The reason for this was to equalize the probability of participations of teachers and workplaces. For this reason, the names of all schools affiliated to the state were written on individual papers and put in bags, and drawn from the bag. Thanks to randomness, all schools are given equal probability (İslamoğlu & Alnıaçık, 2014). The teachers interviewed in the selected schools were determined on a voluntary basis. As a criterion, teaching in pre-school institutions was taken. The questions asked to teachers during the interviews were in Turkish because their mother tongue was Turkish

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and they can express themselves more easily. The translated questions are as follows;

1. Do you include extracurricular activities in your annual curriculum? If you include out-of-class activities, what are these activities?

2. How many hours do you get round to these activities per week?

3. What are the qualified natural environment activities of your students?

4. What are the attitudes of your students towards qualified natural environment activities comparing to their attitudes towards classroom activities?

5. How are your students' participations in qualified natural environment activities compared to their participations in class activities?

6. Is it possible to facilitate your students' first-time experience of being away from their homes and families with biophilic design?

7. What are the benefits of taking lessons in qualified natural environments?

Another method used in the study is literature review. In order for the examined documents to be objective, the researches on the topics discussed have been provided from many sources. The aim here is to continue the investigation and present the correct information, even if there are conflicts in the literature about the subject (İslamoğlu & Alnıaçık, 2014). During the literature review process, Biophilic Design, the relationship between nature and children, and design for children were investigated in detail and comparatively.

Another method is the cognitive mapping method. The reason for using this method is that the age of the children in the focus group is not suitable for verbal interviews. For this purpose, children were asked to paint with a material of their selection, as an answer to the given question. Some randomly selected pictures made by the children are given below in Table 2.

Figure 1. Sample pictures drawn by the children

The pictures made by the participants were detailed by using the content analysis method and the used elements were categorized. The elements and sub-categories of animate and inanimate elements were listed in Table 3. In Table 4, the number of usages of animate and inanimate elements were shown, and in Table 5, the number of colour usage were given. Then, with the content analysis method, what the elements used in

the pictures mean for children in a cognitive context was determined. 140 (54 boys, 86 girls) preschool children from two state schools in Safranbolu district of Karabük province attended the research. The pictures made by the participants were scored according to the subtitles of plants, animals, humans, natural elements and human elements under two main headings (animate elements, inanimate elements) in the answer key created by using the content analysis. Plants, animals, human and natural elements were evaluated as +1, while human factors were evaluated as -1. This means that a picture can get +1 point for every animate element, and -1, if there is an inanimate element in the picture drawn. To make the long story short, the range of points a picture can get varies between -1 and 4 points.

Scoring was done by 3 experts who did not know each other, one of which was a child psychiatrist, a psychiatrist, and a psychologist. The experts evaluated the pictures in a way which was stick to the table created as a result of the content analysis made over the pictures. Evaluation scores varied between -3 and 12 points when all 3 scores given for a picture by the experts were added up. To evaluate the consistency between the experts, the correlation was also analysed by using SPSS. While analysing the correlation between the scores that were given by the experts, correlation coefficients test was used. The correlation of the results that were taken from the experts was also analysed by binary combination and every pair was compared to each other.

Figure 2. Unidentified Picture.
Pictures are categorized as unidentified by the 3 experts in the evaluation stage.

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Table 2. Evaluation of the pictures by the experts according to the group distributions

		Low	Mideum	High
1st GROUP	Younger Age Group			
	Expert Scores	Unidentified	-1/-1/-1	0/0/2
	Older Age Group			
	Expert Scores	0/0/0	0/0/1	0/3/-1
2nd GROUP	Younger Age Group			
	Expert Scores	1/1/1	2/1/2	2/3/2
	Older Age Group			
	Expert Scores	1/1/1	2/1/2	2/3/2
3rd GROUP	Younger Age Group			
	Expert Scores	2/3/3	3/3/4	3/4/4
	Older Age Group			
	Expert Scores	3/3/2	3/4/3	4/4/4

In the Table 3 above, sample evaluations of the experts can be seen. The schools that the intervention was done are shown as 1st Group, 2nd Group and 3rd group. The age categories of students in their schools were determined as follows: Students at the age of 3 and 4 were taught in one group and students at the age of 4 and 5 were taught in another group. Younger students are shown as the younger age group, and older students are shown as the older age group in the table. From every group in every school, sample pictures getting high, medium or low scores, and evaluation scores of all 3 experts for these sample pictures were given.

Figure 3. A 12-Point Picture. The highest score that a picture can get as the results of the evaluations done by the experts is 12.

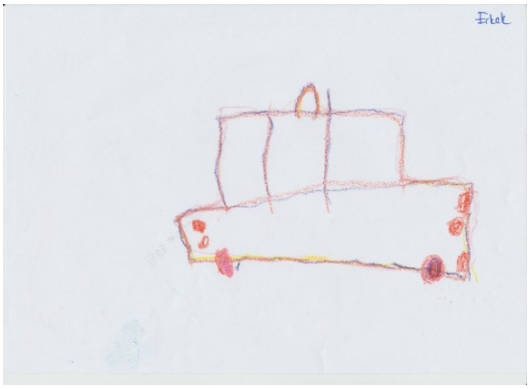

Figure 4. A 3-Point Picture. The lowest score that a picture can get as the results of the evaluations done by the experts is -3.

The data obtained from the study were analysed using SPSS, Version 22.0 (SPSS Inc., Chicago, Illinois, USA) and the results are presented as median, mean values ± standard deviations (SD), number and percentage. To see if age and gender variables follow the normal distribution, the Kolmogorov-Smirnov test, which is a commonly-used test to understand if the collected data is statistically significant or not, was conducted. Non-parametric tests were used in the analysis because the data did not fit into the normal distribution. The value $p<0.050$ was considered statistically significant. In the Table 4 below, it can be seen that the p value ($p = .001$) is lower than .050. It can be interpreted that the data collected are statistically significant and follow the normal distribution.

Table 3. Tests of Normality

Tests of Normality			
	Kolmogorov-Smirnov[a]		
	Statistic	df	Sig.
total scores	,103	136	,001

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Table 4. Content Analysis Table

The elements that children use to answer the question; What is nature like? (141 Children)		
Theme	Category	Expressions
Animate Elements	Plants(110)	Tree (49), Grass (24), Flower (16), Apple (13), Greenery (7), Cactus (1)
	Animals(26)	Butterfly(4), Bee(3), Bug (3), Dog (3), Bird (2), Chicken (2), Octopus (1), Whale (1), Brood (1), Turtle (1), Lizard (1), Olaf (1),Chipmunk (1), Fox (1), Dolphin (1)
	Human Beings (57)	Kid(32), Family(11), Girl(8), Man (3), Mother (1), Me (1), Doctor (1)
Inanimate Elements	Natural Elements(158)	Sun (51), Cloud (41), Mountain (13), Rainbow (13), Sky (13), See (12), Rain (4), Lake (3), Honey (2), Earth (2), Moon (1), Land (1), Rock (1), Water Pond (1)
	Artificial Elements(102)	House (21), Car (16), Hearth Symbol (13), Ball (6), Bag (4), Pot (3), Kite (3), Road (3), Balloon (2), Submarine (2), Ship (2), Hammock (2), Motorcycle (2),Rail Way (2), Bike (1), Tent (1), Ice Cream (1), Mouse Trap (1), Garage (1), Air Pollution (1), Light (1), Square (1), Slide (1), Ashtray (1), Toy (1), Rocket (1), Swing (1), Water Cup (1), Ornament(1), Hat (1), Humming Top (1), Traffic Light(1), Trampoline(1), Triangle (1), Bed (1), Christmas Tree(1)
Colours	Green(103), Blue(96), Red(81),Sarı (73), Brown(73), Black(64), Orange(62), Pink(55), Purple(29), Grey(7), Nude(2)	

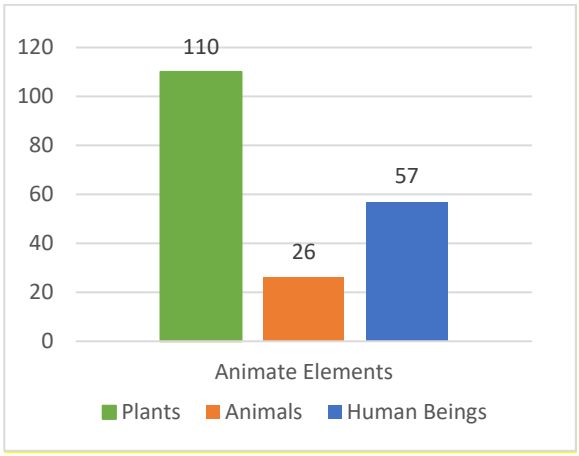

Figure 5. Animate Elements

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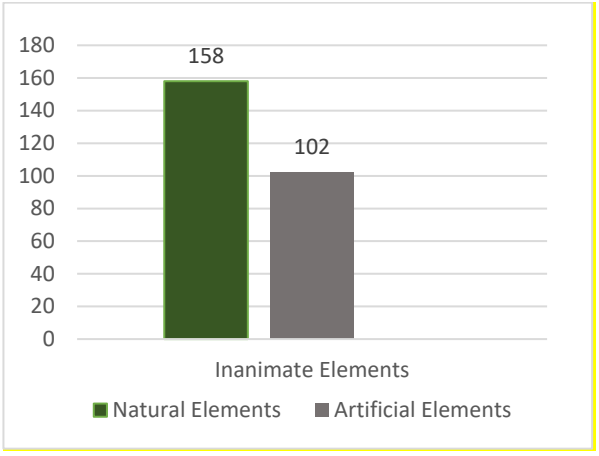

Figure 6. Inanimate Elements

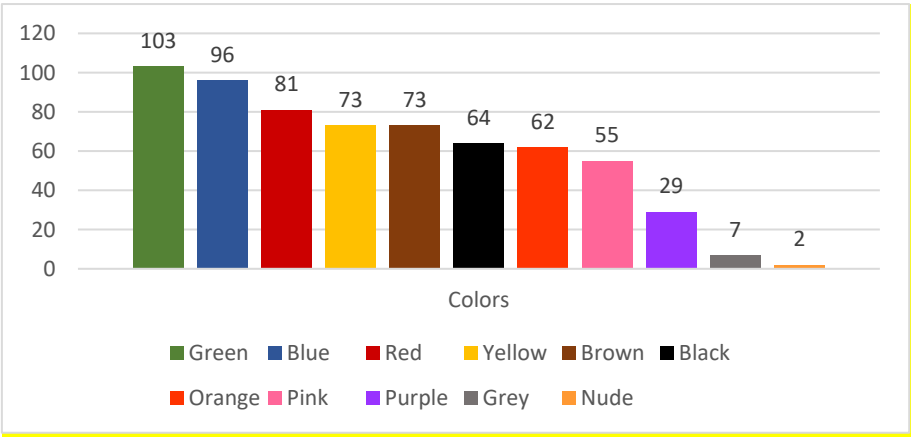

Figure 7. Usage of colours

RESULTS

As a result of the cognitive mapping method, the pictures made by 140 children in response to the question of "what is nature like?" were analysed by 3 independent experts using the table created with the content analysis method as the evaluation rubric. 11 pictures that could not be defined and categorized as unidentified by the experts according to the rubric were excluded from the study. Sample unidentified picture is shown in Figure 1. A total of 129 children, of which 50 (38.8%) were boys and 79 (61.2%) were girls, were accepted. There were 32 students (24.8%) in the younger age group (3-4 years) and 97 students (75.2%) in the older age group. They can be seen on the Table 9 below.

Table 5. Distribution of the focus group by age and gender

		Younger age group	Older age group	Total
Gender	Boy	8	42	50
	Girl	24	55	79
Total		32	97	129

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The total mean score obtained from the pictures made by the participants was 5,59±3.11 58 (min: -3, max: 12), standard deviation (SD) was 4,58, with a median of 6.

The correlation between the scores of the 3 experts who made the evaluations was examined. The internal consistency of the evaluations of all three experts was found to be above 70%. (E1 / E2: 71.5%, E1 / E3: 77.3%, E2 / E3: 72.3%) Being above 70%, in terms of internal consistency means that the correlations among the experts can be accepted as significant. Table 10 shows the detailed correlations among experts.

Table 6. Correlation analysis between experts

			Expert 1	Expert 2	Expert 3
Spearman's rho	Expert 1	Correlation Coefficient	1,000	,715**	,773**
		Sig. (2-tailed)	.	,000	,000
		N	129	129	129
	Expert 2	Correlation Coefficient	,715**	1,000	,723**
		Sig. (2-tailed)	,000	.	,000
		N	129	129	129
	Expert 3	Correlation Coefficient	,773**	,723**	1,000
		Sig. (2-tailed)	,000	,000	.
		N	129	129	129
**. Correlation is significant at the 0.010 level (2-tailed).					

When the total scores of the participants according to their age groups were examined, the scores of the older age group were found to be significantly higher than the younger age group (p< 0.000). When the relationship between total score and gender was examined, no statistically significant difference was found (p< 0.074).

On Table 11, score distributions of pictures drawn by the participants were given in detail. The scores that the children took (between -3 and 12 points) were divided into 3 groups: Group 1, from -3 to 2 points, the group 2, from 3 to 7 points, and the group 3 from 8 to 12 points. There are 17 children in the first group, 76 children in the second group and 36 children in the third group. The children in the first group were defined as the ones with the lowest nature perception and experience; the children in the second group as those with medium nature communication; and the children in the third group as those who had a good relationship with nature.

Table 7: Score distributions of 'What is nature like?' pictures

	Points	Number	Percentage	
Group 1	-3	3	2,3	17 children %13,2
	-1	3	2,3	
	0	4	3,1	
	1	2	1,6	
	2	5	3,9	
Group 2	3	13	10,1	76 children %58,9
	4	15	11,6	
	5	12	9,3	
	6	19	14,7	
	7	17	13,2	
Group 3	8	8	6,2	36 children %27,9
	9	19	14,7	
	10	5	3,9	
	11	3	2,3	
	12	1	0,8	
TOTAL		129	100	

The aim of this study is to emphasise the importance and the benefits of biophilic design for children to provide a solution for alienating from nature. The reason to investigate this situation was the negative results of modern daily life such as spending more time in indoors, having fewer green areas in neighbourhoods and in return, being unable to benefit from the nature. Because of having a weaker connection to the nature every day, this study suggests integrating biophilic design into children's spaces can increase the relationship between children and nature.

DISCUSSION

The starting point of the study was to minimize the negative effects of staying away from nature on adults and especially children with the help of Biophilic Design. Due to the pandemic that has affected the whole world, this issue has become much more important today. People began to realize they need nature more because of the days and even weeks they spent in quarantine due to the Covid-19 pandemic. This period has shown how much we need this design approach beyond the importance of Biophilic Design.

In this period, people have had to focus on different solutions in a spatial context due to the Covid-19 outbreak. The reason for this is the social distance rules that people must provide in order to protect themselves and their relatives. Due to the new regulations in indoor and outdoor places in accordance with social distance rules and the fear of virus, people have started to prefer natural environments over built environments. They started to spend most of their time in isolation due to quarantine (Sever, 2020). As a result, people are now in search of ways

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to bring nature to their homes. For this reason, Biophilic Design provides useful solutions for these difficult times. For further researches, the effects of the pandemic on people's psychology can be discussed to see if Biophilic Design can serve well for this particular situation.

CONCLUSION

It is known that the absence of connection to the nature in a human being's life has severe affects. These can be sorted as fearing from mother nature, lack of vitamin D, hyperactivity, attention disorder, obesity. Unfortunately, these consequences are not the only ones. These problems also lead to other problems which create a chain reaction that in return, affect a person's life entirely in a negative way.

Day by day, increasing daily modern time requirements keeps people away from the nature. The more daily workloads and workhours mean the less time spent on personal needs. As a result of this, people spend most of their times indoors. It causes their children to be kept closed indoor places too. This is why children are not able to benefit from what nature brings for them.

This article which has been produced from a doctoral thesis, aims to bring a solution to this chain reaction. By using Biophilic Design in a built environment especially for children spaces, a lot of children can be able to taste what it would be like to be in nature. As it was emphasized, absence of connection to the nature may cause health disorders, such as attention-deficit hyperactivity disorder, stress, obesity, and depression. Unfortunately, these are not the only effects that nature disconnection causes. Also alienating from nature causes children to lose their motivation to protect it (Hand *et al*., 2017). By using biophilic design elements, it is possible to increase the positive effects that nature can bring to children. For example, if the choice of materials is made accordingly with natural materials, this decision can promote the users feel relaxed. By using biophilic design criteria such as prospect and refuge, it is possible to make the users increase the concentration time and ability to perceive safety. Another solution can be about light and space. To increase comfort, happiness, and productivity, dynamic and diffused light applications can be effective (Park & Lee, 2019).

During the fieldwork, the aim was to understand the perception of the chosen group about the nature. It was to be able to claim that children need Biophilic Design approach in their lives to understand and benefit from nature even in an artificial environment. According to the results of this study, as it was written before, the target group shows that most of the children participants have a weak nature perception. This is why another aim of this work is to emphasize how important it is to make the most of the nature elements and to have a better connection with nature. So, a positive chain reaction can be created. The use of biophilic design approach applications in the built environments, where children spend most of their lives, strengthening the perception of nature for them has a crucial importance. In this way, children will be able to benefit from the

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experiences that nature can provide for them, even if they are in the built environment.

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LEGAL PUBLIC / PRIVATE PERMISSIONS

In this research, the necessary permissions were obtained from the relevant participants (individuals, institutions and organizations) during the survey, in-depth interview, focus group interview, observation or experiment.

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Resume

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Turkey Experience in Urban Transformation

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Abstract

Purpose

This study focuses on the current situation and problems of urban transformation practices in Turkey, with respect to space, society, and policy. A number of field studies and surveys were conducted in the study area in Konya city in Turkey, with regards to the unity of space, society, and politics and were developed spatial strategies that ensure such unity.

Design/Methodology/Approach

The study consisted of two stages. In the first stage, the literature on the need for urban transformation in Turkey was reviewed based on experiences relating to space (land fragmentation, property rights, informalities housing), society (the coordination and participation processes), and politics (current legislation, actors and their roles, horizontal and vertical coordination, public interest, planning strategy, policy learning). In the second stage, a number of field studies (the status of the buildings, the building types, the land use status, the status of historical and cultural structures, the land to building ratio, the land fragmentation and cadastral status and surveys) were utilized within the scope of our analysis. The survey questions consisted of the problems and expectations of inhabitants and NGOs with respect to spatial, political and social aspects of the study area.

Findings

Based on the results of the current situation analysis and field survey, spatial strategies that provide the unity of space, society, and politics were developed for the study area.

Research Limitations/Implications

With respect to actors and their roles, this study focuses on two groups as representatives of the social structure. The other groups also should be involved directly or indirectly because of the multi-factor structure of the urban transformation processes.

Social/Practical Implications

Identifying the need, processes and problems related to urban transformation, based on the unity of space, society, and politics could have positive effects on sustainable projects.

Originality/Value

This study is important with the development of spatial strategies with the participation and cooperation activities of the residents and non-governmental organizations (NGOs) on the basis of neighbourhoods in urban transformation.

Keywords: *Sustainability, urban governance, urban negotiation, urban policy, urban transformation.*

INTRODUCTION

Urban transformation is an urban regeneration program that involves the rehabilitation of existing parts of a city, the reuse of previously built-up areas and abandoned buildings, and the redevelopment of blighted urban spaces to increase urban sustainability (Rosa *et al.*, 2017). From past to present, urban transformation practices are developing in the context of creating comparative forms of policy and practice, putting more emphasis on integrated treatments in urban areas, having partnership as a dominant approach, creating a good balance between public, private, and voluntary funding, building older areas preserving heritage, and introducing the broader idea of environmental sustainability (Stöhr, 1989; Lichfield, 1992; Roberts, 2004). In the literature, urban transformation has been examined under major themes and topics, such as evolution, definition, and purpose (economic, physical, social, employment, education, and housing) (Roberts & Skyes, 2000; Noon *et al.,* 2000; Jeffrey & Pounder, 2002; Jacobs & Dutton, 2004; Hart & Johnston, 2006; Edgar & Taylor, 2008). Furthermore, urban transformation practices have had repercussions in the literature in different urban areas such as architectural studies (Sklair, 2017), the evolution of historical port cities and the process of reconnecting them with the urban structure (Öztürk, 2006; Topçu, 2017), gentrification studies that dominate urban transformation practices (Levy *et al*., 2006; Lees, 2018), gentrification studies in which real estate came to rule of the city (Stein, 2019), neighborhood transformations led by the cultural structure (Gainza, 2017), culture- and tourism led peri-urban transformation (Li, 2020), and planning of cities as safer and healthier places against global health problems and the threat of a pandemic (Fabris *et al*., 2020).

