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Not impossible
Editorial

Aliye Ahu AKGÜN • *Editor*

Global challenges such as climate change, COVID-19 and natural disasters remind us how deep the sorrows we feel can be and how nature is warning us for the sake and future of our world.

Although for centuries we are talking about sustainability and continuity of things, we, humans, do not hold back from exceeding the carrying capacity without increasing the resistance of the world.

More than ever, we are focusing on resilient cities and looking for solutions even if small. Due to our endless desires and changing behaviours, what makes space attractive is changing and we are still trying to find our place in the world away from cluttered cities, with attention on the warning of the mother nature.

We the scientists and decision makers have a lot of responsibilities on such challenges. We should hear and listen to nature as well as our community in a holistic manner. From now on, we must ensure ways to benefit from these circumstances. It is not easy but it is not impossible either.

In this issue you will find papers on a great variety of topics.

We are excited about a call for papers for a Special Issue: New Horizons edited by Prof. Dr. Ayşe Şentürer and Prof. Dr. Belkıs Uluoğlu. We will be accepting papers starting from March until August 2023. The motivation of the call is to promote theoretical studies on architecture and architectural design. The guest editors are looking forward to receive works which involve fresh and unique ways of looking at longstanding issues of architecture, alternative approaches to architectural thinking and making, situated practices, specific knowledge in architectural design, and ground-breaking research inviting papers which specifically address issues that will shape the future. Please follow the call on the AZ Journal website and consider submitting work.

Enjoy reading our new issue!

Stay safe!

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Transforming perception of space in the pandemic agenda: From real space to virtual space

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Abstract
Due to the COVID-19, a lot has changed regarding daily routines. Homes have become an extension of the public sphere. Because of the pandemic, people's daily roles have moved mainly into the home via the internet and this shift has created a new multi-role situation. Within the scope of the study, an online semi-structured interview was conducted to examine people's experiences of the new representations of the house. The findings in this case study were evaluated with the literature and discussed under these headings: representation of self and representation of space. The study showed that; house, as the new representation space, has become a part of the social identity shared with the public. Objects seen by the camera served as an indicator of self-representation. The privacy of the home was disturbed by the host of the public. The house has become a place where many identities have to exist together. Interviews show that the home's effect on representation cannot be denied. The house is now both a private and a public space, hosting many formal and informal activities. Moreover, while at home, many personal and spatial representations have been transferred to the virtual world. The COVID-19 pandemic has made the home a part of the public space. However, the house is not designed to function as a public space and acts as an insufficient representation of self and place. If daily life continues with a focus on home, the house should be redesigned by the new representations it hosts.

Keywords
COVID-19 pandemic, Online representation, Representation of self, Representation of space.

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1. Introduction

The COVID-19 pandemic has required mandatory stay-at-home measures to prevent the transmission of the virus. As Garber (2020) points out, people have had to perform many actions that are part of their everyday lives, such as work, education, and entertainment, at home during the pandemic. Many places, activities, and responsibilities in daily life have been moved to the house, and the roles that the house represents have changed. In particular, the transfer of public roles to the house has transformed the private space into a multi-identity space. In this study, the effects of the house's new roles on the daily life of individuals during the COVID-19 pandemic process are discussed through the concept of representation. Representation has been handled under two main headings; the representation of self and the representation of space. The representation of the self is examined concerning the subjects: identity and social identity, object-oriented representation, privacy at home online, and roles fit into the home. On the other hand, the representation of the space is discussed under the following headings: public vs. private, home as formal and informal space, and social practices in real and virtual space. The fact that a single physical space hosts these contrasts requires the idealization of the space. The execution of daily roles through online platforms spread by the pandemic is examined through the example of Zoom, which is a virtual space.

As a result of the forced stay at home with the COVID-19 pandemic measures, the new roles represented at home were examined. New personal and spatial arrangements are required when it is only necessary to display the social role that the person represents in the real and representative spaces. This situation causes a differentiation by creating an effect on the person's daily life, social identity, social relations, and spatial meanings. Within the scope of the research, how the meaning shift experienced in space due to the lockdown is reflected in the representation of self and space has been revealed with a case study based on the findings of the literature study.

Individuals reveal different identities as the necessity of their various roles in their daily lives. The self and identity are dynamic mechanisms that can exist in situated activity by interacting with society (Blumer, 1986). Like the change of the activity, the transformation of the place is also effective for realizing the identity change. However, the compulsory stay at home required by the pandemic necessitated bringing different identities to the house with the moving of various activities related to daily life. For this reason, in order to meet the requirements of the role, it is necessary to shape the environment (Hogg, 2006), namely the home environment, by shaping the interactions. In this way, as Goffman (1959/2020) points out, the role is idealized by highlighting the usual actions and hiding the unusual ones so that the audience believes in the reality of the role. Since the individual, who spends most of the day at home, has to exhibit his daily activities and thus his different social identities at home without making any spatial changes, the requirements of these social roles are intertwined.

Transferring the roles of different public spaces to the house has led to a re-questioning of the house's meaning. The house, which does not already have a definite and unchanging meaning (Altan, 1993), has gained new meanings, including contrast with the effect of new roles. The necessity of staying at home, which the COVID-19 pandemic requires, has required a large part of the requirements of daily life to be moved home with digital platforms. This situation causes the house to exist as a virtual place in the individual's life, where the individual's physical existence and the requirements beyond the defined boundaries are fulfilled. Van Bavel et al. (2020) consider that social platforms become a part of the house through the change in the daily living standards of individuals in the home and express that the regular use of space has differentiated and gained new meanings, while in this global crisis, the differentiation of physical, social, and individual uses become a current issue.

2. Method

This study prefers a case study to test the literature findings in real-life situations. This practice helped to get rich and detailed answers from participants by creating a multilateral conversation environment. The case study included fifteen people (eleven women and four men). The main common feature of all participants was that they had to maintain more than one of their daily life roles, especially the formal ones, at home due to the pandemic. The data saturation for the research, as the participants had different characteristics such as various profiles in sharing a house, different family dynamics, and having children or pets. In addition, all participants who are active in both business and education have the financial standards to make appropriations in the place they live (see Table 1). These differences effectively shaped the behaviors and problems of the participants regarding the pandemic agenda. Thus, rich data was obtained by detecting similar and different patterns between participants' behaviors with varying characteristics in the research. The participants consist of people who teach or get education in university and those who have/are having postgraduate education. Moreover, two research coordinators participated in the group interview as facilitators. Since the research coordinators had a profile compatible with the interviewed group, the data they provided was also included in the research outputs without dominance compared to the others.

At the time of the case study, the COVID-19 pandemic was ongoing. During the study, where the participants lived, curfew restrictions were applied in Turkey (Koronavirüs ile Mücadele, 2020). For this reason, all participants attend the interview online from their homes. All participants' cameras were active voluntarily, which helped observe their behaviors and mimics during the interview and include them in the research.

A semi-structured interview was constructed in line with the findings obtained from the literature review and structured in two main parts: the presentation of the self and the presenta-

Table 1. *Participant profile.*

Participant	*Gender*	*Age*	*Share the house with who?*	*Significant issues*
P1	F	41	Spouse, child (1 yo), dog	lack of borders for family