In Turkey, the beginning of the EU harmonization process in 1999 and the economic and political crisis experienced in 2001 necessitated significant reforms. This process encouraged political modernization, and significant reforms were made regarding the supply of housing. Since 2002, urban transformation practices in Turkey have attracted significant interest from the construction sector with political support (Afacan, 2015). Urban transformation practices have become an important urban planning interest to create a driving force for the construction sector in physical and economical terms, enable social and cultural investments in space, and ensure justice in the distribution of such investments. Such interest has resulted in conflicts and competition among the actors in the process of sharing and distribution of lands - which is a scarce resource, - and securing public interest. This has altered the purpose and meaning of urban transformation practices. To ensure sustainable practices, it is very important to analyse changing definitions, to address the political and social aspects, and to identify associated problems.

In spatial terms, current practices lead to problems such as the creation of spaces that do not reflect the identity of the location where people live

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(Öngel, 2013); investments that are far from having a balanced sector distribution, which is the opposite of what is necessary for a holistic urban planning perspective (Özdemir, 2010); the fragmentation of the space, with social, economic, cultural, environmental, etc. aspects being treated individually and separately (Oatley, 2000); and - from the perspective of the mapping sector - the problem during the projects is that property rights (formal or informal) are sometimes not secured and documented well enough and there is no mixed pattern of rights. Furthermore, there is need for a more sustainable inner-city transformation to address physical and social problems (Zhu & Huang 2015).

In political terms, these practices bring about problems such as the dilemma of 'satisfying the expectations of actors versus serving the public interest' faced by local administrations (Kreukels & Spit 1990; Göksu & Bal 2010; Muñoz-gielen, 2012) the hierarchical structure of local administration coordination that is far from having a reconciliatory character (Bozdağ, 2015) and the development of pseudo-projects based on the ideological choices of local administrators (Tekeli, 2009).

In social terms, the practices bring about problems such as failure to build capacity and cooperation with respect to participatory practices.

In the literature, there are some studies that are examined the urban transformation process from the social, spatial and policy aspects. Güzey, (2009) analysed the legal aspect of the urban transformation processes and, based on the case of Ankara, demonstrated the details of squatter transformation projects and other current projects of the time. Uysal (2012) studied the social aspect of urban transformation based on the case of Istanbul-Sulukule. Özgür (2013) examined the role of urban design projects in urban planning processes, based on two implementation areas in Istanbul. Güzey (2016) discussed the latest urban regeneration law, namely the Law No. 6306 on Regeneration of Areas Under the Risk of Disaster. Ay (2019) analysed the reactions of local people to urban regeneration projects in three neighbourhoods in three different metropoles (Adana, Bursa and Izmir). Turk *et al*. (2020) analysed the social and spatial aspect of the Fikirtepe Urban transformation Project (Istanbul, Turkey) and focused on the issues of holistic urban transformation project that includes using plan notes to eliminate a co-existence of the commons and the anticommons.

This study primarily examines the needs, processes, and problems of urban transformation in Turkey based on the unity of space, society, and politics to achieve sustainable and successful urban transformation practices defined in the literature. Subsequently, it analyses based on field studies and surveys on space, society, and politics the study area in Meram Municipality, Konya, Turkey, and develops spatial strategies to ensure the unity between the aforesaid three concepts. Finally, with this study, spatial strategies were developed with the participation and cooperation activities of neighbourhood residents and NGOs.

MATERIAL AND METHODS

Urban transformation practices lead to the development of significant spatial-functional strategies for the resolution of problems relating to the property structure in urban areas, the transformation of the property structure, and the development of land use policies.

While urban transformation practices in Turkey are gradually pervading, there are still certain issues and shortcomings. To avoid such issues, this study proposes recommendations based on the unity of space, society, and politics regarding spatial strategies developed within the framework of a case study.

The study area is in the city centre of Konya (Figure 1). Konya is the largest province in Turkey in terms of surface area, and has a population of 2,108,806 according to 2015 data. Konya is a developed city with its considerable historical, cultural, economic and agricultural wealth. Konya was the capital city of the Anatolian Seljuk Sultanate, and has many significant sites within its border. Çatalhöyük, which is included in UNESCO's World Heritage List, is one of the most ancient settlements in history. The Tomb of Mevlana is another important site, particularly in terms of religious tourism.

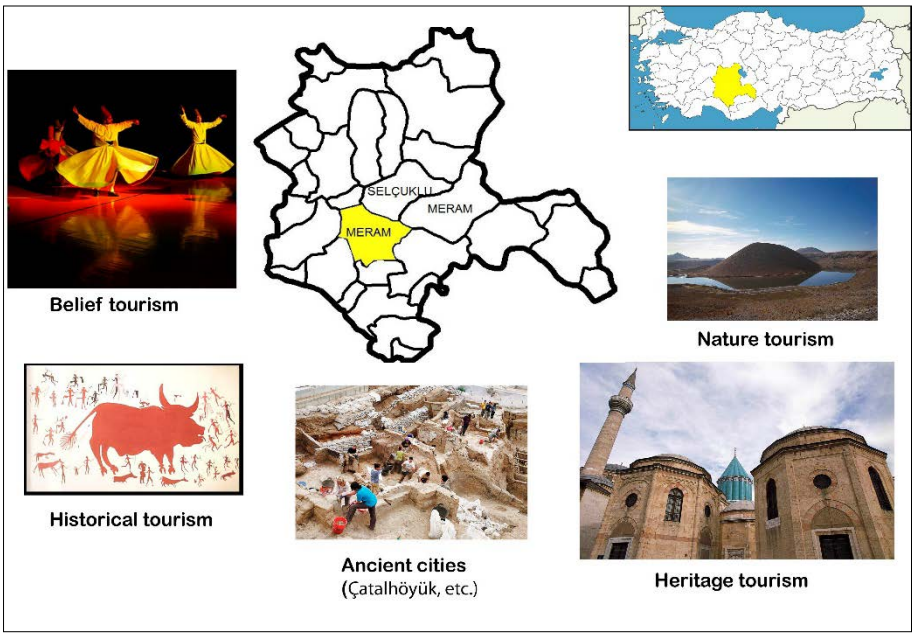

Figure 1. General view of Konya (source: Konya general overview)

The study area, which has a surface area of 55 hectares, was designated by the Council of Ministers as a risky area in accordance with the Law Number 6306 on Urban Regeneration in Areas under the Risk of Disaster. Due to property problems and the presence of historical and cultural structures that require preservation, the project will be carried out in several stages. The Şükran Neighbourhood was selected for the first stage (painted in red in Figure 2).

Şükran neighborhood transformation application is orchestrated by the Ministry of Environment and Urbanization and Meram Municipality. The executive firm was determined by the Ministry of Environment and

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Urbanisation, TOKI presidency through a tender. While a ground survey, excavation, and application project is carried out by the executive firm, archeological studies are carried out for the purpose of finding historical remains by the Monuments Board.

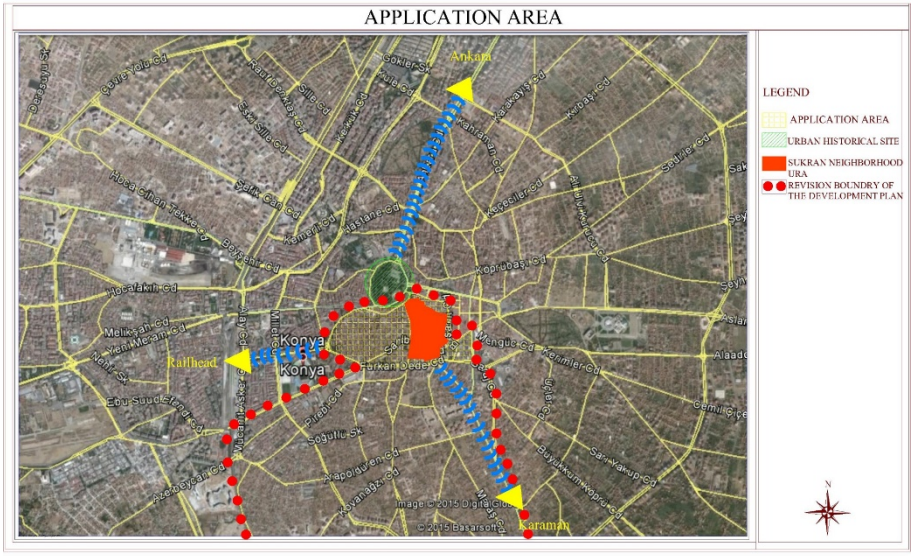

Figure 2. The urban transformation study area in Meram Municipality

The Şükran Neighborhood was selected for this study because:

- It encompasses the old city of Konya.
- It is important to renew in terms of touristic areas and the image of the city.
- There are lots of informalities housing resulting from increased population.
- There are fragmented ownership and inheritance problems due to its location in the old city center.
- The historical identity and urban fabric were deteriorated in the area.

The purpose of this study is to develop spatial strategies that are based on the unity of space, society, and politics for urban transformation in the Şükran Neighborhood.

The study consisted of two stages because of the study propose. In the first stage, the literature on the need for urban transformation in Turkey was reviewed based on experiences relating to space, society, and politics, and current problems were identified.

- The spatial aspect of urban transformation practices in Turkey was analyzed by considering the primary issues (land fragmentation, property rights, informalities housing)
- The political aspect of urban transformation practices in Turkey was analyzed by considering current legislation, actors and their roles, horizontal and vertical coordination, public interest, planning strategy, policy learning, and methods of transformation.

- The social aspect of urban transformation practices in Turkey was analyzed by considering the coordination and participation processes.

In the second stage, a number of field studies and surveys were utilized within the scope of our analysis. The aim of the field studies is to examine how the status of the buildings, the building types, the land use status, the status of historical and cultural structures, the land to building ratio, the land fragmentation and cadastral status, and the morphology of land use situation. The field studies helped with the identification of the current physical structure of the study area on maps, and with deriving significant conclusions that would guide spatial strategies. The maps, which were received from the local administration and the cadastre, were updated in the implementation area.

The surveys were conducted together with the inhabitants and NGOs. The reason these two groups were selected is to ensure their active participation in the planning process and develops spatial strategies that ensure the unity between spatial, political and social aspects in the study area. There are 2261 shareholders in the implementation area. The sampling volume for the local inhabitants was determined as 327 persons based on a 95% confidence level, and for different main mass sizes. Simple random sampling technique was used. The sampling number of NGOs was determined as 30 participants based on a 95% confidence level according to a standard table on acceptable sample sizes (Altunışık *et al*. 2010). The number of participants in the sample is sufficient to determine characteristics in Konya urban center as statistical. Professional chambers associated with urban transformation practices were preferred as NGOs' participants. Participants consist of surveyor, city planner, architects, chamber of civil and geological engineers, president, vice president and members. The survey questions consisted in order to determine the problems and expectations of inhabitants and NGOs with respect to spatial, political and social aspects of the study area.

Finally, based on the results of the current situation analysis and field survey, spatial strategies that provide the unity of space, society, and politics were developed for the study area.

THE NEED FOR URBAN TRANSFORMATION IN TURKEY

Turkey has experienced a rapid urbanization process since the 1950s (Iban, 2020). In 1940-1950, the migration from rural to urban areas gradually began, and the newcomers needed to settle upon public lands to start up their lives in the cities. In 1950-1960, since there was no mass housing, there was no possibility of acquiring houses with long-term credit, and there were no cheap/affordable lands with the existing infrastructure. Therefore, those who migrated from rural areas to cities created their own housing on public lands (Akın & Özdemir, 2010). Thus, a squatting process started, in which low-income migrants coming from rural areas solved their property and housing problems using informal methods. During the same period, the 'Property Ownership Law,' enacted,

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was the only instrument to produce housing for middle-income citizens (Işık, 1995). The Property Ownership Law led to the demolition of buildings that had completed their lifetime and the construction of apartment blocks in their place. However, this eventually led to issues of infrastructural inadequacy. These methods failed to supply mass housing in urban spaces or areas.

In the period from 1980, the government enacted mass housing projects and provided comprehensive formalization. Furthermore, the authorities of the central government were transferred to local governments. Private sector investors, who made significant investments in squatter areas and led to changes in income levels at the periphery of cities, were included in this process. It can be said that this period, in general, witnessed the first appearance and introduction of urban policies and regulations. However, legal regulations - especially those related to amnesties for squatters - have not been able to ensure spatial and functional fairness or social justice. The reason for this is the political interventions in land use and property.

In 2005, Article 73 of Municipality Law No. 5393 provided municipalities with the authority to implement urban regeneration projects. This article did not enable any transformation project since it did not have any implementation regulation. Therefore, the municipalities did not know how to implement projects and solve problems related to property rights. Instead, the municipalities tended to implement projects by the Law on Conservation of Cultural Properties at the beginning of the 2000s.

According to the aforementioned legislation, the entire decision-making authority rests on the local authorities, with no opportunity for participation being offered to the population (Cahantimur *et al*., 2010). Nevertheless, a number of projects were developed to resolve some of the problems of the time, and to facilitate supply of housing. Projects developed in cooperation with the Mass Housing Administration (TOKI), in particular, have mobilized the construction sector all over the country. Following the 2011 earthquake in Van that led to many deaths, the government took a significant action in 2012 and introduced the Law No. 6306 on Urban Regeneration in Areas under the Risk of Disaster.

Throughout this process, the need for urban transformation in Turkish cities has also been described by various academicians, and the relevant legislation and practices have brought about certain discussions on the triad of space, society and politics. The review of some studies on the issues of urban transformation in Turkish cities with respect to space-, society- and politics-related considerations can be briefly summarised as shown in the following Table 1.

When Table 1 is examined, it can be determined in which direction urban transformation projects are concentrated in Turkey according to their subject in academic studies. In this sense, it can be said that there is a significant trend regarding the restructuring of squatter areas, providing affordable housing, physical and social transformation for different ethnic groups or neighborhood associations, redesigning and

functionalizing historical places by preserving them. It has been determined that other remarkable issues in urban transformation practices are disaster risk, environmental pollution, and improving the socio-economic structure.

Table 1. A review of some studies on the issues of urban transformation in Turkey

	To prevent housing problems that have disaster risk	To provide affordable housing	To redesign and gain functionalization of historical places	To restructure the squatter	To transformation urban areas for attraction and prestige	To protect national heritage and historical structure	To redesign waterfront	To restructure commercial buildings.	To prevent environmental pollution	To consist holistic urban transformation projects	To reconceptualization traditional urban conservation planning.	To be required significant reforms in cities after the integration process of European Union in 1999 and economic crisis in 2001.	New policies on the supply of housing giving to local administrations by the single-party government since 2002.	The decentralization and/or recentralization of urban transformation	To examines informal houses in Turkey with a historical framework	To integrate different racial groups or Neighborhood associations	To increase job opportunities.	To resolve socioeconomic imbalances in the urbans.
Dündar, 2001		X		X	X													X
Kocabaş, 2006	X	X	X			X					X	X	X					
Eyüboğlu et al. (2007)			X			X												
Güzey (2009)		X		X					X								X	
Bostan et al. (2010)								X	X									
Ercan (2011)		X	X			X										X		X
Uysal (2012)			X			X										X		
Günay & Dökmeci (2012)			X			X	X											
Batuman (2013)		X		X														
Kayasü & Yetiskul (2014)												X						
Uzun & Şimşek (2015)		X		X														
Eğercioğlu, et al. (2016)			X			X												
Guzey (2016)	X			X														
Ay, (2019)														X		X		
Turk, et al. (2020)				X						X						X		
Iban, (2020)															X			

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The Spatial Aspect of Urban Transformation Experience in Turkey

One may say that the purpose of urban transformation practices in Turkey is to ensure the proper planning of land use and to develop property allocation strategies in problematic urban areas. However, in practices performed within squatter areas, urban transformation inadvertently results in gentrification due to the displacement of local communities or the provision of benefits to other (i.e. non-local) groups. Similarly, in examples where socio-economic and socio-cultural uses are not duly considered, the transformation practices become nothing more than restructuring of lands and building areas.

In urban transformation practices, the primary issues that are encountered with respect to the spatial aspect are listed below:

- During the identification of the limits of the implementation area, due attention should be paid to avoid fragmentation of the urban space. For example, proper identification of neighborhood limits, protected area limits, etc. would help maintain the holistic nature of the transformation project.
- In Turkey, property rights and rules on land use are not clearly defined before land use planning is performed.
- No studies are performed on the morphology of the land use. For this reason, there are similarities in the practices and approaches implemented in different regions with different identities. Performing a morphology of land use analysis before transformation activities, and carrying out practices based on such analysis, might ensure that the land use planning reflects the urban identity, thus enabling a holistic planning for the city.
- There is no framework for ensuring that the increase in land value before and after transformation are balanced, that the earned income is used for the public benefit, and that the necessary spatial and functional policies and strategies are developed. To balance the changes land value, one possible approach would be to perform balancing development/construction right transfers on the boundaries of these areas (such as the revision of construction plans) that would serve the public interest.
- In implementation areas; there are various problems such as outdated cadastre maps, conflicts between the boundaries shown on maps and the actual ones on the field, incomplete studies on cadastral renovation, and inheritance and shared property problems for deeds in city centers. Since urban transformation is an ex-officio practice, it is a significant tool for regulating property ownership and solving legal and technical problems.

The Political Aspect of Urban Transformation Experience in Turkey

In order to demonstrate the political aspects of the Turkish experience, urban transformation practices - which represent an instrument for regulating urban space for local and central administrations - should be analysed in association with political dynamics. The political dynamics of

practices in Turkey can be evaluated based on the following aspects: current legislation, actors and their roles, horizontal and vertical coordination, public interest, planning strategy, policy learning, and methods of transformation.

Current legislation: Since 2012, urban transformation practices have been conducted in line with Law No. 6306 on Urban Regeneration in Areas under the Risk of Disaster. The practices performed under this legislation were analysed with respect to the aforementioned political dynamics.

Actors and their roles: Under the framework of the legislation mentioned above, almost all authorities have been concentrated in the Ministry of Environment and Urban Planning, which is a central administration. If the Ministry deems appropriate, it may delegate authorities to TOKI (Mass Housing Administration) or local administrations. The authority of local administrations in designating urban transformation areas has been eliminated, with local administrations now having solely the authority to "propose" or "recommend" areas for urban transformation.

For local administrations, urban transformation projects in risky areas are quite significant to promote urban development and to increase their votes in the future. In this context, when such an authority is delegated from the central administration to the local administration; local administrations supply TOKI with the land, and establishes a "coalition" with TOKI to ensure that the cost of the investment is covered by TOKI. Thus, TOKI contributes to urban development based on coalitions with local administrations. Furthermore, thanks to economic coalitions with local administrations, TOKI generates income for social housing production.

Actors and their roles are presented briefly in (Figure 3). (Bozdağ, 2015)

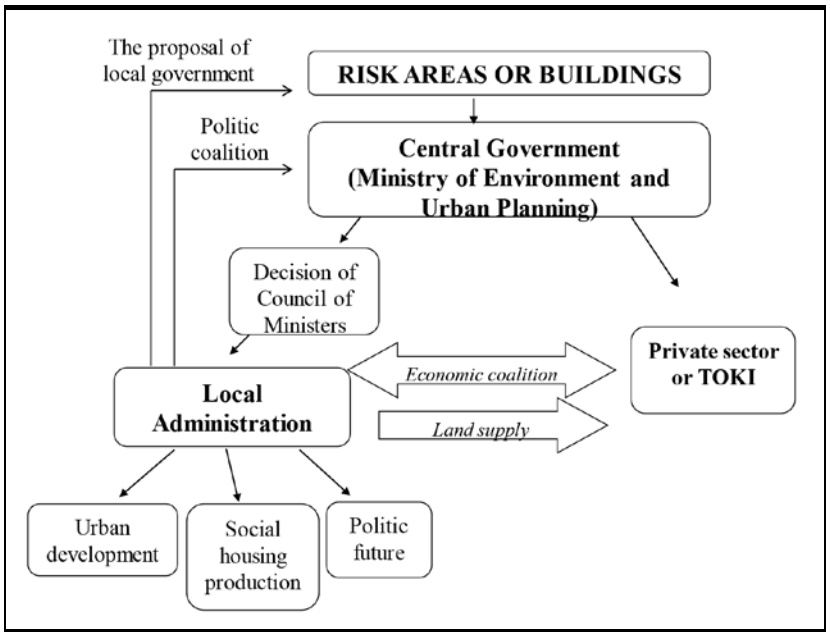

Figure 3. Actors and their roles in urban transformation process (Palancıoğlu & Cete, 2014; Zhang, 2014; Bozdağ, 2015)

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Horizontal and vertical coordination: Under this law, the central administration plays a significant and prominent role. In this case, the scope of the Law implies a hierarchical structure and vertical coordination, based on strong accountability of representative democracy. However, urban transformation practices are multi-actor practices. Sustainable practices require social and spatial coordination at horizontal level and a planning perspective, which is rather based on a supervising function at vertical level.

Public interest: In implementation, the principle is to ensure the consent of the two thirds of proprietors. In case no agreement is reached or the building under risk is demolished, the immovable under the ownership of real or legal entities are urgently expropriated by the Ministry, TOKI or the municipality. During expropriation, both public interest and personal interests should be taken into consideration (Üstün, 2009).

Planning strategy: Within the scope to the law, urban transformation practices can be implemented in three cases, which are risky areas, reserve areas, and buildings under risk. Risky areas can be determined based on the proposal of the Ministry/administrations and the decision of the Council of Ministers. Moreover, property owners can apply to private offices to check the physical safety of their buildings, and they can have some benefits if the building is certified as risky. On the other hand, reserve areas and buildings under risk can be designated by the Ministry (Bektaş, 2014).

Plans prepared under the relevant Law may not be subject to the impeding provisions of the Public Works Law, the Forestry Law, etc., or to provisions from other laws that are contrary to the relevant Law concerning urban transformation (Bektaş, 2014). For instance, the plans may not fully adhere to the social and technical infrastructure standards defined in the Public Works Law. Similarly, the Law on Preservation of Cultural and Natural Properties is quite significant for the preservation and improvement of the existing cultural fabric. The Law stipulates that principles on preservation of the cultural fabric are taken into consideration in the planning of risky areas or buildings. While this approach accelerates the bureaucratic processes related to risky areas, they might also lead to the omission of basic planning principles.

Under the Law, special standards can be developed, planning decisions based on such standard can be performed, and urban design projects can be developed.

Policy learning: The Law aims not only to prevent earthquake hazards, but also to create legal and safe living environments in areas such as unlicensed buildings that are already in use. However, the outcomes are generally unsatisfactory due to the fact that examples from foreign countries are articulated into the projects, similar projects are developed in almost all cases, and the environmental, cultural and social aspects are not reflected in the implementation.

Methods of transformation: Tekeli (2009) described transformation methods in three groups:

The first group is the projects that involve the transformation of squatter-like areas to urban areas; the second is the gentrification projects that occur in city centres; and the third is the pseudo projects that stem from the ideological preferences of local administrations (Özdemir, 2010).
To these transformation methods, one should also add projects related to areas and under the risk of disaster, and reserve areas, which are within the scope of the Law enacted in 2012.
The aim is thus to develop a rapid and comprehensive transformation process in disaster areas that will not be hindered by bureaucratic barriers. However, it may be said that the practical scope of this method is to facilitate urban transformation required in every sense in urban and rural areas and to create an economic dynamism by mobilizing the immovable property market.

Social Aspect of Urban Transformation Experience in Turkey

The social aspect of urban transformation practices in Turkey was analysed by considering competitive approaches and the relevant coordination and participation processes.
Competitive approaches: Actors involved in the implementation have many spatial-functional strategies such as satisfying the public interest, generating maximum income, and achieve better life standards. They are in competition and conflict with each other in pursuance of their own strategies to the maximum level. Such competitive approach, in turn, results in disparities with respect to spatial-functional justice, owners' expectations on property, public interest, and spatial-functional quality. Prevention of such conflict requires creation of an urban governance network that ensures horizontal coordination in public administration (Muñoz-gielen, 2012). Since the 20th century, urban governance network has been offering new tools for citizens to make decisions on development of the cities they live in (Roman´czyk, 2015). Urban governance also increases the competitive capacity of cities in attracting and retaining capital and people (Oakley, 2011). However, urban governance should not be depoliticized in order to establish a consensus between public and private stakeholders and attention should be paid to strengthen social structure by making democratic decisions between all stakeholders (Swyngedouw, 2005; Oakley, 2011; Williamson & Ruming, 2019).
Coordination and participation: In technical sense, the urban transformation process in Turkey comprises the following activities: identification and analysis of the current situation, identification of the parameters of urban transformation, and actions towards the applications (Figure 4). Administration is the main actor in these processes. The first phase of this process is the preparatory process, where the administration ensures coordination with relevant institutions and inhabitants. The participatory technique used for coordination aims to collect information and data before the planning phase. In the second phase of the process, the administration ensures coordination with the

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departments thereunder and the funders that bear the costs of the implementation. The aim is to identify the parameters of the urban transformation. This phase comprises the planning process, which is not based on participatory techniques in Turkey. The last phase of the process involves actions aimed at implementation. In this phase, the administration builds coordination with NGOs (civil society organizations) and stakeholders to ensure post-planning transition to the implementation phase. The participatory techniques used within the context of such coordination are consultation, placation, and negotiation (Eğercioğlu *et al.*, 2016).

Arnstein (1969) analyses the participatory practices and suggests a classification. The classification involves three groups of participatory techniques (non-participation, degrees of tokenism, and degrees of citizen power). We analyzed the ideal participation techniques of orchestrating the urban transformation projects in Figure 4. While the first and third phases involve degrees of tokenism, the second phase is non-participatory. The first and second phases of the participation technique have been implemented in Turkey. Although there are studies on the participation technique in the 3rd phase, the participation success is not at the desired level.

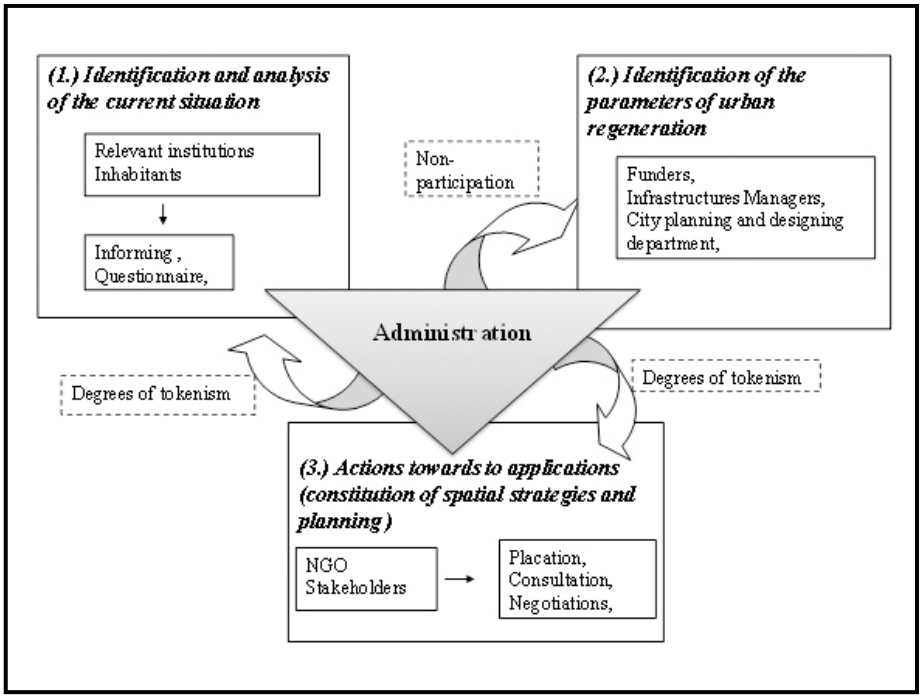

Figure 4. Coordination process and participatory techniques in urban transformation (Uzun & Şimşek 2015), (Bozdağ 2015).

There are approaches and attitudes that make it difficult for actors to build coordination. The following factors particularly complicate the effectiveness and success of coordination efforts:

- Local administrations' rigid attitude towards participation and negotiation processes (Özden, 2010),
- Ideological approaches of professional chambers,

- The hierarchical structure resulting from strong accountability in representative democracy leads to conflicts of authority in multi-stakeholder practices, such as urban transformation practices (Bozdağ, 2015),
- Failure to manage the urban profiles with cultural diversity (Tallon, 2010),
- Erroneous implementation of participatory methods (participatory practices that are not comprehended at local level, that increase confusion among stakeholders who are expected to act together, that raise the expectations of the population, and that decrease satisfaction), and
- Deeming participatory practice as unnecessary or drudgery.

This complicates the governance process established between local administrations and other competent bodies (Tallon, 2010). Yılmaz (2007) described that "due to structural problems such as organizational failures, structural problems, personnel, tools and instruments, methods, and bureaucratic culture; an organizational and functional reform is needed in Turkey in the area of in public administration."

URBAN TRANSFORMATION EXPERIENCE IN TURKEY; THE CASE OF KONYA

In the study area, a number of field studies and surveys intended for space, society, and politics were conducted.

Field Studies on the Current Structure

Field studies helped identify the status of the buildings, the building types, the land use status, the status of historical and cultural structures, the land to building ratio, the land fragmentation and cadastral status.

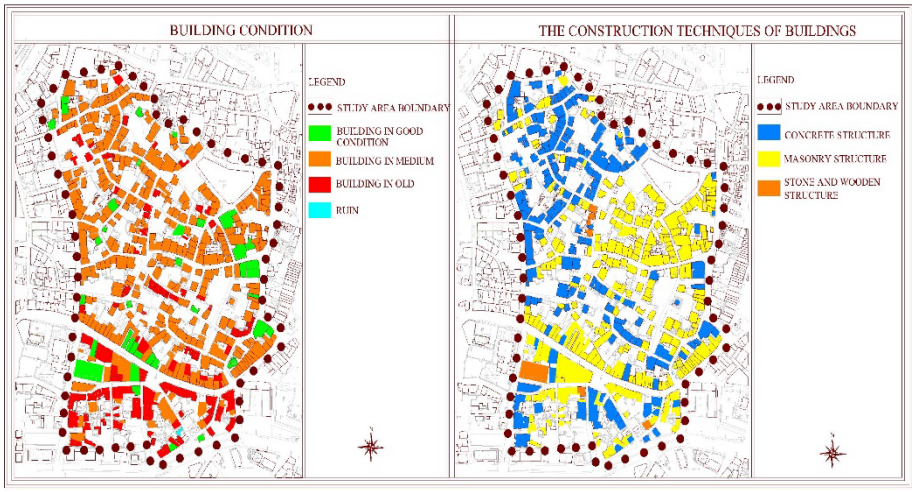

Figure 5. Building condition and construction technique of buildings

In the implementation area, there are quite a few buildings in good condition. The buildings are at least 30 years old. The building type is generally concrete and masonry structure (Figure 5). The buildings on

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the main street, which are in bad condition, were generally built by the stone masonry technique.

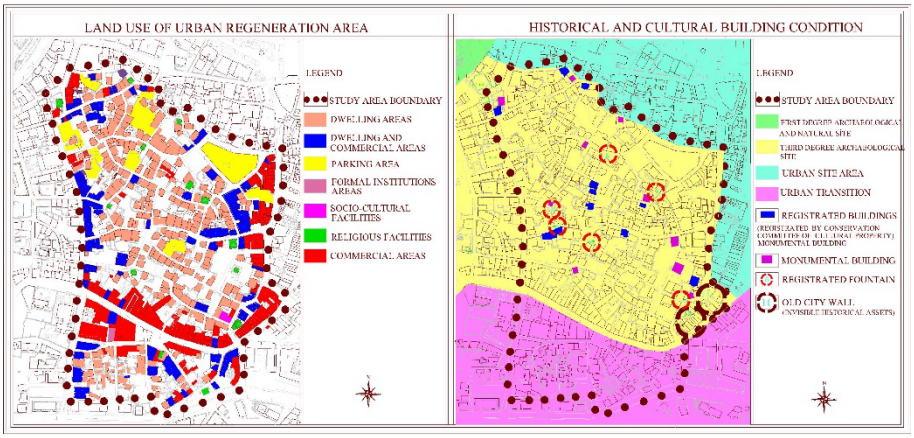

Figure 6. Land use and historical and cultural building condition of urban transformation area

In terms of land use; while dwelling use and dwelling + commercial use was observed at the centre of the area, there is an increased level of wholesale commercial use on the main street axes (Figure 6). Although there are two legal parking areas on the zone, there are other parking areas formed illegally on idle/unused lands. There is only a single socio-cultural facility, which is insufficient in terms of quality and capacity.

The implementation area is located at the border of the urban site (protection) area, within a third degree archaeological site area and an urban transition zone (Figure 6). The area includes registered buildings, monumental buildings, and registered fountains. Geo-radar ground inspection was also carried out in the implementation area. Fortification walls belonging to the old city (and which are no longer visible) were identified under the ground.

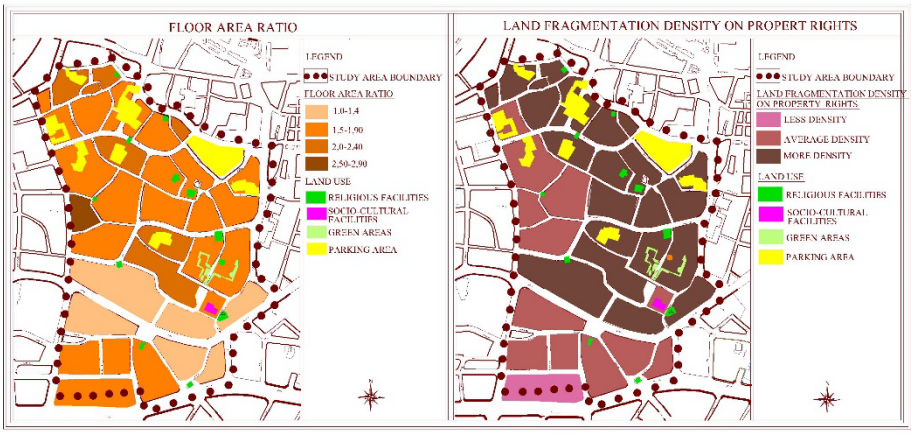

Figure 7. The floor area ratio and land fragmentation density on property rights

The floor area ratio is generally low in the implementation area (Figure 7). Buildings used for commercial purposes on the main street, in particular, consist mainly of single-floor buildings. This results from the fact that the area is the old city centre. Furthermore, fragmented ownership is also quite frequent in the area.

Since the implementation area is an old city centre, fragmentation of ownership of the lands is also quite common (Figure 7). It has been described that the main reason for such fragmentation of property rights is the problems relating to inheritance (Meram Municipality). Due to inheritance problems that have yet to be legally resolved, the cadastral situation has not been updated.

Surveys

Within the frame of the survey, the participants were consulted on the following matters:

- Their opinion on the current situation (problems),
- Their expectations on the spatial strategies to be developed, and
- Their needs in terms of having a say and responsibility in the process.

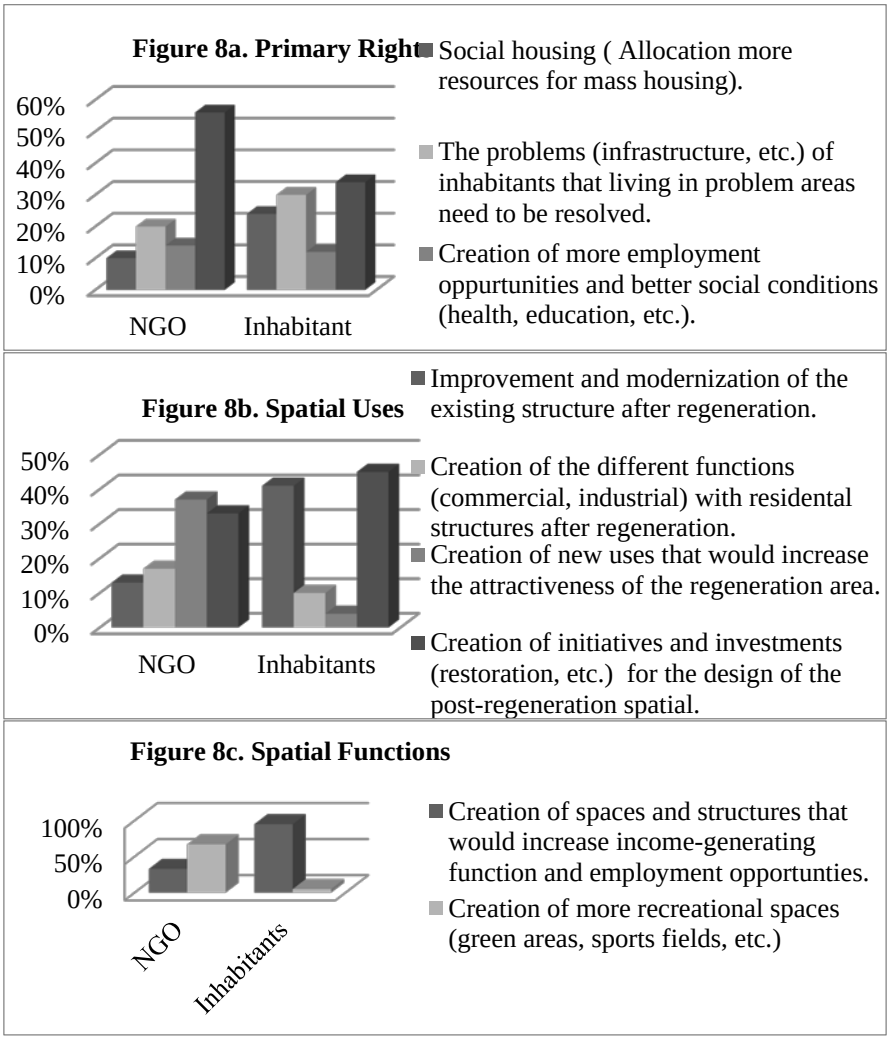

Figure 8. The expectations from the municipality within the context of the implementation (Figure 8a. Primary Rights, Figure 8b. Spatial Uses, Figure 8c. Spatial Functions)

In the implementation area, the participants were consulted on the use of the current structure and current problems concerning its near vicinity. Regarding the use of the current structure, both participant groups considered the advanced age of buildings, and insufficiency of parking areas, gardens, and patios as the main problems. While NGOs consider tall

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storey heights as a planning problem, inhabitants considered low number of rooms as a problem with respect to the use of the current structures.
Regarding the near vicinity of the current urban structure, both participating groups considered parking areas, roads, and streets insufficient in terms of both physical conditions and safety. Unlike the local inhabitants, NGOs also mentioned problems related to recreational areas and architectural view in the near vicinity.
The participants were consulted on the primary rights, spatial uses, and spatial functions that they are expecting from the local administration following the transformation activities.
Both groups of participants had expected to have a greater say regarding the implementation (Figure 8a). The next most important expectations of the participant groups were resolving the problems of inhabitants living in problematic areas, and allocating more resources for mass housing.
Expectations related to spatial use were different for both groups (Figure 8b). What is common for both groups is that there is an expectation for initiatives for the design of the post- transformation space. While inhabitants expected improvement and modernization of the existing structure, NGOs expected the creation of new uses based on its potentials, and efforts that would increase the appealed of this space/area.
Concerning spatial functions, local inhabitants expected the inclusion of income-generating functions, which would also increase employment opportunities, while NGOs expected the creation of more recreational spaces (Figure 8c).

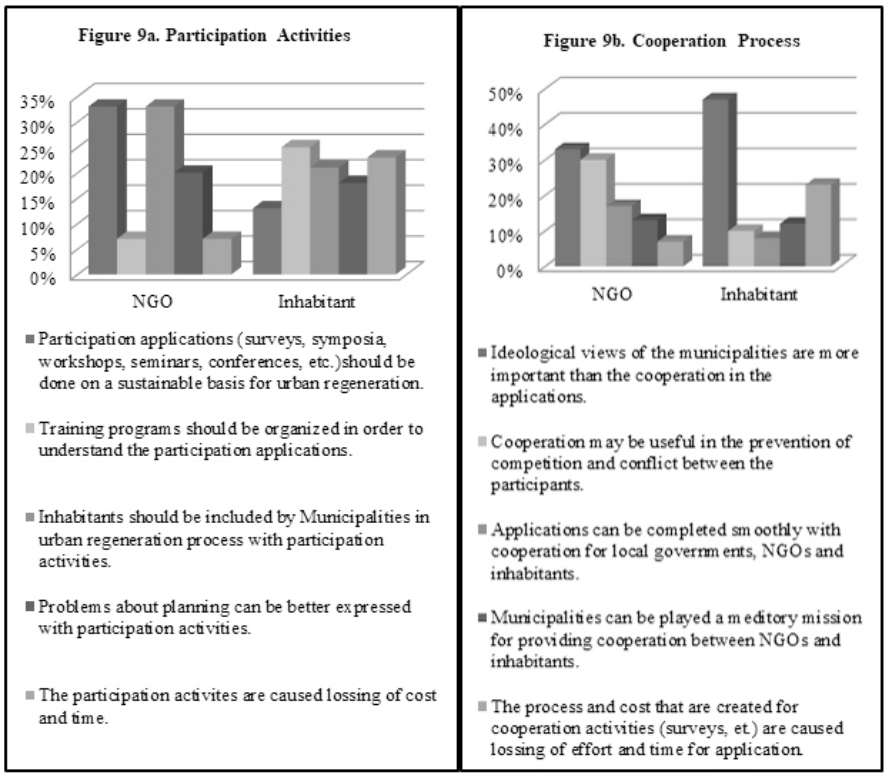

Figure 9. The expectations from the municipality within the processes of participation and cooperation activities (Figure 9a. Participation Activities, Figure 9b. Cooperation Process)

The participants were consulted on the 'participatory practices' where they would have a better say and 'cooperation' where they would have more responsibility during the transformation process.
NGOs expected the conduct of activities for the creation and sustainability of participatory practices, and also that local administrations allow them to take part in such activities (Figure 9a). A majority of inhabitants, in turn, expected to have training on participatory practices (surveys, consensus, interviews, etc.). Some of the local inhabitants considered that participatory processes would not result in any concrete gain, and that they represent a loss of time and financial resources.
Regarding cooperation, NGOs believed that ideological views will tend to dominate in practice (Figure 9b). Most of the inhabitants believed that cooperation will not be possible due to ideological views, and that transformation efforts would thus not be worth the money or time spent.

Development of Spatial Strategies Based on the Unity of Space, Society, and Politics

Based on the results of the current situation analysis and field survey, spatial strategies were developed for transformation practices in the Şükran Neighborhood.

- In the implementation area, historical and cultural structures below and above the ground should be identified, preserved and improved.
- In new constructions, inhabitants' expectations for gardens, patios, and number of rooms should be taken into consideration; initiatives should be developed for the preservation of registered buildings; and the potential of historical and cultural assets should be used to enhance the attraction of the space.
- Reconciliation should be preferred to prevent legal problems related to property rights under the urban transformation process. Development (construction) right transfers to proprietors should be considered within the limits of the revised development (construction) plans of the municipality. Since the area is under the risk of disaster; ex-officio solutions should be offered in accordance with the Law No. 6306 on Regeneration of Areas Under the Risk of Disasters in case of any disputes, such that legal problems related to property rights can be resolved. Thus, the cadastral structure should be reorganized at the end of the implementation process.
- Within the context of the planning strategy, standards on the historical characteristics of the area should be developed under the Law No. 6306.
- In order to satisfy the public interest, the implementation should be done within the framework of a certain revised development (construction) plan to reflect the increased land value to the

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public, or increased development (construction) rights should be transferred to satisfy the public interest.

- With respect to urban policy production for the area; the primary expectations from the local administration during the restructuring of problematic areas are increased employment opportunities, production of mass housing, and infrastructure, etc. In this respect, a balanced sectoral development is expected in relation to land use and land functions. This can only be ensured through the development of upper scale policies at city level.
- The results of the field research and surveys are important for determining the suitable method of transformation. In this regard, a transformation method that preserves cultural assets while also ensuring economic dynamism and the restructuring of risky areas and buildings should be preferred.
- A governance approach should be adopted to ensure horizontal and vertical coordination. Thus, planning decisions can be taken based on reconciliation. According to the survey results, both groups believe that due to the ideological views of the local administration, participatory and cooperative practices are a loss of time and financial resources; they also seem to think that their inclusion into the relevant practices is solely an approach for convincing them regarding the relevant practice's utility. Actors should be given more responsibility, and they should be employed and actively involved in the implementation process to encourage them to willingly take part. This requires the development of a comprehensive plan in which the administration should lead the process to build participation and cooperation under the concept of governance.
- With respect to actors and their roles, this study focuses on two groups as representatives of the social structure. Although this framework is not sufficient, the implementation process might become further complicated if the multi-actor structure of urban transformation processes is fully involved in the process. For this reason, those actors who directly or indirectly affect or who are directly or indirectly affected may be assigned as representatives through democratic processes. For example, in the implementation area, those who are influential among the craftsmen may be selected as their representative.

CONCLUSION

Urban transformation practices in Turkey still have certain issues and shortcomings. To avoid such issues, this study makes recommendations based on the unity of space, society, and politics regarding spatial strategies developed within the framework of a case study.

With the spatial analyses conducted within the scope of the study, it has been revealed that the application area needs to be redeveloped while

preserving its historical texture. During this process, the invisible and visible cultural and historical assets in the implementation area should be identified, preserved, and improved.

The survey revealed differences in the expectations of different groups from urban transformation. While allocating more resources to mass housing and functions that will increase employment come to the fore among residents' expectations, improving the attraction and design of the space and creating recreational areas are among the leading expectations of NGOs. The results of this survey show that considering the area in terms of housing needs, design attractiveness, employment and economic vitality and recreation according to the expectations of both groups will affect the success of the application. Therefore, within the framework of the analyses on land use and survey, the groups involved in the practice should be consulted, and their experience, knowledge, and requests should be taken into consideration.

NGOs and residents have completely opposite ideas about participation and cooperation in the implementation process. For this point of view not to affect the success of the implementation adversely, it is necessary to focus on creating plans in a cooperative nature. Therefore, the management of participatory and cooperative processes and the concept of governance should be analyzed by local governments to ensure coordination between the actors involved in the implementation. Furthermore, an active role in the awareness and decision-making processes to be created by the actors can play a significant role in the project's ownership.

In conclusion, it can be said that, with the increase in population, cities in Turkey are rapidly developing and undergoing transformation at the same time. To ensure the success and sustainability of this transformation process, issues and deficiencies in practice should be identified, and urban transformation processes should be monitored.

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CONFLICT OF INTEREST

No conflict of interest was declared by the authors.

ETHICS COMMITTEE APPROVAL

Ethics committee approval was not required for this article.

LEGAL PUBLIC/PRIVATE PERMISSIONS

In this research, the necessary permissions were obtained from the relevant participants (individuals, institutions and organizations) during the survey, in-depth interview, focus group interview, observation or experiment.

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Resume

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Evaluation of Aluminium Production Waste in Building Material Production

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Abstract

Purpose

The production of aluminum is based on obtaining alumina from bauxite, which is also known as the "Bayer Process." However, waste that is enough to endanger the environment is released at the end of this process applied to obtain aluminum. In Turkey, red mud waste is released from Seydişehir ETİ Aluminum production facilities into the pond located within the settlements. Red mud, which creates a potential environmental problem, should be systematically eliminated. In the literature, there are hundreds of studies on this subject. However, it is observed that these studies will not accelerate the waste consumption process. The consumption of the waste as soon as possible will be possible by using it as the main raw material. In this context, using both the literature and the doctorate study of the manuscript's author, the methods for using the waste as a building material were discussed for the systematic consumption of it.

Design/Methodology/Approach

Accordingly, in the study, the physical (specific gravity, plastic limit, differential thermal analysis, etc.) and chemical properties (XRF) of the waste red mud were discussed together with the waste generation process starting with the Bayer process. Furthermore, the physical (specific gravity, water absorption, water vapor permeability, initial water absorption velocity), mechanical (compressive strength) of the building materials that could be produced by using the waste were also included in the study.

Findings

It was concluded that it was possible to produce a quality building material by using the waste as a raw material.

Research Limitations/Implications

Type the research limitations/implications of the paper here.

The study was limited to the mixing of red mud waste and pyroclastic rocks in certain proportions and their use as raw materials in the production of baked building materials by baking at different temperatures.

Social/Practical Implications

In this study, a solution method to a potential environmental problem was developed. Furthermore, a source of raw material was provided in sustainable building material production. Accordingly, a contribution can be made to the national economy with the building material that can be produced with local opportunities.

Originality/Value

With the materials and joining methods used in the study, a production was made on a unique subject.

Keywords: *Aluminum, baked building materials, Bayer process, bauxite residue, red mud*

INTRODUCTION

Red mud is a waste that remains as a result of the method of obtaining alumina from bauxite, known as the Bayer process (Saternus, 2011). This waste, which is formed as a result of a chemical process, can also be called hazardous waste (Saternus, 2011). In the process, 2 units of alumina are obtained from 4 units of bauxite, while 2 units of waste called red mud is generated and left to nature as waste at the end of the process (Dereli & Tosun, 2020). Red mud waste is kept in artificial ponds in nature. Waste ponds built in the basins are used for the Seydişehir ETİ Aluminum Factory. The second pond built for the factory is used. The pond is filled with tons of sludge. The pond located right next to the settlements poses a potential threat to the environment. In the city of Ajka, Hungary, with the collapse of one of the banks of the pond where the red mud was stored, the waste spread many kilometers away and turned into an environmental disaster (Winkler et al., 2018). The systematic consumption of waste has become a necessity in order to prevent such an environmental disaster from happening again. In this direction, hundreds of studies have been done in the literature. While some of them are in the direction of making use of it as an additional contribution to production of brick (Arroyo et al., 2020), ceramic (Xiang et al., 2020), cement (B. Yuan et al., 2020), geopolymer (Zhang et al., 2020) etc., some of them are in the direction of obtaining iron from the waste in terms of its chemical content (S. Yuan et al., 2020), treatment of waste waters (Li et al., 2020) and its use for different purposes with chemical reactions (Wang et al., 2020). However, the general feature of the studies is that the waste red mud is used only in small amounts as an additive. With this general feature, it will not be possible to provide the targeted process for the systematic consumption of waste.

From this point of view, it is planned to use red mud as the main raw material at a high rate in the study, and to keep the additives to be made in a way to improve the properties of red mud and keep it in low proportions. The color and texture of the waste mud and its similarity to clay have led to its use in brick production. Considering that the use of red mud alone may increase the cost of brick production, it seemed appropriate to add micronized pyroclastic to the waste, which is also obtained from idle fields. In this way, it is aimed to obtain an artificial clay and to reach decreasing values in cooking temperatures. Micronized pyroclastic rocks for the development of artificial clay properties have been obtained from abandoned inert fields since they have no economic value. Accordingly, 4 different volcanic based materials were used: Campus Volcanic Tuff (CT), Selahattin Village Volcanic Tuff (SVT), Karapınar Region Red Basaltic Slag (KRS), Karapınar Region Black Basaltic Slag (KBS).

In the study, the physical and mechanical properties of the brick produced by adding micronized pyroclastic rocks to red mud at different rates were investigated and its suitability for high density brick production according to the standards was tested. It has been accepted

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that the sample type that gives the best strength results with the experiments is the optimum mixture type that can be used in brick production. At the same time, results were obtained whether it is possible to evaluate inert pyroclastic fields with the results obtained with other mixture types. In this way, it has been researched that both waste material and inert pyroclastic material can be used together in the production of a sustainable building material.

MATERIAL AND METHOD

In this chapter, information about raw materials and their properties are given. Also, production of test specimens using raw materials and test methods are explained in detail.

Raw Materials

The definition of raw materials, red mud and pyroclastic rocks, their locations, physical and chemical properties are discussed in this chapter.

Red mud (RM)

Red mud is a waste generated during the production of alumina (Al2O3). In 1887, K.J. Bayer's Bayer process method, which enables to obtain alumina from bauxite, emerged. Accordingly, bauxite, which is the raw material of alumina, reacts with sodium hydroxide and becomes aluminate [NaAl(OH)4]. Aluminum hydroxide is formed by dissolving under 950-1200 oC temperature and pressure. During this process, insoluble iron, silicon and titanium sink to the bottom. This precipitated waste product is called red mud (Arslan et al., 2012). Red mud for this research was obtained from the waste pond (37o27'39.09" N latitude, 31o48'43.00" E longitude) of ETİ Aluminum factory in Konya-Seydişehir. Factory; uses the second of the waste ponds built in the basins.

Pyroclastic rock

Pyroclastic rocks can form in many ways as culms ejected from chimneys due to volcanic eruption. Hydroclastic clastic is formed by steam eruption, rapid cooling or mechanical granulation of the lava in the parts that are in contact with magma and water. Hydroclastic cullet is a type of pyroclastic rock. Apart from chimney or hydroclastic fragments, volcanic rocks decomposition and transport (epiclastic), mechanical friction during lava movement or gaseous eruptions (autoclastic) fragments also occur. Another formation is seen in the form of fragmentation by tectonism. Pyroclastic rocks include all clastic volcanic rocks that have undergone any process of disintegration, have been moved or mixed with other non-volcanic fragments. The term volcanoclastic, which appears in the literature, is synonymous with pyroclastic. The terminological use is considered to be pyroclastic rock, regardless of other processes that were formed directly by volcanic means, such as water or wind, that may carry the fragments later. Pyroclastic eruption products are formed in three

different ways: juvenile (main), cognate or incidentally (Helvacı & Erkül, 2001). Pyroclastic rocks from different regions were used in the study.

Konya Selahattin Village Volcanic Tuff (SVT): The inert tuff field of the samples used in the study is around the Selahattin Village between Derbent District and Konya Province. Accordingly, the coordinates of the sample location taken from the inactive tuff field are 38o1'7.94" N latitude, 32o8'40.55" E longitude.

Konya Selçuk University Campus Surroundings Volcanic Tuff (CT): The inert tuff field is located in Konya-Selcuklu district, around Selcuk University Alaaddin Keykubat Campus. The samples were taken from the inactive tuff field at 38o2'8.96" N latitude, 32o28'13.07" E longitude coordinates to be used in the study.

Konya Karapınar Region Basaltic Slag: Basalt type rocks are formed from two kinds of movements of volcanism. Such rocks are formed during lava flows or eruptions. The basalts formed as a result of these two volcanic movements gain diversity in the form of ash, slag and blocks. Especially around Lake Meke, there are slag cones formed by lava flows. Slag covers, which are black or dark gray in color, can also form red colored layers with oxidized iron content. The thickness of the plates varies between 1-6 m. It is possible to encounter white carbonates in the black basalt as a result of the infiltration and circulation of surface waters. The slags in the region are spongy in appearance (Olanca, 1999). The basaltic slag samples were taken from Karapınar District of Konya Province. It is located between 37o40'18.31" N latitude and 33o41'46.24" E longitude according to the coordinate system. Since the samples obtained from the region were in two different colors, basaltic slag was divided into groups according to colors in the study.

Karapınar Region Red Basaltic Slag (KRS): In the area where the samples were obtained, red colored layers were formed in places due to the oxidized iron content. For this reason, red colored slags were used as a different material in this study with this title denomination.

Karapınar Region Black Basaltic Slag (KBS): Two colored stratifications were formed in the slag quarry of Karapınar region. The characteristic color of the slag is dark gray-black. Black basaltic slag is mentioned with this denomination during raw material and sample production stages.

Method

Determination of the raw material characteristics

The chemical analysis, grain density, plastic limit and thermogravimetric analyzes of the raw materials to be used in the production of a baked building material were determined by a preliminary study.

Chemical Analysis (XRF- X Ray Fluorescence): The elemental properties of red mud waste were taken from the literature. The chemical analyzes of the pyroclastic rocks were carried out in the R&D laboratory of the Kütahya Ceramic Factory. Accordingly, in the analyzes, the method specified in the standard "Characterization of Waste And Soil -

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Determination of Elemental Composition With X-ray Fluorescence" and Spectro X-LAB 2000 (400-W Rh end window tube and Si (Li) detector with a resolution of 148 eV (1000 cps Mn Kα)) was used (TS_EN_15309, 2008).

Grain Density: The experiment was carried out in Konya DSI 4th Regional Directorate, Laboratory and Quality Control Branch Directorate, Soil Laboratory using the "liquid pycnometer method" specified in the standard named "Determination of Grain Density" (TS_EN_ISO_17892-3, 2016). Two experiments were carried out for each type of raw material.

Plastic Limit Value: The experiment was determined by the experiment conducted in Konya DSI 4th Regional Directorate, Laboratory and Quality Control Branch Directorate, Soil Laboratory, in accordance with the method described in the standard named "Soil Laboratory Tests in Civil Engineering: Determination of Physical Properties" (TS 1900-1) (TS_1900-1, 2006) . Since the plastic limit value was made twice, the plastic limit value of the raw materials was calculated by taking the average.

Thermogravimetric Analysis (TGA): The analysis was carried out at Selcuk University Advanced Technology Research and Application Center. "Mettler Toledo" brand device with "TGA/DSC 1-Thermogravimetric Analysis" feature was used. The inside of the device furnace used in TGA analysis provides an atmosphere with dry air. It was heated to approximately 1100 °C for 2 hours with a temperature rise rate of 10 °C per minute (TS_EN_ISO_11358-1, 2014).

Production of experiment samples

Samples were prepared by the method described below to be used in the experiments.

Grinding: The grinding process was carried out in the Mining Engineering Laboratory of Konya Technical University. The rocks were ground in a steel ball mill produced by Ünal Engineering and Machine Industry to pass under a 100 micron sieve. Before grinding, the materials were oven-dried at 105 ± 5 oC for 24 hours (Dereli & Tosun, 2020).

Mixing and Remolding: In the production of samples to be used in the experiments, pure red mud and samples produced by adding different percentages of pyroclastic rock to the main raw material as red mud are used. The primary purpose was to use red mud in high proportions and thus make it possible to consume the waste. Therefore, it was decided to test the pure red mud as it is to determine the potential of the baked building material. Using the material as it is in its natural environment with this method will provide economic gains. In order to learn the behavior of red mud against the effect of temperature, "pure red mud is taken as it is and remolded" was chosen as the first sample type. For other mixtures, micronized pyroclastic rock was added as 10%, 20%, 30%, 40%, 50% by weight compared to red mud. In the amount of material to be used in the mixtures, the "weight percent ratio in dry material" method was chosen. With these additions, it is aimed to determine the changes

made by different cooking temperatures in physical properties or mechanical properties, and in this way, to reach an optimum mixing ratio in the production of a material with high mechanical strength. Plastic consistency water is needed in the production of baked building materials. In this respect, it has been seen that the red mud is in the water in the environment where it is found as a waste, it is possible to use this raw material together with its water content, and at the same time, water savings will be achieved (Dereli & Tosun, 2020).

Molding: Since the waste materials to be used in the production of test samples have a clay-like structure used in baked building materials, the molding forms used in this field were targeted as a method in sample production.

In the compressive strength test to be performed on the samples, it was deemed appropriate to choose a method from a standard suitable for similar sample types. For the laboratory-type filled sample, the 5x5x5 cm cube samples specified in the standard "Standard Test Method for the Compressive Strength of Hydraulic Cement Mortars Using 50-mm Cube Samples" (ASTM_C109, 2001) were seen to be similar. In this direction, plaster molds were made to produce samples in these dimensions. Considering that there will be a change in the dimensions of the samples after drying-shrinking and baking-shrinking, these molds were manufactured with the inner dimensions of 5,5x5,5x5,5 cm.

Baking: Preliminary trials were made for optimum temperature values due to the different contents of the samples. First, the minimum temperature required for baking the red mud in its pure form was determined. In this way, it was thought that it would be possible to bake samples at lower temperatures than this temperature value with the addition of pyroclastic (Dereli & Tosun, 2020).

Preliminary evaluations on samples and selection of samples to be used in experiments

Hundreds of samples were prepared as described above. Volume stability, mechanical strength, etc. on the prepared samples. values were analyzed. At the end of the investigations, two types of mixtures with high strength properties compared to the type formed by the addition of pyroclastic obtained from all different regions were selected to be used in the experiments to be made in terms of the properties of the baked building material (Dereli & Tosun, 2020).

Experiments on samples

The experiments described below were carried out on the samples.

Net Dry Density: In order to determine the net dry density values, the method specified in the standard named "Determination of net and gross dry unit volume masses of masonry units (excluding natural stone)" was used. Accordingly, the net volumes of 12 samples were calculated for each type of mixture with dimensions of 50x50x50 mm with smoothed surfaces and they were made ready for the experiment (TS_EN_772-13,

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2002). The lowest and highest results were obtained from the net dry density values obtained from 12 samples for each species, and the arithmetic average of the other values was taken.

Water Absorption Test: The test was conducted with the water absorption test method described in the standards named "Natural Building Blocks-Examination and Test Methods" and "Clay Masonry Units-Properties" (TS_699, 2009; TS_EN_771-1, 2005). The water absorption test was carried out in two parts: by mass and by volume.

- **Water Absorption by Mass:** The dry weight of the sample is needed to calculate the rate of water absorption by mass. For this reason, the water-saturated samples were dried in an oven for 24 hours. The samples taken out of the oven were cooled in a desiccator and weighed on a scale with an accuracy of 0,01 g. The formula given in the standard was used to determine the water absorption rates of the samples whose weighing processes were completed (TS_699, 2009; TS_EN_771-1, 2005). The lowest and highest results were excluded from the water absorption values obtained from 12 samples used for all different types, and the arithmetic average of the other values was taken.
- **Water Absorption by Volume:** In the water absorption experiment by volume, the data obtained in the water absorption experiment by mass were used. In addition, the weight of the samples in water was determined by Archimedes balance. With the obtained data, calculations were made with the help of the formula given in the standard. For each type of sample, the lowest and highest values of water absorption by volume obtained from 12 samples were excluded and the arithmetic average of the other values was taken.

Fill (Compactness) Rate: Fill rate of materials is known as the ratio of unit volume weight to specific weight. Accordingly, the percentage value of the ratio of the net dry density of the samples to the actual density was calculated with the help of the formula in TS 699 (TS_699, 2009).

Porosity Degree: The sum of the porosity rate and the filling rate constitutes the whole of the materials. In this direction, porosity degrees were calculated with the formula in the standard named "Natural Building Blocks-Examination and Test Methods" (TS_699, 2009).

Initial Water Absorption Rate: The "initial water absorption rate" experiment was carried out on samples according to the standard named "Masonry units - Test methods - Part 11: Determination of capillary water absorption in masonry units made of concrete, artificial and natural stone and initial water absorption rate in clay masonry units". Accordingly, for the experiment, at least three samples were dried in an oven and the surface area to absorb water was measured. It is covered with paraffin to prevent water absorption from the side surfaces. The final dry weight of the paraffin-coated sample was weighed and recorded with a balance with an accuracy of 0,01 g. By measuring the amount of water entering the samples within 1 minute, the initial water absorption rates were

calculated with the help of the formula given in the standard (TS_EN_772-11, 2002).

Compressive Strength: Experiment was carried out according to the methods in the standards named "Masonry Units-Compressive Strength" and "Test Methods of Bricks and Tiles" (ASTM_C67-11, 2011; TS_EN_772-1, 2012). Compressive strength tests were carried out at DSI 4th Regional Directorate, Quality Control and Laboratory Branch Directorate, Concrete Laboratory, using the Form-Test Prufsystem device with 50x50 mm caps developed for cement sample tests. In the test for compressive strength, 7 samples of 50x50x50 mm dimensions were used for each species. First of all, the samples were dried in an oven and conditioned by cooling in a desiccator before the experiment. The standard loading rate of the device was determined as 0,60 N/mm2. KN (Kilonewton) values given by the device at the time of fracture were recorded. Values were converted into units with the help of the formula given in the standard and recorded by making calculations. For the compressive strength values, the smallest and highest values of the 7 samples that were broken were excluded from the average calculations as deviation values. The arithmetic average of the remaining values was calculated by excluding the deviation values.

Resistance to Acid Effects: If the product samples are used in kitchens, dairy facilities, laboratories, etc. as a brick to be used as a wall material, they may be exposed to acid. For this reason, resistance tests were carried out with 4 different acids, known as very strong acids, in the laboratory environment.

For the experiment, 4 samples were prepared from each type of sample. The samples were first oven-dried and cooled in a desiccator. Then, the weights were made and recorded on a balance with a precision of 0,0001 grams. They are placed in the beaker for the acid bath. Sulfuric acid, hydrochloric acid, nitric acid and phosphoric acid were used for the acid bath. 50 ml of acid of each type was poured onto the samples in pure form and waited in this way for 24 hours. During this period, changes on the samples were observed. At the end of 24 hours, 50 ml of water was added to the beakers and the acids were diluted and kept in this way for another 24 hours. The damaged samples were observed and the undamaged samples were removed from the acid bath at the end of the period and left to dry. It has been determined whether the samples dried in the oven have a weight loss or not.

EXPERIMENT FINDINGS AND ASSESSMENT

Raw Material Characteristics

Chemical Analysis (XRF): Chemical analysis results for red mud and pyroclastic rocks are given in the Table 1.

With its red color caused by high amount of oxidized iron content, waste mud has been the subject of studies for its use in the production of baked building materials such as bricks and etc. In this study, based on this idea, it has been seen that it is possible to obtain an artificial clay not only as a color but also with pyroclastic to be mixed into it.

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Table 1. XRF analysis of red mud and pyroclastic rocks

COMPONENT	% (RM)	% (SVT)	% (CT)	% (KRS)	% (KBS)
Na_2O	5,79	3,96	0,88	3,08	2,1
MgO	0,26	1,58	2,04	6,15	6,39
Al_2O_3	21,08	14,79	15,16	15,31	17,13
SiO_2	15,58	68,8	67,39	47,2	51,23
P_2O_5	0,04	0,05	0,15	0,22	0,27
SO_3	0,56	0,07	0,06	0,04	0,03
K_2O	0,61	4,57	2,93	0,78	0,07
CaO	2,71	5,12	3,8	9,94	10,32
TiO_2	4,62	0,17	0,43	0,98	1,03
MnO	0,03	0,08	0,06	0,13	0,15
Fe_2O_3	30,37	1,53	4,27	9,64	9,88
Ignition Loss (%)	15,66	17,54	15,50	1,06	6,35

- Grain density: Grain densities of the raw materials determined by the calculations made at the end of the experiments, each repeated twice, are given in Table 2.

-Plastic limit: The results obtained at the end of the plastic limit tests are given in Table 2. Accordingly, there is no plastic feature in other raw materials except red mud.

Table 2. Grain density and plastic limit values of raw materials

	RM	SVT	CT	KRS	KBS
Grain Density	23	2,58	2,64	2,93	2,72
Plastic Limit (%)	28,4	No Value	No Value	No Value	No Value

Malayoğlu and Akar in their study classified the materials with 10%-30% plastic properties as non-clay materials and ordinary clays (Malayoğlu & Akar, 1995). They stated that the plasticity of clays with kaolin and montmorillonite content is between 30-65%, while clays with bentonite content show plasticity at values of 80% and above. Accordingly, according to the plastic limit test results for red mud, it can be said that it is a material that does not show sufficient plastic properties.

-TGA Analysis: When the TGA graphic values of the red mud were examined, it was seen that the weight loss started at 30,23 Co. The analysis was terminated when the heating temperature reached 1095,35 °C. Partially small endothermic peaks occurred, with the first peak at 238 °C and the more prominent second peak at 286,33 Co. According to the results of the analysis, maximum weight loss was experienced in the range of 250-300 °C. Total weight loss at the end of the whole period was calculated as 1,7749 mg (15.66%).

According to TGA analysis of volcanic tuff (SVT) around Selahattin Village, the total weight loss was calculated as 1,2427 mg. Accordingly, the total weight loss was calculated as 17,54%. At 70 °C, the first endothermic peak was formed at a high rate, at 140 °C the second peak was observed to a lesser extent, and at 468 °C the last observed peak occurred.

According to the TGA analysis of the volcanic tuff around the Selcuk University campus (CT), a weight loss of 1,3247 mg occurred in the

material that started at 29,07 °C and was heated to 1095,35 °C for 2 hours. Accordingly, the total weight loss in the sample was calculated as 15,50%. When the endothermic peaks were examined, the first peak was observed at 72 °C, the second peak at 140 °C and the third peak at 690 °C. The fourth peak is partially observed in the range of 900-950 °C.

In the TGA analysis of Karapınar Region red slag (KRS), the test was started with 15,2010 mg of micronized red slag. The temperature range at which weight loss occurred was between 37,20 °C and 1095,93 °C. The weight loss after two hours is 0,1607 mg. The calculated total weight loss was calculated as 1,06%. In the endothermic peak analysis, very active mobility was observed, with small amounts. The most prominent peak occurred at 660 °C.

Thermogravimeter analysis was started with a sample of 17,0962 mg micronized from black basaltic slag (KBS) taken from the Karapınar region. The temperature range at which weight loss was experienced was observed as 29,65 °C to 975.14 °C. A weight loss of 1,0853 mg occurred in the sample, which was heated for two hours. Accordingly, the total weight loss was calculated as 6,35%. The most prominent endothermic peak occurred at 720 °C. An example of the graph type obtained at the end of the TGA analysis is given in Figure 1.

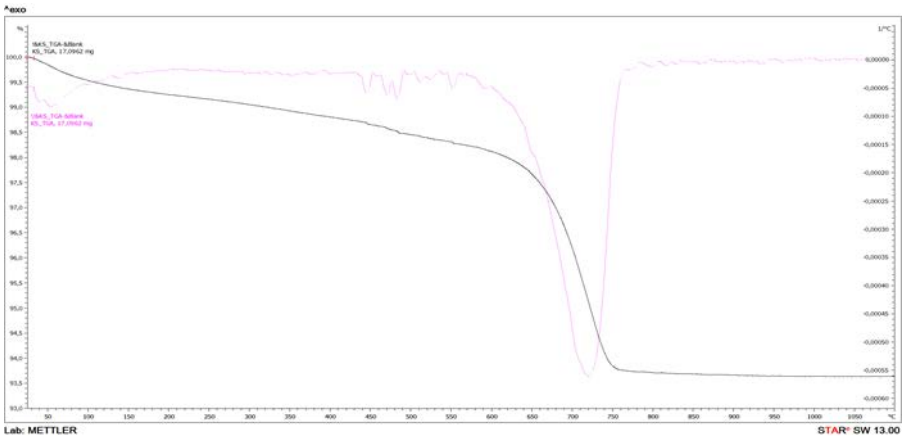

Figure 1. TGA analysis of Karapınar Region black slag

Production of the Experiment Samples

While the volcanic tuff group became oven-dry at 105 oC, this temperature was not sufficient for the basaltic slag group. Then, after calcining for the crystal water at 300-400 oC, the grinding process could be carried out.

Hundreds of samples were produced to be used in the experiments. In the first produced samples, stratifications in the form of capillary cracks were observed. It was concluded that the plastic properties of the sample mixtures were not sufficient and it was effective in these layerings. For this reason, it has been decided to add an additive to the mixture, which will be added in very small proportions and will provide plastic properties. In order to remove the observed layering, new samples were produced by adding 3% and 5% bentonite. The material named KAR-CVL (Construction bentonite- API 13 A, specified in TS EN ISO 13500, TS EN

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1536, TS EN 1538 standards) of the Karakaya Bentonite plant was used. Since there was no visible difference in the bentonite addition experiments, 3% was chosen as the amount of additive and this amount was included in the mixing ratio of all the samples to be produced next. A sample calculation to be used in determining the amount of material to be mixed is given below.

- **Sample Mixture Calculation:** Let's assume that the water content of 1000 gr red mud material is analyzed and the calculated water content is 40%, accordingly the amount of dry material will be 600 gr. If it is necessary to calculate with 10% pyroclastic addition, 600 gr dry material is counted as 90% and 67 gr material amount is calculated for 10%. The total amount of dry material entering the mixture is 667 gr. Since 3% bentonite will be added in line with this result, the calculation is made using the same proportional method. Accordingly, if 667 g dry material is 97%, 3% bentonite addition amount is calculated as 21 gr (Dereli & Tosun, 2020).

Cube plaster molds with internal dimensions of 5x5x5 cm were successful in the study. However, since drying-shrinking and baking-shrinking will occur in the dimensions of the samples removed from the mold, the inner dimensions of the plaster molds were resized according to these factors. The average inner size of the molds was kept as 5,8x5,8x5,8 cm.

The samples prepared without any additives to the red mud were baked at 1000, 1050 and 1100 degrees. In the examination made by observation, it was determined that the pure state of the red mud showed the characteristics of baked material at the limit of 1100 degrees. Upon this result, 1100 degrees was accepted as the upper limit value of baking and one sample from each mixture ratio was baked at this temperature. As the rate of pyroclastic rock addition increased at this temperature value, a high rate of reduction in volume occurred. In this direction, it was concluded that it is possible to bake at lower temperatures. Based on this result, in order to determine the optimum temperature and optimum mixing ratio of the samples to be used in the preliminary experiments, baking processes were carried out at different temperatures such as 1050, 1000 and 930 ^{o}C. Here, the temperature of 930 ^{o}C was specially chosen. The temperature setting of 930 ^{o}C was chosen as the closest temperature because the ovens in the laboratory did not have a suitable value for this temperature setting for the samples that are intended to be baked at 950 ^{o}C.

Preliminary Evaluations on Samples and Selection of Samples to be Used in Experiments

Samples with micronized pyroclastic addition rate of 40% and 50% to red mud were excluded from the scope of the study due to high volume losses at the end of baking. In addition, the fact that the CT group dispersed at the end of the baking at 20% and 30% additional rates caused this group samples to be out of the scope of the study. On the remaining samples,

two species from each group with different mixture types were selected that achieved the best compressive strength results. Accordingly, the samples named in Table 3 were used in the study.

Table 3. Mixing Ratios and Baking Temperatures of the Samples Used in the Experiments

Pyroclastic Addition Type	Addition Ratio (%)	Baking Temperature (C°)	Sample Name
Selahattin Village Tuff (SVT)	30	930	SVT 30 930
Selahattin Village Tuff (SVT)	30	1050	SVT 30 1050
Campus Tuff (CT)	10	1000	CT 10 1000
Campus Tuff (CT)	10	1050	CT 10 1050
Karapınar Region Red Slag (KRS)	20	930	KRS 20 930
Karapınar Region Red Slag (KRS)	30	1050	KRS 30 1050
Karapınar Region Black Slag (KBS)	20	1050	KBS 20 1050
Karapınar Region Black Slag (KBS)	30	1050	KBS 30 1050

Experiments on Samples

The results of net dry density, water absorption, compactness, porosity, initial water absorption speed and compressive strength on the selected samples are given in Table 4.

Table 4. Values of net dry density, water absorption, compactness, porosity, initial water absorption rate and compressive strength

Sample Name	Net Dry Density (kg/m³)	Water Absorption		Compactness Ratio (%)	Porosity Ratio (%)	Initial Water Absorption Speed (kg/m².min)	Compressive Strength (N/mm²)
		By Mass Wm(%)	By Volume Wv(%)				
SVT 30 930	1358	35,13	48,05	41,21	58,79	2,488	10,8
SVT 30 1050	1393	32,35	46,23	43,17	56,83	2,624	10,4
CT 10 1000	1735	16,95	30,97	48,20	51,80	1,948	9,6
CT 10 1050	1971	11,39	23,01	56,94	43,06	0,715	9,48
KRS 20 930	1424	33,12	48,12	42,14	57,86	2,884	8,08
KRS 30 1050	1510	29,17	45,24	46,60	53,40	2,953	9,03
KBS 20 1050	1670	20,75	35,62	48,69	51,31	1,874	16,41
KBS 30 1050	1508	29,51	45,26	42,54	57,46	3,719	13,11

Özdemir gave the porosity value of some materials in his study (Özdemir, 2002). According to this; gas concrete 74%, pumice concrete 61,8%, concrete 19%, andesitic tuff 8,7%, limestone 3,1% and granite 0,9%. When the samples used in the study were compared with these materials, it was seen that the results were close to the pumice concrete value. Based on these results, it is possible to say that the samples are highly porous.

High density brick compressive strengths specified in TS EN 771-1 are given in Table 5 below. Thus, the compressive strengths of the samples produced for the experiments were compared with the help of the table.

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Table 5. Average Pressure Values of High Density (HD) Vertical Perforated Brick Units (TS EN 771-1)

Brick Type	Compressive Strength		Mass of Unit Volume (kg/m³)	
	Arithmetic Average N/mm² (kgf/cm²)	**Minimum Value** N/mm² (kgf/cm²)	Max	Min
2000 kg/m³	24,0 (240) 18,0 (180) 12,0 (120)	19,0 (190) 14,5 (145) 9,5 (95)	2000	1801
1800 kg/m³	22,0 (220) 18,0 (180) 10,0 (100)	17,5 (175) 12,0 (120) 8,0 (80)	1800	1601
1600 kg/m³	22,0 (220) 15,0 (150) 10,0 (100)	17,5 (175) 12,0 (120) 8,0 (80)	1600	1401
1400 kg/m³	20,0 (200) 12,0 (120) 8,0 (80)	16,0 (160) 9,5 (95) 6,5 (65)	1400	1201
1200 kg/m³	15,0 (150) 10,0 (100) 6,0 (60)	12,0 (120) 8,0 (80) 4,5 (45)	1200	1001

With the lowest values of 1200 kg/m³ and 1400 kg/m³ in terms of standard brick compressive strengths given in the table, it was concluded that all types produced in the study could be used as bricks without any additives. Again, ceramic coating material, clinker wall covering, etc. to be used in places that do not require properties in terms of pressure resistance. It was concluded that it could be a baked building material. If it is necessary to determine the optimum mixture type in terms of compressive strength; The type of black slag material added to the red mud at a rate of 20% and baked at 1050 °C (KBS 20 1050) was determined as **the optimum mixture type in terms of compressive strength.**

Table 6. Changes occurred in the samples at the end of the sulfuric acid bath

Sample Name	Form of Damage
SVT 30 930	Crusty swellings over the entire surface
SVT 30 1050	Very slight swelling from the surface
CT 10 1000	No deformation was observed.
CT 10 1050	No deformation was observed.
KRS 20 930	No deformation was observed.
KRS 30 1050	Very slight swelling from the surface
KBS 20 1050	No deformation was observed.
KBS 30 1050	Very slight swelling from the surface

On the first day of the acid bath, it was observed that a very small amount of superficial swelling occurred under the influence of pure sulfuric acid (Figure 2.a). On the second day, in the acid bath, which was turned into a 50% aqueous solution with the addition of 50 ml of water, the surface of the samples was partially more pronounced. The changes that occurred on the samples that dried at the end of the sulfuric acid bath (Figure 2.b) are given in Table 6.

a. View of Samples in Sulfuric Acid Bath

b. View of Samples After Sulfuric Acid Bath

Figure 2. Views from the sulfuric acid bath

It was observed that the acid color turned dark yellow as soon as the pure hydrochloric acid bath started (Figure 3.a). In this direction, the samples started to oscillate into the acid from the very first moment. In the first day, very obvious damages occurred in the samples (Figure 3.b). Damage observation of dried samples is given in Table 7.

Table 7. Changes occurred in the samples at the end of the hydrochloric acid bath

Samplee Name	**Form of Damage**
SVT 30 930	Although not completely disintegrated, very obvious damage has occurred.
SVT 30 1050	Dispersion has occurred in the sample
CT 10 1000	Severe damage has occurred
CT 10 1050	Damages in the form of crumbling from the surface to the inner parts have occurred.
KRS 20 930	No significant damage has occurred, except for minor cracking.
KRS 30 1050	Very heavy comminution and disintegration have been observed
KBS 20 1050	Very little crusting was observed.
KBS 30 1050	Surface eroded and scattering damage was observed.

At the beginning of the pure nitric acid bath, a pink release occurred from the hydrochloric acid-like samples (Figure 4.a). While no obvious damage was observed in the pure acid bath, layering or deep cracks were observed on the surfaces of the samples when it became an aqueous solution. It was observed that some of the samples dried at the end of the acid bath had ruptures on their surfaces (Figure 4.b). The observation results of the damages occurring in the samples after the nitric acid bath are given in Table 8.

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Figure 3. Views from the hydrochloric acid bath

a. View of Samples in Hydrochloric Acid Bath

b. View of Samples After Hydrochloric Acid Bath

Table 8. Changes occurred in the samples at the end of the nitric acid bath

Sample Name	Form of Damage
SVT 30 930	Severe damage with ruptures in the form of layers
SVT 30 1050	Severe damage with ruptures in the form of layers
CT 10 1000	Intense capillary cracks and partial ruptures
CT 10 1050	Small cracks and superficial chipping
KRS 20 930	Both superficial cracks and deep cracks were observed together.
KRS 30 1050	No deformation was observed.
KBS 20 1050	Small cracks
KBS 30 1050	No deformation was observed.

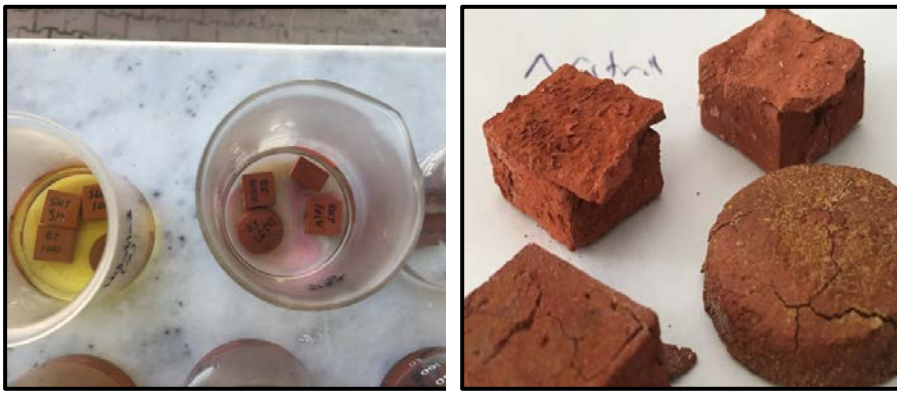


Figure 4. Views from the nitric acid bath

a. View of Samples in Nitric Acid Bath

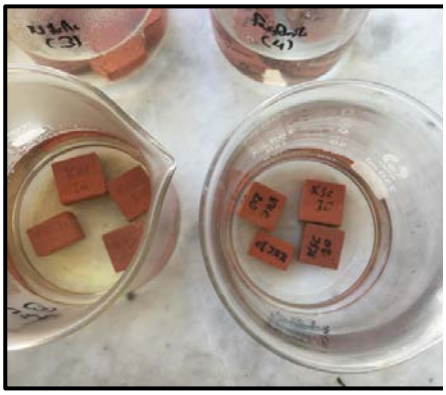
b. View of Samples After Nitric Acid Bath

Table 9. Changes occurred in the samples at the end of the phosphoric acid bath

Sample Name	Form of Damage
SVT 30 930	Very little flaking
SVT 30 1050	No deformation was observed
CT 10 1000	No deformation was observed
CT 10 1050	No deformation was observed
KRS 20 930	Very dense cracks on the surface
KRS 30 1050	No deformation was observed
KBS 20 1050	No deformation was observed
KBS 30 1050	No deformation was observed

No signs of damage were observed in the pure phosphoric acid bath (Figure 5.a). No damage was observed during the bath process, which was turned into an aqueous acid solution by adding water on the second

day. After the drying of the samples, the end of the acid bath observations were made (Figure 5.b) and the results are given in Table 9.



a. View of Samples in Phosphoric Acid Bath

b. View of Samples After Phosphoric Acid Bath

Figure 5. Views from the phosphoric acid bath

CONCLUSIONS AND RECOMMENDATIONS

The paper should also include a conclusion and recommendation section. This should identify the key issues, problems, and consequences for the findings of the research in conjunction with clear recommendations to the theory, methodology, industry, practitioners, the professions and for further research.

According to preliminary studies on raw materials and samples following results have been achieved:

• Aluminum production waste, which has a red color due to its chemical content, can be used in the production of building materials in this color,

• The plastic property of red mud is low compared to other clays. Considering that pyroclastic rocks have no plastic properties, additives must be made to increase the plastic properties of red mud,

• During the micronizing of the pyroclastic rocks, it should be calcined because the moisture in it poses a problem,

• The plaster mold system is the best method in laboratory-type sample production, but molding will not be a problem in fabricated productions,

• Baking temperatures can be used as they are, but baking at lower temperatures can be achieved with additives in terms of energy efficiency,

• As the pyroclastic addition rate increases, the total shrinkage after firing increases,

• Materials taken from all pyroclastic regions can be used in brick production by adding red mud.

The following results were obtained in the whole study for the production of sustainable building materials by micronizing the materials taken from the idle pyroclastic fields to the aluminum production waste red mud, which has effects that will harm the environment.

• It is possible to produce building materials at low temperatures,

• It is a light material, it will not bring an extra load to the structure,

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• It will be a material that can provide insulation with its high porosity and thermal insulation properties that can be improved from thermal conductivity values,
• Its mechanical strength is sufficient without making any supplemental additives,
• It is resistant to other acid effects from its behavior to strong and corrosive acids,
In this direction, it has been concluded that it is possible to produce a baked building material.
In general as a result of this study, it has been seen that red mud can be used in the production of brick (with or without bearing), which is a light, durable contemporary baked building material, as well as it can also be used in the production of building materials such as ceramics, clinker wall coverings, tiles, floor coverings, etc.
With the study, it was also concluded that red mud waste, which is a problem for sustainable environment, can be consumed by using high rates. It has been seen that it will meet some of the modern building material needs for sustainable building. And it has been seen in the literature studies that there are ways to make it possible to recycle the material produced in line with the work on behalf of sustainable building material, if it completes its useful life. Again with the study, the use of idle pyroclastic fields will be opened and contribution to the economy will be made.

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There is a patent application numbered 2020/00625 on behalf of Mustafa Dereli for research.

CONFLICT OF INTEREST
No conflict of interest was declared by the authors.

FINANCIAL DISCLOSURE
The authors declared that this study has received no financial support.

ETHICS COMMITTEE APPROVAL
There is no element that requires ethical committee approval.

LEGAL PUBLIC/PRIVATE PERMISSIONS
In this research, the necessary permissions were obtained from the relevant participants (individuals, institutions, and organizations) during the survey, indepth interview, focus group interview, observation, or experiment.

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Resume

Mustafa Dereli works as a research assistant doctor at Konya Technical University, Department of Architecture. Dereli received MSc in Department of Architecture in 2004 from Selcuk University, Konya, Turkey. And he received PhD in 2019 on Using Industrial Waste for Sustainable Building Materials at Konya Technical University, Department of Architecture, Konya, Turkey.

Mustafa Tosun is a professor at Konya Technical University, Faculty of Architecture and Design, Department of Architecture. He supervised the thesis on which this study was used. He still trains students in the field of Building Information.

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Culture-led Urban Transformation Strategies for Industrial Heritage and Industrial Areas in Istanbul

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Abstract

Purpose

In relation to the advances in information economics the flow of capital, creative industries, high-speed transportation systems and spatial characteristics of cities have led to the proliferation of cultural economics. In this respect, the departure of industry from cities is considered as a significant opportunity for the spatial improvement of cultural economics. Brownfields and industrial sites that are likely to abandon residential areas in the future stand out on account of their potential for transformation. Accordingly, this study aims to shed light on the spatial future of İstanbul, where development is currently aimed at achieving a global city, and to provide an analytical framework for the likely transformation of brownfields and idle industrial heritage sites.

Design/Methodology/Approach

For the purposes of this study, Suitability Analysis was utilized to evaluate industrial heritage sites that are no longer functional and industrial sites that hold the potential for transformation in İstanbul from the perspective of cultural development strategies. Therefore, first of all, the factors that influence site selection and agglomeration of cultural functions and cultural industries were created, weighed and mapped. Second, the components that specify the spatial preferences of entrepreneurial, creative class, and progressive strategies as well as the corresponding weighs of these components were identified. Finally, cultural development strategies that may be used to address the industrial sites in İstanbul with the potential for transformation, and the weighs of these strategies were revealed by using the "multi-criteria evaluation" method.

Findings

Culture-led transformation is typically shaped with the high-income target of entrepreneurial strategies. However, the transformation process should be reinforced with creative and progressive strategies. In this context, sites that are favourable for transformation in İstanbul accommodate an immense potential for entrepreneurial strategies, while the Bosporus as well as the Historic

Research Limitations/Implications

This study focuses on the province of İstanbul, which has the strongest connection to the network of global cities. The theoretical framework and materials for this study are made up of the available body of literature, digital maps, plans and plan reports.

Originality/Value

This study provides a platform for planners and authorities to discuss the culture-led regeneration of industrial heritage sites and brownfields with a focus on the medium- and long-term plans, programs and decisions for İstanbul. In addition, it contributes to the planning literature by offering a perspective on content and methodological approach for similar studies.

Keywords: *Cultural development strategies, cultural industries, creative industries, transformation of industrial sites, İstanbul.*

INTRODUCTION

The future of cities at the urban and regional scales are defined by the ability of the capital to adapt to the outcomes of the ever-developing information economics and the goal to gain competitive edge. Accordingly, technological advancements, which trigger the departure of industrial facilities from cities, enable the maintenance of production and management in regions remote from each other, thus further encouraging an economic reconfiguration that relies on service industries. In this context, the notion of "culture" is considered as a key factor for urban development in terms of local economic development, employment generation, sustainability of the culture, urban image, improved quality of life, etc. (Niu, Lau, Shen, and Lau, 2018, p. 502). In this context, the primary objectives of cultural development strategies are to restructure urban economies and to deliver various approaches to configure cities and regions as centers for creativity and information by attracting capital, investments, qualified work force, and tourists (Degen and Gacia, 2012, p. 7-8; Grodach and Loukaitou-Sideris, 2007, p. 352). Such approaches aimed at the regeneration of urban space adopt strategies that, on one hand, support creative industries, create science and technology corridors, and improve cultural industries, and they embrace strategies that seek to achieve significant and influential architecture projects, cultural clusters and vibrant cities that live around the clock (Degen and Gacia, 2012). Given that this study is focused on spatial preferences to formulate cultural strategies, İstanbul is selected as the case study area on the grounds of its geographic features, its historic, cultural and natural assets, its location within the global network, its socially, economically and culturally diverse and dynamic composition, and its background as a European Capital of Culture. On the other hand, when the spatial evolution of culture industries is scrutinized, the transformation of idle sites and incompatible functions in the built environment presents a potential (Niu, Lau, Shen and Lau, 2018, p.516; Camerin, 2019, p. 2). Accordingly, idle industrial heritage sites in residential areas as well as industrial sites located in residential areas that hold the potential for transformation are considered with this perspective. Furthermore, in its 2010-2014 Strategic Plan, the İstanbul Metropolitan Municipality calls for the redevelopment of abandoned industrial sites within the city as cultural sites (İMP, 2009). In reference to Grodach and Loukaitou-Sideris' study (2007), cultural development strategies that may be adopted in potential transformation areas can be addressed in three categories. In their research that aims to comprehend the marketing and development of cultural activities by local governments and agencies in American cities, Grodach and Loukaitou-Sideris (2007) examine culture-led development strategies in three categories (namely, entrepreneurial strategies, creative class strategies, progressive strategies) (Grodach and Loukaitou-Sideris, 2007, p.352).

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The present study proposes that culture-led development strategies should be considered during the planning of 45 sites that were identified by means of fieldwork and the analysis of technical documents. Furthermore, it provides a framework for policymakers so as to identify what type of cultural development scenario is more appropriate for each site. The proposed framework scrutinizes the potential future transformation projects and provides an objective perspective that can be capitalized on for planning efforts. In respect to the planning process in İstanbul, it opens the floor for discussion on entrepreneurial strategies that may prove to be an economic attraction for the city, on creative strategies that present value in the competition between cities, and on progressive strategies that may help improve the social-spatial infrastructure of the city.

In this context, the first chapter provides the definition of urban cultural policies and addresses the notion of "culture industry." The typology of culture-led development strategies is presented in the second chapter. In the third chapter, the analytical method that is formulated to reveal the culture-led development potential in industrial heritage sites is tested in İstanbul. The last chapter provides a discussion on the opportunities and threats for the future of İstanbul presented by industrial heritage sites that carry the potential for transformation.

LITERATURE REVIEW

Urban Cultural Policies and Cultural Industries

Cultural policies and cultural industries are strategic development dynamics for cities of the 21st century. The allocation of public funds to culture is not a new practice. Nowadays, however, cultural strategies have gained a different character. Investing in culture and improving the global competitiveness and image of cities through culture have become a common policy tool for both central and local authorities (Grodach and Loukaitou-Sideris, 2007, p. 351-353). In this process, sectors known as "culture industries" have been evaluated within the framework of urban revitalization policies (Hospers and Pen, 2008, p. 259; Teper, 2002, p.162-164).

The term "culture industry" was first coined by Theodor Adorno and Max Horkheimer in their work titled "Dialectics of Enlightenment," published in 1947. Adorno and Horkheimer used the term "culture industry" to express the mass culture of the late capitalist world, and they held the culture industry responsible for the reification that emerged due to the management of culture through commodification and homogenization (Adorno, 2009, p.18-23; Montgomery, 2007, p.601).

Cultural economics and industries have lately been identified as "creative sectors/ industries." It is reasonable to argue that such an identification puts higher emphasis on creativity, thus concealing the commercial aspect of culture. These industries encompass a wide range of fields including music, performing arts, visual arts, publishing and

broadcasting, handicrafts, advertising, architecture, computer and video games, software, design, environmental heritage, electronic and digital media, film, fashion design, other cultural goods, and manufacturing and sales (Montgomery, 2007, p.602; Banks and Hesmondhalgh, 2009, p.146; Trembath and Fielding, 2020). In the United States, cultural industries are grouped under four categories: core art field, cultural industries, creative industries and activities, and related industries (Özdemir, 2009, p.77).

The Department for Digital, Culture, Media and Sport (DCMS) in the United Kingdom has emphasized that culture industries are based on individual creativity, skills and talent, and it has also drawn attention to the potential these industries carry to improve their intellectual property and to create welfare and employment (Banks and Hesmondhalgh, 2009, p.146). For this reason, since the 1990s, culture industries, such as audiovisual media, informatics, recording and digital technologies, have been considered both as an important field of investment and as a significant source of employment (Montgomery, 2003, p.294; Lavanga, 2009, p.61-62). In 1996, the European Communication Commission highlighted numerous effects of culture in local development. The commission declared that "the increasing importance of culture in terms of regional development should be examined in contexts related to the restructuring of the economy as well as being the result of modified lifestyles" (Çelik, 2011, p.302). Similarly, in 1998, the New Labor Party in England opted for using the phrase "creative industries" instead of "cultural industries" in the party's cultural policy documents. In the first report prepared by the DCMS in 1998, "creative industries" are defined as "those industries which have their origin in individual creativity, skill and talent and which have a potential for wealth and job creation through the generation and exploitation of intellectual property." Since then, many governments expanded or narrowed the scope of the sector's activities, thus adapting this definition to their own cultural and/or creative industries (Lavanga, 2009, p. 63).

Chris Smith, former Secretary of State for Culture, Media and Sport in the United Kingdom (1998), stated that "Creative institutions and cultural developments are candidate to become a major concern for the modern world. It looks like creative professions will be the primary sector that generates employment in the next century" (Banks and O'Connor, 2017, p.638). Similarly, academician Shalini Venturelli (2000) expresses her opinion as "Employment growth is linked to the continuity of a country's creative structures. Economies that are not made up of creative teams will inevitably suffer." (Venturelli, 2000 as cited in Teper, 2002: 160). Evidently in its report on local economies, the National Governors Association emphasizes the fact that, in recent years, innovative commercial professions and nonprofit organizations has been the main input for the success of regional development projects. The data show that creative sectors in OECD member countries

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grow double the rate of the service industry and four times the rate of the conventional production industry (Robinson 2001, p. 42 as cited in Teper, 2002: 160). Evidently, in recent years, cultural industries have become a common interest and concern for all sectors in urban development programs, and the intensive use of cultural industries in urban development programs has led to the proliferation of public-private partnerships (Grodach and Loukaitou-Sideris, 2007, p. 350-351; Kuzmann, 2004, p.383-384). As one of the leading countries in this competition, the United Kingdom has set its cultural policies as follows:

- developing the knowledge interface,
- improving the demand-supply relationship,
- securing a high quality physical, social and cultural environment, and
- ensuring that all city-region inhabitants benefit from regional economic growth (Bontje and Musterd, 2009, p.846).

In line with these purposes, in 2005, the DCMS launched the Creative Economy Program (CEP). In addition to branding the United Kingdom as "the creative center of the World," the Creative Economy Program also aims to increase the number of professions involved in cultural industries (Banks and Hesmondhalgh, 2009, p. 422).

Also involved in this competition are cities such as Amsterdam, Munich and Helsinki that specialize in information and communication technologies, thus creating conditions that encourage creative business groups. Cultural industries, as in United Kingdom, are among the primary tools that local development agencies in Finland and Germany use to develop cities and regions (Bontje and Musterd, 2009, p. 348). In a similar fashion to many industrial cities in Western Europe, Barcelona placed culture in the center of its transformation efforts in the backdrop of global competition (Camerin, 2019, p. 2). In this respect, particularly in the city's third strategic plan enacted in 1999, Barcelona was presented as "a creative and information-based metropolitan area that is well-connected to the world and capable of providing economic opportunities to its residents" (Marshall, 2000, p. 308). Kong (2000) refers to this period as "cultural economic policy," and outlines its four characteristics as follows: a) sustaining of infrastructure investments necessary for cultural production (creating cultural clusters/regions, marketing, etc.), b) hosting mega-events as well as flagship arts developments related to the city's local cultural heritage, thus encouraging culture tourism, c) revitalization of urban spaces, and d) significant increase in public-private partnerships (Kong, 2000, p.387 as cited in Garcia, 2004, p.315).

Attracting high-income professionals with the help of creative urban discourses has also become a trend. In this context, as an effort to strengthen their urban image and for branding purposes, local governments began making spatial plans within the framework of revitalization themes by developing strategies on these trends that aim to increase the consumption rate of local residents and tourists by

means of cultural industries (Kunzmann, 2004, p.383; Florida, 2003, p.3). Whilst designing town centers, many strategies were used such as amenity bonuses, tax credits, land writedowns to promote highly-recognized constructions and modernize industrial buildings for cultural purposes. Numerous other cities also allocated budgets for public art programs in order to artistically enrich renovation activities. With the aim to revitalize abandoned industrial areas, more than 90 cities in the United Stated had designated arts regions before the 1990s. Most of these tried to gain success, and even mark the beginning of a new epoch, by constructing a high-end cultural building as an effort to promote the city (Grodach, 2017, p.83). In other words, many attempted to achieve their own "Bilbao effect" by means of a high-concept cultural building to brand the city. These include the Yerba Buena Center for the Arts in San Francisco, Art Gallery of Ontario in Toronto, the Temple Bar in Dublin, and the Arts District in Dallas. Coupled with the promotional efforts, the cultural development initiatives of local governments led to a complete boost of cultural activities (Grodach, 2017, p. 83; Grodach and Loukaitou-Sideris, 2007, p.351; Montgomery, 2007, p. 610-611).

With the advances in technology and the emergence of new production systems, former industrial cities aimed to restore their place in the urban competition by repurposing brownfields through cultural development strategies. In this context, the old armory in Beijing was transformed as an arts district (Niu, Lau, Shen and Lau, 2018); the power station Shanghai was regenerated as a contemporary arts museum; the Zollverein Coal Mines, the Herne Hulsmann Brewery, and the Oberhausen Gasometer in in Essen in the Ruhr region were regenerated as a shopping center, cultural center and museum (Saner, 2011, p.270); the Bankside Power Station in London was repurposed as the Tate Modern art museum and gallery; the Custard Factory in Birmingham was regenerated as an arts and media complex; the chocolate factory in Wood Green, London was repurposed for fine arts, handicrafts, textile design, and film studios (Montgomery, 2007, p.606-607).

Another culture-led urban transformation project is the 22@Barcelona in Barcelona's Poblenou neighborhood. In scope of the project, the Barcelona Industrial Culture Center, Barcelona Media Park, a shared campus for universities, headquarters of design companies, medical technology hub, offices and R&D centers of energy companies, headquarters of IT companies were established in Poblenou, which was once home to industrial facilities and warehouses. Furthermore, the 22@Barcelona project provided numerous programs to develop capacity, improve technology knowledge and use, and improve the quality of live of those who live and work in the neighborhood (Camerin, 2019, p. 8-9).

In Turkey, on the other hand, fine examples of industrial heritage sites are found particularly in İstanbul, İzmir, and Eskişehir, and when compared to Europe, few of these sites are conserved and/or

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regenerated for cultural purposes. Out of these, the Silahtarağa Power Plant in İstanbul that was regenerated as an educational and cultural facility stands out as an interesting project. The "lengerhane" building (a building used for casting anchors and chains) and the Hasköy Dockyard, which were regenerated as the first industrial museum in Turkey by the Rahmi M. Koç Museology and Cultural Foundation, are the finest examples where the industrialization along the Golden Horn can be observed in situ (Köksal , 2012, p. 23). In addition, Ankara TCDD (Turkish State Railways) Train Hangars were repurposed as a contemporary arts museum, İzmir Pasaport Ferry Terminal and its warehouses were regenerated as a cultural center and a shopping mall, and the winery in Eskişehir was regenerated as Hayal Kahvesi (a restaurant and a venue for live music) (Cengizkan, 2012, p.28).

The number of examples, only a limited amount of which are presented in this paper, has been on the rise, and the topic draws increased attention in Turkey similar to the case in Europe. The intellectual and actional reuse of these facilities, which once played a critical role in the evolution of cities and life, by preserving their value and by ensuring public interest not only reintroduces the industrial heritage to contemporary life but also ensures high-quality contribution to urban life. Increasing awareness on the subject, conserving industrial buildings with different functions and value in different regions of the country before they get dilapidated, and reusing these buildings for public good will also lead to favorable outcomes in terms of improving the quality of life (Köksal , 2012, p. 23).

Culture-led Urban Development Strategies

According to Evans (2005, p.968), culture-led development models that include cultural programs and activities in the revitalization process can be classified as culture and regeneration, cultural regeneration, and culture-led regeneration. However, he states that these three models may not differ much from each other in the process (Evans, 2005, p.968-969).

If cultural efforts and regeneration are led by separate authorities, the culture and regeneration model would typically be the first model used. In this case, although culture contributes to regeneration, it is not possible to integrate culture while developing urban designs or main projects. Accordingly, a powerful local or global leader who can endeavor against negative social views and ideas to strengthen the effect of culture on regeneration, and who attaches importance to integrating cultural activities as well as preserving ethnic groups and values is needed for this model (Chiu, Lee, and Wang, 2019, p. 2).

The second model, cultural regeneration, is a more inclusive and coordinated model at the policy level, and it involves questioning at the level of cultural policies and strategies. Such interventions are often smaller in scale, such as a public art program for office development or a local history museum hidden in an industrial site. It should be noted,

however, that the absence of any noticeable cultural activity or provision in such a resuscitation strategy does not mean that there is no cultural activity, it only indicates that culture is not organized or supported as part of the process. In this approach, the main reason behind why culture is addressed as a supplement rather than a part of the revitalization strategy is the fact that relevant authorities, organizations and individuals that formulate revitalization plans and those in charge of cultural activities do not consider each other as stakeholders, thus avoiding collaboration (Evans, 2005, p. 969; Chiu, Lee and Wang, 2019, p. 2).

The third model, culture-led urban regeneration, encompasses interventions that involve cultural programs and activities where public interest is a priority. These interventions are typically a means of attracting attention and generating enthusiasm for revitalization programs in their entirety. In other words, the investment programs formulated for culture-led revitalization are aimed at social development, and they do not necessarily entail any economic objectives (such as increase in real estate values, etc.). In these models, physical renewal is performed with the aim to ensure the availability of cultural activities and programs (Evans, 2005, p.968). Moreover, such interventions should encourage the construction of new commuting systems, the renovation of the current social and cultural premises, or the building of first-class hotels. Raising local support and approval is extremely essential for all these actions (Chiu, Lee, and Wang, 2019, p. 2).

Grodach and Loukaitou-Sideris (2007: 352) summarize three different models as culture-led development strategies in their research that aims to understand the marketing and development activities process of cultural activities of carried out by local governments and agents in American cities: (1) Entrepreneurial strategies, (2) Creative class strategies, (3) progressive strategies (Table 1).

Entrepreneurial strategies: Almost all of them are focused on economic development rather than social goals. In this approach, local governments try to create an attractive environment for investments by means of regulations such as tax deductions, land allocation and flexible zoning practices. Cities are marketed through large-scale prestige projects, and private sector investments are sought. In this process, city authorities attempt to increase the competitiveness of their cities in terms of the developing industries of the "new economy," such as tourism, culture and information technologies. Cultural projects are considered as important tools for enhancing the image of cities and creating a "brand." These strategies have been criticized for trying to develop cities with the help of investors, tourists and the wealthy rather than the residents of the city, and for departing from the principle of community benefit by granting privileges to the private sector (Grodach and Loukaitou-Sideris, 2007, p. 353).

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Table 1. Cultural development strategies (Grodach and Loukaitou-Sideris, 2007, p. 352).

Cultural Development Strategies	**Entrepreneurial Strategies**	**Creative Class Strategies**	**Progressive Strategies**
Goals	- Economic development through tourism and city image - Catalyst effect on private sector investments	- Economic development through quality of life - Attracting new residents in the creative economy	- Community development - Arts education and access to art - Local cultural production
Types of Cultural Projects and Programs	- Flagship cultural projects - Spectacular events - Promotional activities	- Arts and entertainment districts - Collaboration between arts and private sector	- Community centers - Arts education programs
Geographic Focus	- Downtown - Old historical areas	- Downtown and historic urban neighborhoods	-Inner-city neighborhoods -Underserved neighborhoods
Target Audience	- Tourists and conventioneers - Affluent "residents" and suburbanites	- Prospective and existing residents - Young professionals and knowledge-based workers	-Underserved residents
Criticisms	- The argument that they depart from the principle of community benefit - Privileges granted to the private sector - The neglect of urban issues (such as poverty, crime, homelessness, etc.) - Initiatives for investors, tourists, and the wealthy	- The argument that it would result in a biased economic development program for the benefit of a single class - Its focus on the construct of a living environment that responds to the expectations of the creative class - The threat of "gentrification" in the downtown and in historical neighborhoods, which are appealing for the creative class	N/A

Creative class strategies: They try to attract the "creative class[2]" to the city by focusing on improving the quality of life and providing opportunities to respond to a certain lifestyle. Therefore, they strive to create an urban environment that would be appealing for this class with attributes such as being open to new ideas, tolerant, culturally diverse and multifunctional, featuring a well-preserved historical identity, and

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offering various cultural and recreational opportunities. In this scenario, cultural activities are very important because they respond not only to the consumption habits but also to the entertainment & leisure needs and the cosmopolitan identity of the creative class. By contrast with the entrepreneurial approach, the creative class approach promotes clusters of small-scale cultural and art venues. Advocates of this approach state that the economic benefit that is generated by the attraction of the creative class into the city will disperse to other segments of society and will spread to the numerous segments with help of the low-wage jobs created in the service sector. Some experts, on the other hand, criticize this approach on account of being for the benefit of a single class, thus arguing that it would result in a biased program of economic development. They also argue that, although the goal to ensure ethnic diversity, a clean environment and access to art are quite important in essence, they are actually aimed at creating a living environment that will respond to the expectations of the creative class rather than providing benefit to the general public. Finally, when a creative city is built with this approach, the downtown and historical neighborhoods, which are the center of attraction for the creative class, will face the threat of gentrification (Peck, 2005, p. 746; Grodach and Loukaitou-Sideris, 2007, p.354).

Progressive strategies: The main objective of this approach is to increase the standards for everyone by means of redistribution policies that support economic and social inequality, and participatory practices. Progressive strategies strive to return the advantages granted to the private sector with the zoning and development rights to the general public, and for this purpose, they impose high taxes and/or seek developer obligations such as the improvement of the built and the natural environment, the provision of affordable housing, and the promotion of public transportation in return for the zoning rights granted. Furthermore, progressive cultural strategies aim to promote access to art and culture and to support local cultural production, they also seek to improve disadvantaged neighborhoods through culture and art, and to strengthen the sense of social identity and belonging. In short, they look for methods to ensure that benefits generated by cultural development are distributed to wider audiences (Grodach and Loukaitou-Sideris, 2007, p. 355).

In light of these details, the purpose of integrating culture to civic regeneration is to draw the attention of innovative minds and industries to a certain region for environmental improvement. It also aims to create places and environments, highlight and commercialize local amenities, and maintain historical and cultural attributes. Cultural identity can spark regional confidence and agreement and can also ensure receiving approval and the trust of the community. Therefore, it is possible to suggest that community agreement and trust -and not the regeneration strategies themselves- are what identifies culture-led urban regeneration (Chiu, Lee, and Wang, 2019, p. 7).

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CULTURE-LED URBAN TRANSFORMATION AND İSTANBUL

With its geographical, political, cultural, social, and economic characteristics, İstanbul is one of the oldest settlements that served as an important hub for numerous cultures. In addition to its rich cultural and historical context, it also plays an important role in terms of capital and employment. İstanbul did not experience de-industrialization to the same extent as Western cities. On the contrary, the manufacturing industry still has a significant share in the city's economy.[3] However, the decentralization of the industry has been a policy that has persisted since the 1960s. As a result of both the changing needs of industrial production and the policies aimed at clearing the city from industry, there are numerous idle industrial sites in İstanbul. These areas are now being considered within the scope of revitalization policies. For example, the repurposing of the Cibali Tobacco Factory, Feshane (fez factory), Lengerhane (a building used for casting anchors and chains), Silahtarağa Power Plant, which are identified as industrial archeology in the Golden Horn Master Plan Report, from their manufacturing function into a cultural function as well as İstanbul Metropolitan Municipality's proposal to regenerate idle industrial areas within the city with cultural activity areas in the 2010-2014 Strategic Plan are the indicators of this trend. This trend makes it important to make a spatial evaluation of the transformation potential of existing industrial areas that hold the potential for transformation as well as industrial heritage sites in terms of cultural development strategies.

In this study, which aims to make such an evaluation and to draw attention to alternative scenarios, industrial heritage areas in İstanbul and industrial sites with the potential for transformation in İstanbul were identified first. In order to do so, a five-stage evaluation process was formulated, a total of 45 industrial sites were identified, and their boundaries were determined. Secondly, Suitability Analysis was performed. In order to evaluate the level of suitability of each one of the 45 sites for urban transformation within the framework of cultural development strategies, various criteria and the significance level of these criteria were identified based on the data on centrality, accessibility, historical quality, and plan decisions (Koramaz, 2016, p. 129-130). As a result of the analysis, a quantitative value was obtained for each area that holds the potential for transformation. Then, spatial preferences criteria were specified to determine which cultural development strategies could be prioritized in these areas. At this stage, based on the criteria determined previously, the primary and secondary strategic approaches were determined for each site in the percentile system. Finally, the culture-led strategies that can be evaluated for the repurposing of industrial areas that hold the potential for transformation and cultural heritage areas in İstanbul were discussed, and the opportunities and threats related to these strategies were put forward.

Industrial Heritage and Industrial Sites in İstanbul with Transformation Potential Industrial heritage sites in İstanbul: Cultural industries based on the local production system feature strong spatial characteristics. Cultural industries:

- are typically, small and medium-sized,
- need a great deal of physical proximity between each other, with a high tendency to cluster,
- depend on the inputs and infrastructures of the locally-specialized labor market,
- require effective communication and face-to-face interaction, and
- depend on local social networks, thus requiring a robust transportation network.

Considering these features of cultural industries, industrial heritage sites, which are likely to undergo transformed, prove to be an important potential. Therefore, the industrial heritage sites in İstanbul are identified in this section. For this purpose, the industrial heritage areas listed by Köksal and Ahunbay (2006) were examined, and out of these areas, sites that are still operational, sites for which a project and an implementation plan are prepared, sites that were already regenerated were excluded. Only the areas that are currently being planned, that remain idle, and that are unplanned were included in the scope of the study. Consequently, 16 idle industrial sites were identified and shown on the map within the context of mentioned criteria (Figure 1) (Table 2).

Industrial sites with transformation potential in İstanbul: In this section, a five-stage evaluation process was applied by examining the data obtained from the İstanbul Metropolitan Planning Office (İMP) to determine the industrial sites that hold the potential for transformation and can be evaluated within the framework of cultural development strategies.

In Stage I, organized industrial zones (OIZs) were excluded from all existing industrial sites.

In Stage II, structures other than those with 'manufacturing and warehouse function' were excluded from all existing industrial sites in order to identify sites that are used for production purposes only.

In Stage III, technology development areas, dockyards, advanced technology areas, innovative technology industrial sites specified in the Draft 1/25,000 Environmental Plan were included as potential areas in terms of cultural development strategies.

In Stage IV, areas that are planned to be transformed as service, public facility, technology development, housing, tourism, and recreation areas in the Draft 1/25,000 Environmental Plan were superimposed onto the areas identified in the previous stages, thus all sites with transformation potential were identified.

In Stage V, the maps created in the first four stages were superimposed, thus areas that tend to cluster were detected and their boundaries were identified (Figure 1).

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As a result of all these stages, a total of 45 sites that hold significant transformation potential and that stand out in terms of cultural development strategies were identified in İstanbul (Table 2).

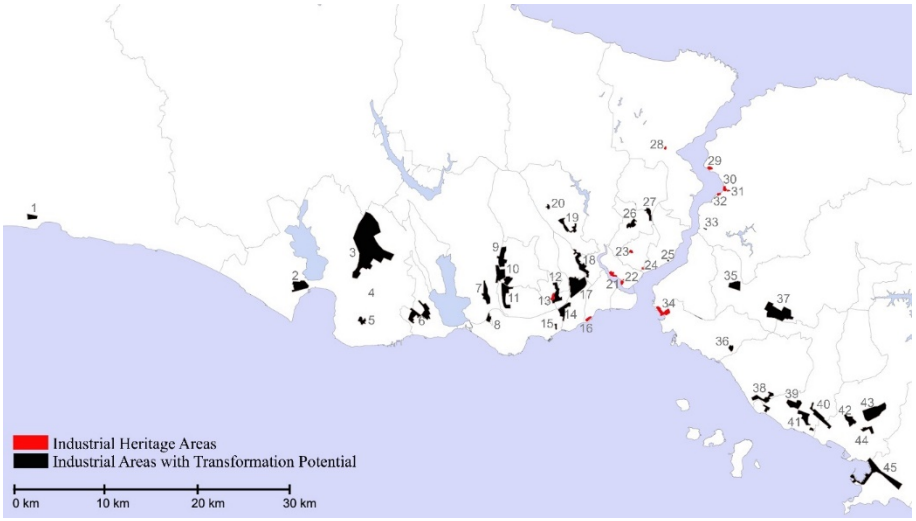

Figure 1. Idle industrial heritage areas (x) and industrial sites with transformation potential in İstanbul, 2018.

Table 2. Idle industrial heritage Areas (x) and industrial sites with transformation potential in İstanbul, 2018

1	Silivri	**16**	Yedikule Gashouse (x)	**31**	Beykoz Brick Factory (x)
2	Büyükçekmece	**17**	Zeytinburnu 2	**32**	Beykoz Distillery (x)
3	Beylikdüzü 1	**18**	Bayrampaşa - Eyüp	**33**	Beykoz Rope Factory
4	Beylikdüzü 2	**19**	Gaziosmanpaşa	**34**	Haydarpaşa Railway Station Atelier (x)
5	Beylikdüzü 3	**20**	Sultangazi	**35**	Ümraniye 1
6	Avcılar	**21**	Haliç Dockyards (x)	**36**	Ataşehir
7	Küçükçekmece	**22**	Kasımpaşa Flour Factory (x)	**37**	Ümraniye 2
8	Bakırköy 1	**23**	Bomonti Beer Factory (x)	**38**	Maltepe 2
9	Bağcılar 1	**24**	Dolmabahçe Gashouse (x)	**39**	Kartal 1
10	Bağcılar 2	**25**	Ortaköy Pharmaceutical Plant	**40**	Kartal 2
11	Bahçelievler	**26**	Kağıthane 1	**41**	Kartal 3
12	Güngören	**27**	Kağıthane 2	**42**	Pendik 1
13	Haznedar Brick Factory (x)	**28**	Büyükdere Match Factory (x)	**43**	Pendik 2
14	Zeytinburnu 1	**29**	Beykoz Shoe Factory (x)	**44**	Pendik 3
15	Bakırköy 2	**30**	Beykoz Glass Factory (x)	**45**	Tuzla

Evaluation of the Level of Suitability for Urban Transformation of the Designated Areas Under Cultural Development Strategies

In order to evaluate the designated areas in terms of cultural development strategies, the researchers referred to the site-selection trends of cultural functions and culture industries based on the available literature, and identified five criteria. These criteria were then assigned a numeric value to reach a quantitative result. These criteria include

centrality, accessibility via different modes of transportation, historical attributes, and upper-scale plan decisions.

Centrality: Given the fact that being in or near the center are considered as an opportunity for the development of cultural industries, distance to the urban center was considered as a priority in the evaluation (Figure 2).

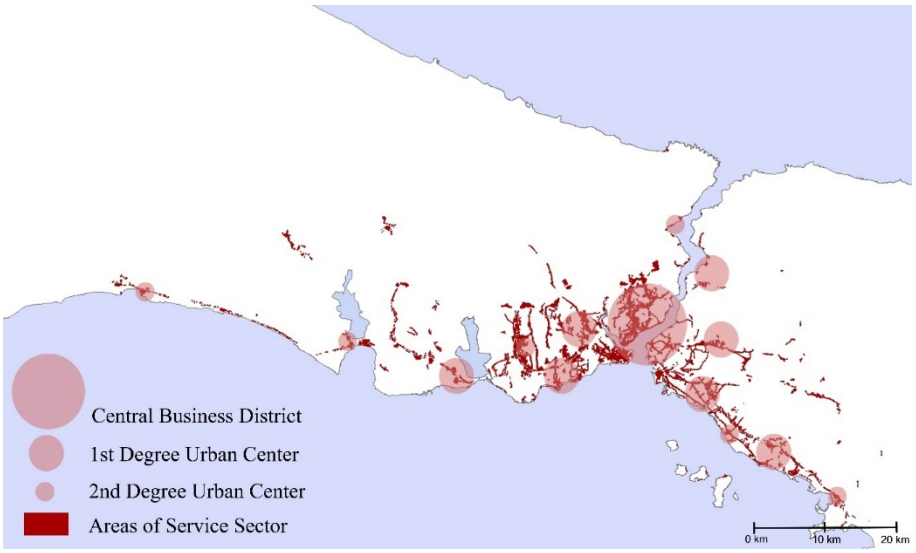

Figure 2. Current centers in Istanbul (IMM, 2018).

Accessibility (via private and public transportation): Decisions on transportation policies and programs for the İstanbul metropolitan area prove to be one of the most important determinants of the city's macroform; therefore, it has been taken into account as one of the decisive criteria in the culture-led transformation of the areas with the transformation potential. In order to determine the level of integration and accessibility of the designated areas to the city, accessibility was examined under two sub-criteria (namely, public transportation and private transportation) (Figure 3).

Historical attributes: As mentioned previously, cultural development strategies primarily prefer structures or areas with an authentic identity and historical character that can be transformed by repurposing.

Planning decisions: Several studies produced during the strategic planning process of the İstanbul metropolitan area in 2006 as well as the İstanbul Environmental Plan in 2009 were considered as references. Based on these planning activities,

- the "development districts for cultural industries" that were proposed in the course of the strategic planning process for İstanbul (İMP, 2006a),
- the "industrial areas that will be transformed" (İMP, 2006b) specified in the synthesis of industrial sites in the İstanbul strategic planning process, and

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- the service, tourism, recreation, technology development and residential areas that are identified in the 1/25,000 Environmental Plan for İstanbul

were used as basis during the evaluation process (Figure 4) (İMP, 2009).

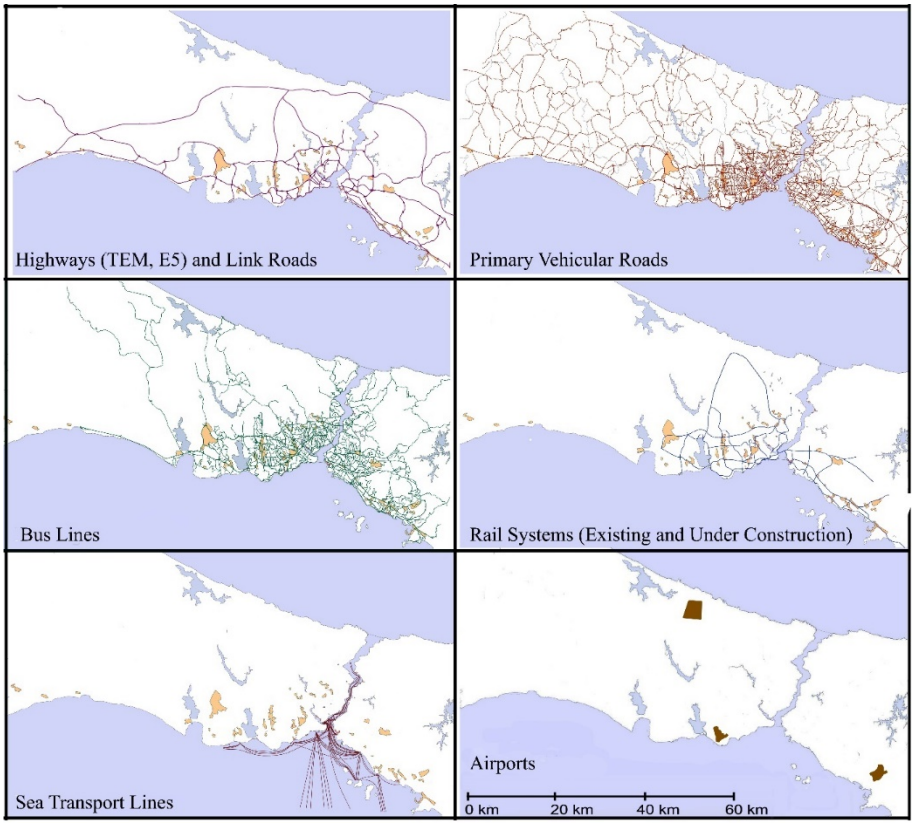

Figure 3. Private and public transportation in Istanbul (IMM, 2018).

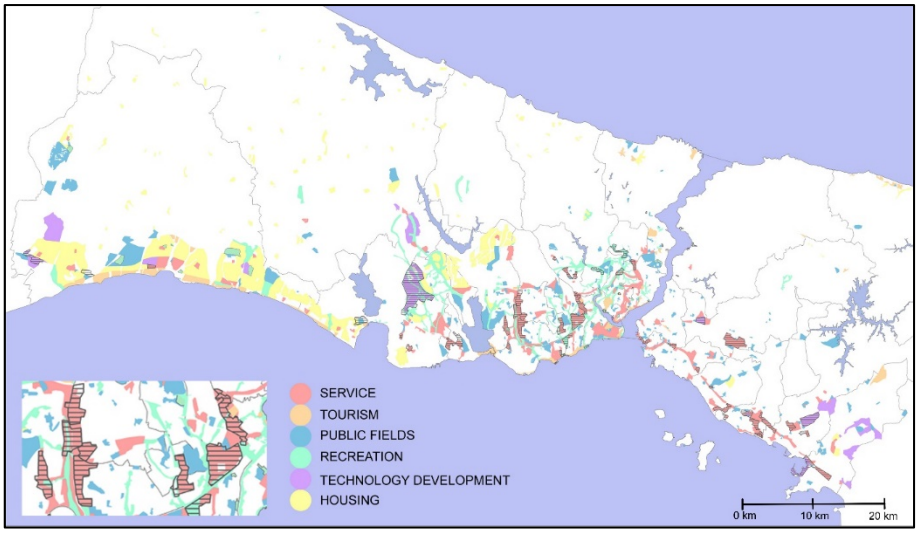

Figure 4. Transformation areas and functions determined in the 1/25,000 environmental planning process (IMP, 2009).

Based on the criteria and the scoring system presented in Table 3, the total score of each area was determined, and the suitability level of these areas for urban transformation with help of cultural development strategies was calculated (Table 3).

Table 3. Criteria and cores that were used to evaluate the areas from a perspective of cultural development strategies

CRITERIA		GRADE	SCORE
ENTRALITY [C]	**Centricalness**		
	Located in the impact area of the CBD	High	3
	Located in the impact area of a 1st degree urban center	Medium	2
	Located in the impact area of a 2nd degree urban center	Low	1
	Distance		
	Located in the CBD	Very high	4
	10 km distance to the CBD	High	3
	20 km distance to the CBD	Medium	2
	30 km distance to the CBD	Low	1
PRIVATE TRANSPORTATION [PT]	**Proximity and connection level to main traffic arteries**		
	Located on the TEM and/or E5 highway	High	3
	High connectivity to the TEM and/or E5 highway	Medium	2
	High connectivity to 1st degree vehicular roads	Low	1
PUBLIC TRANSPORTATION [PBT]	**Proximity to bus lines**		
	High proximity to existing lines (400 m)	High	3
	Medium proximity to existing lines (400-800 m)	Medium	2
	Low proximity to existing lines (800+ m)	Low	1
	Proximity to rail transport lines		
	High proximity to existing and under construction lines (800 m)	High	3
	Medium proximity to existing and under construction lines (800 m – 2 km)	Medium	2
	Low proximity to existing and under construction lines (2 - 4 km)	Low	1
	Proximity to sea transport lines (iskele)		
	High proximity to existing lines (400 m)	High	3
	Medium proximity to existing lines (400-800 m)	Medium	2
	Low proximity to existing lines (800m-2 km)	Low	1
	Proximity to airports		
	High proximity to existing airports (5 km)	High	3
	Medium proximity to existing airports (5 km-10 km)	Medium	2
	Low-proximity to existing airports (10 km – 15 km)	Low	1
HISTORICAL ATTRIBUTES [HA]	Cultural heritage areas	N/A	3
	Newly developed areas	N/A	0
PLAN DECISIONS [PD]	High proximity to the regions designated as “development areas for cultural industries” in the 1/100,000 Strategic Plan	N/A	3
	High proximity to the industrial areas that will be transformed in the synthesis of industrial sites in the 1/25,000 Environmental Plan	N/A	3
	Transformation functions defined in the 1/25,000 Environmental Plan	N/A	3
	Service - tourism	N/A	3
	Facilities (education, culture, recreation)	N/A	2
	High-tech production - housing	N/A	1

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In this scoring system, a certain site can receive maximum 30 points and minimum 3 points. According to the analysis, the areas that are suitable for urban transformation with help of cultural development strategies and the score for each area are shown in Table 4.

According to the calculation method,

- each field presented in Table 2 was analyzed according to the criteria in Table 3,
- the score related to each criterion in Table 3 is assigned for each field, and
- the scores assigned to each field in reference to the provided criterion are added up (Table 4).

The following method is used to evaluate the field of cultural development strategies:

*Total Score= C+PT+PBT+HQ+PD [1]

*Centrality [C]; Private transportation [PT]; Public transportation [PBT]; Historical attributes [HA]; Planning decisions [PD]

According to the calculation, industrial areas with the highest transformation potential are Haliç Dockyards (30 points), Haydarpaşa Railway Station Machine Shop (30 points), Kasımpaşa Flour Factory (29 points), Dolmabahçe Gashouse (29 points), and Bomonti Beer factory (28 points). On the other hand, Beylikdüzü-1 (7 points), Pendik-2 (8 points), Pendik-3 (10 points), and Sultangazi (10 points) prove to be the industrial areas with the lowest transformation potential.

Table 4. Designated industrial sites ordered by their level of suitability for urban transformation within the framework of cultural development strategies

Code	Name	Score	Code	Name	Score
21	Haliç Dockyards	**30**	8	Bakırköy 1	**20**
34	Haydarpaşa Railway Station Machine Shop	**30**	36	Ataşehir	**19**
22	Kasımpaşa Flour Factory	**29**	30	Beykoz Glass Factory	**19**
24	Dolmabahçe Gashouse	**29**	31	Beykoz Brick Factory	**19**
23	Bomonti Beer Factory	**28**	7	Küçükçekmece	**19**
45	Tuzla	**27**	12	Güngören	**18**
15	Bakırköy 2	**26**	29	Beykoz Shoe Factory	**17**
27	Kağıthane 2	**26**	32	Beykoz Distillery	**17**
41	Kartal 3	**26**	37	Ümraniye 2	**17**
18	Bayrampaşa-Eyüp	**25**	35	Ümraniye 1	**17**
38	Maltepe	**25**	33	Beykoz Rope Factory	**15**
17	Zeytinburnu	**25**	19	Gaziosmanpaşa	**14**
26	Kağıthane 1	**25**	4	Beylikdüzü	**14**
11	Bahçelievler	**24**	42	Pendik 1	**14**
14	Zeytinburnu 1	**24**	1	Silivri	**13**
16	Yedikule Gashouse	**24**	28	Büyükdere Match Factory	**12**
39	Kartal 1	**24**	2	Büyükçekmece	**11**
40	Kartal 2	**23**	5	Beylikdüzü 3	**11**

25	Ortaköy Pharmaceutical Plant	**21**	44	Pendik 3	**11**
13	Haznedar Brick Factory	**21**	20	Sultangazi	**10**
9	Bağcılar 1	**21**	43	Pendik 2	**10**
6	Avcılar	**20**	3	Beylikdüzü 1	**7**
10	Bağcılar 2	**20**			

Classification of idle industrial sites and industrial heritage areas by cultural development strategies

The criteria were determined based on the spatial preferences of entrepreneurial, creative, and progressive cultural development strategies preferred by central and local governments (Table 5).

At this stage, each one of the designated idle industrial sites and industrial heritage sites were evaluated quantitatively based on the criteria specified. According to the evaluation method:

- "1 point" was assigned for each criterion that an area fulfills.
- The scores assigned for each criterion fulfilled by each area were added up separately on the basis of three strategic approaches.
- The total scores obtained for each one of the three strategic approaches were divided by the number of criteria of the relevant group. Thus, the point normalization of the three strategic approach groups was ensured.
- The scores obtained were proportioned in percentage format.

Table 5. Spatial selection criteria of different cultural development strategies

Strategies	Criteria
Entrepreneurial [ES]	▪ Primary urban centers ▪ Historical urban areas ▪ Large-scale industrial areas ▪ Highly attractive locations ▪ Regions with touristic potential ▪ Economically advantageous regions ▪ Areas that can create a catalytic effect for private-sector development ▪ Prestige/pioneer regions with project development potential ▪ Regions with suitable location for the upper-income group ▪ Areas or structures that are flexible in terms of physical transformation
Creative class [CS]	▪ Areas with suitable location for the arts and entertainment functions ▪ Art- and culture-focused regions with private enterprise potential ▪ Primary urban centers ▪ Historic urban centers ▪ Old urban areas ▪ Regions with a suitable location for education and research ▪ Areas or structures that are flexible in terms of physical development
Progressive [PS]	▪ Secondary city centers ▪ Regions with difficulty in access to services ▪ Regions closer to high-density housing ▪ Large-scale manufacturing areas ▪ Areas of urban decay ▪ Areas or structures that are flexible in terms of physical exchange

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The following formulas were used to calculate the scores of the fields according to the site selection criteria of different cultural development strategies:

Entrepreneurial strategies=ES; Creative strategies=CS; Progressive strategies=PS; Total point=TP; Percentage Distribution=PD

$$ES = \frac{1}{10}\sum_{i=1}^{10} e_i \;, CS = \frac{1}{7}\sum_{i=1}^{7} c_i \;, PS = \frac{1}{6}\sum_{i=1}^{6} p_i \quad [2]$$

$$TP = ES + CS + PS = \frac{1}{10}\sum_{i=1}^{10} e_i + \frac{1}{7}\sum_{i=1}^{7} c_i + \frac{1}{6}\sum_{i=1}^{6} p_i \quad [3]$$

$$\%E_{score} = PD_{ES} = 100.ES \div TP = 100.ES \div (ES + CS + PS) = 100.\frac{1}{10}\sum_{i=1}^{10} e_i \div \left(\frac{1}{10}\sum_{i=1}^{10} e_i + \frac{1}{7}\sum_{i=1}^{7} c_i + \frac{1}{6}\sum_{i=1}^{6} p_i\right) \quad [4]$$

$$\%C_{score} = PD_{CS} = 100.CS \div TP = 100.CS \div (ES + CS + PS) = 100.\frac{1}{7}\sum_{i=1}^{7} c_i \div \left(\frac{1}{10}\sum_{i=1}^{10} e_i + \frac{1}{7}\sum_{i=1}^{7} c_i + \frac{1}{6}\sum_{i=1}^{6} p_i\right) \quad [5]$$

$$\%P_{score} = PD_{PS} = 100.PS \div TP = 100.PS \div (ES + CS + PS) = 100.\frac{1}{6}\sum_{i=1}^{6} p_i \div \left(\frac{1}{10}\sum_{i=1}^{10} e_i + \frac{1}{7}\sum_{i=1}^{7} c_i + \frac{1}{6}\sum_{i=1}^{6} p_i\right) \quad [6]$$

Accordingly, a high percentage value indicates the most appropriate strategic approach for each area. However, strategic approaches with a value more than 30% were considered in order to embrace a flexible perspective in the policy-development process. Thus, the primary and secondary strategic approaches were identified for each area (Table 6) (Figure 5).

The industrial areas with the highest transformation potential are: Haliç Dockyards (30 points), Haydarpaşa Railway Station Machine Shop (30 points), Kasımpaşa Flour Factory (29 points), Dolmabahçe Gashouse (29 points), and Bomonti Beer Factory (28 points). As a result of the evaluation of these industrial areas according to the criteria that determine the cultural development strategies, Haliç Dockyards, Haydarpaşa Railway Station, Kasımpaşa Flour Factory, Dolmabahçe Gashouse, and Bomonti Beer Factory prove to be prominent for creative class strategies. The industrial areas with the lowest transformation potential are: Beylikdüzü-1 (7 points), Pendik-2 (8 points), Pendik-3 (10 points), and Sultangazi (10 points). Accordingly, the priority transformation scenarios for these industrial areas can be specified as progressive strategies for Beylikdüzü-1, entrepreneurial strategies for Pendik-2 and Pendik-3, and progressive strategies for Sultangazi.

Table 6. Classification of industrial sites that bear transformation potential in İstanbul within the scope of cultural development strategies

	Transformation potential (score)	1st strategy	2nd strategy		Transformation potential (score)	1st strategy	2nd strategy
Haydarpaşa Railway Station Machine Shop	30	**E**	C	K.çekmece	19	**P**	N/A
Tuzla	27	**E**	C	Güngören	18	**P**	E
Bakırköy 2	26	**E**	N/A	Gaziosmanpaşa	14	**P**	N/A
Kağıthane 2	26	**E**	N/A	Beylikdüzü 2	14	**P**	N/A
Kartal 3	26	**E**	N/A	Pendik 1	13	**P**	N/A
Bayrampaşa - Eyüp	25	**E**	P	Silivri	12	**P**	C
Maltepe	25	**E**	P	Büyükdere Match Factory	12	**P**	C
Zeytinburnu 2	25	**E**	C	B.çekmece	11	**P**	E
Kağıthane 1	25	**E**	P	Beylikdüzü 3	11	**P**	N/A
Zeytinburnu 1	24	**E**	P	Pendik 3	11	**P**	N/A
Bahçelievler	24	**E**	P	Sultangazi	10	**P**	N/A
Kartal 1	24	**E**	P	Beylikdüzü 1	7	**P**	E
Kartal 2	23	**E**	P	Haliç Dockyards	30	**C**	E
Bağcılar 1	21	**E**	P	Kasımpaşa Flour Factory	29	**C**	E
Bakırköy 1	20	**E**	P	Dolmabahçe Gashouse	29	**C**	E
Ataşehir	19	**E**	C	Bomonti Beer Factory	28	**C**	E
Ümraniye 2	17	**E**	P	Yedikule Gashouse	24	**C**	E
Ümraniye 1	17	**E**	N/A	Ortaköy Pharmaceutical Plant	21	**C**	E
Pendik 2	10	**E**	P	Beykoz Glass Factory	19	**C**	N/A
Haznedar Brick Factory	21	**P**	E	Beykoz Shoe Factory	17	**C**	N/A
Avcılar	20	**P**	E	Beykoz Distillery	17	**C**	N/A
Bağcılar 2	20	**P**	E	Beykoz Rope Factory	15	**C**	N/A
Beykoz Brick Factory	19	**P**	N/A				

E: Entrepreneurial Strategies **C:** Creative Strategies **P:** Progressive Strategies

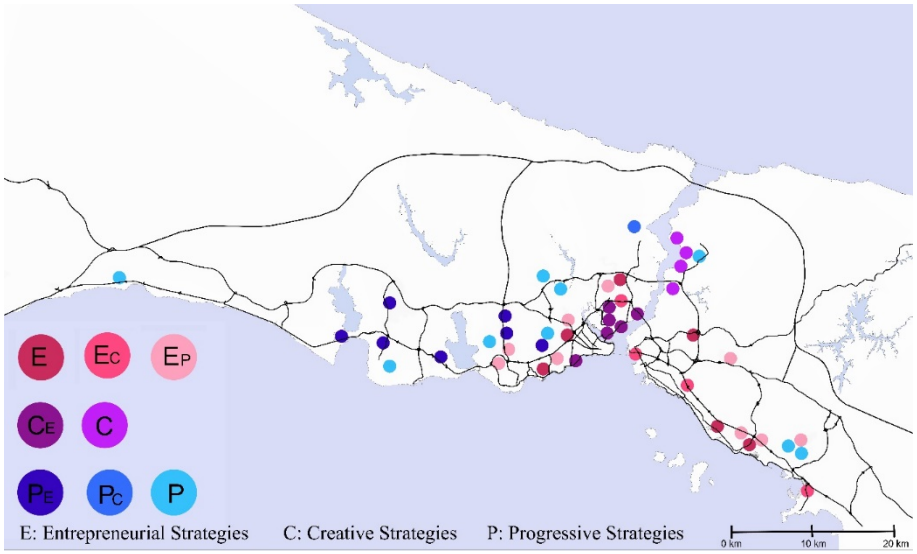

Figure 5. Classification of industrial sites that bear transformation potential in İstanbul within the scope of cultural development strategies

DISCUSSION AND CONCLUSION

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Since the mid-20th century, “culture” has been acknowledged as a significant theme in the urban transformation and revitalization programs aimed at protecting and reinforcing the character of cities, improving local economies, and ensuring a creative management. The emergence of a global service-based economy has placed culture in the heart of urban development and highlighted the economic value of culture in this process (Banks and O'Connor, 2017). This is an indication of the fact that culture industries and the creative workforce gain prominence each day. In this respect, the role of planners is to be involved in the urban development and the decision-making processes, to take lessons from past success and failures, and to promote “cultural planning” in various phases of spatial planning. However, cases where cultural activities in cities are used as a tool to market the city to consumers, tourists, and prospective investors or to support urban transformation should be handled deliberately (Degen and Gacia, 2012). As Kunzmann (2004) suggests, cultural activities should not be promoted at the expense of losing the local cultural environment. This may indeed easily lead to damages in the unique culture of a city as well as the forfeit of the informative and illuminating character of a city.

This study is focused on industrial sites that remain idle or that may be transformed, thus proving to be a potential for the proliferation of culture industries worldwide. It presents an approach to how a culture-led urban transformation scenario may be formulated within the scope of cultural development strategies (entrepreneurial, creative, progressive strategies) for the regeneration of the brownfields and the industrial sites that may be transformed in İstanbul.

According to the research, cultural projects and programs developed in line with entrepreneurial and creative class strategies are rather focused on old city centres and historic neighborhoods, and they bear a real-estate-oriented nature, thus departing away from the principle of public interest. In addition, it is well known that such strategies trigger gentrification in the project site and/or its vicinity; therefore, former residents of the project site who can no longer afford the escalating property values are forced to relocate (Grodach, O'Connor, and Gibson, 2017; Niu, Lau, Shen and Lau, 2018, p.516; Degen and Garcia, 2012, p.10-11). Consequently, it is possible to suggest that project sites that may be the subject of entrepreneurial and creative class strategies are vulnerable when it comes to the sustainability of the social structure. Progressive strategies, on the other hand, entail a rather fair distribution of the economic advantages to all segments of society, and they are the primary approach adopted in this study. Progressive strategies seek to ensure a just redistribution of the value generated as a consequence of culture-led transformation projects. The results of the surveys conducted by Grodach and Loukaitou-Sideris (2007) in order to understand the local cultural development strategies also indicate that local governments and the private sector share the same perspective. Grodach and Loukaitou-Sideris drew the conclusion that all three

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models have been utilized in the cities they analyzed, while further attention was given to entrepreneurial strategies. On the other hand, it was observed that cities where creative and progressive strategies are adopted have a bigger budget and are already prominent with their cultural strategies.

The present study demonstrates the strategic approaches that may be formulated for brownfields and industrial heritage sites in İstanbul with reference to the analytical evaluation of the spatial preferences of the three approaches mentioned above (Table 7). The primary purpose in doing so is to stay one step ahead to ensure that planners formulate balanced policies between the culture consumed in the global system and the local culture and to formulate plans and programs that consider public interest to shape the dispositions of the private sector. It is apparent that addressing idle industrial heritage sites or brownfields merely with entrepreneurial strategies poses great risk. New functions informed by creative industries and progressive policies may indeed contribute to the development of the cultural infrastructure in a city.

According to the analysis performed in scope of the present study, the researchers suggest that 45 brownfields in İstanbul are appropriate for culture-led transformation scenarios. Without question, this study does not indicate that all 45 sites should be transformed in scope of cultural development policies. However, emphasis is put on the fact that these sites may be evaluated in scope of cultural development policies, and further explanation is provided on those strategies that may be considered with priority. Accordingly, the researchers suggest that creative strategies should be developed in Fatih, Beyoğlu, Beşiktaş, and Beykoz districts, entrepreneurial strategies should be formulated in Kartal, Maltepe, Tuzla, Ümraniye, Şişli, and Zeytinburnu districts, and progressive strategies should be created in Kurtköy, Sultangazi, Bayrampaşa, Küçükcekmece, Beylikdüzü, and Silivri districts. In addition, an alternative development scenario is provided for each site. Bu doing so, entrepreneurial strategies that may prove to be an economic attraction for the city, creative strategies that present value in the competition between cities, and progressive strategies that may help improve the social-spatial infrastructure of the city may be thoroughly discussed in respect to the planning process in İstanbul. When planning for the future, handling project sites with reference to cultural development strategies is critical for local economic development and quality of life. On the other hand, addressing transformation sites with an entrepreneurial perspective to ensure the highest return leads to missed opportunities that would otherwise enable competitive advantage and social quality of life for creative industries at the global scale.

Future urban issues and new economic crisis that may accompany the rapid economic return ensured by the quick marketing of urban culture, which lies beneath the decision to opt for entrepreneurial approaches, should not be ignored. Cities may face the risk of gentrification due to

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public-private partnerships in which local governments only adopt entrepreneurial and creative class strategies. Progressive approaches not only provide employment opportunities but also enable urban citizens to contribute to culture and art. Based on the experiences in cities (such as Barcelona, Tampere, Dortmund, Nollendorf, Essen, Helsinki, Birmingham, and Beijing) where transformation scenarios were realized by means of progressive strategies (Degen and Gacia, 2012; Niu, Lau, Shen and Lau, 2018) such contributions can be summarized as follows:

- Ensuring the active involvement of the representatives of civil society in the strategic planning process,
- Including iconic buildings in the cultural heritage listing in order to preserve the industrial heritage and memory on the site,
- Integrating industrial sites with the city centre in terms of function, traffic, and urban design,
- Making investments aimed at creating public spaces while preserving the former urban fabric,
- Increasing the appeal of the industrial site for economic, commercial, and non-commercial activities, and enabling marketing and branding by means of the built environment,
- Creating an inspiring environment that hosts all kinds of activities intrinsic to the city centre,
- Ensuring that a diverse cultural environment is part of the everyday life of the city's residents,
- Improving access to culture by creating a robust social and cultural infrastructure to meet the social needs of the local community,
- Mobilizing cultural energy to create a vibrant local economy, and socioeconomic improvement.

Brownfields and industrial heritage sites that bear the potential for culture-led transformation should be addressed within a corporate and regulatory context to eliminate the social and economic inequalities in the urban space. It is suggested that cultural actors involved at the local scale should concentrate on progressive strategies that revolve around the interests and efforts of the citizens of the city. It is also necessary to highlight the importance of the existence of regulatory and supervisory authorities in such an approach.

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1. The unpublished first version of this study was presented in the 21. Urban Design and Applications Symposium as an oral presentation. In this latest version of the study, the literature review, the database, and the fieldwork were accordingly updated and revised.

2. Florida (2003:8) divides creative class into two groups: "Super-Creative Core" and "Creative Professionals." The Super-Creative Core includes scientists, engineers, university professors, poets and novelists,

artists, actors, designers and architects as well as the leaders of modern society, science fiction writers, editors, cultural figures, analysts, and opinion makers.

3. According to TÜİK data, the share of employment in the manufacturing industry makes up 31.5% of the total employment in İstanbul in 2018 (İŞKUR, 2018: 29).

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CONFLICT OF INTEREST

No conflict of interest was declared by the authors.

ETHICS COMMITTEE APPROVAL

Ethics committee approval was not required for this article.

LEGAL PUBLIC/PRIVATE PERMISSIONS

In this research, the necessary permissions were obtained from the relevant participants (individuals, institutions, and organizations) during the survey and in-depth interviews.

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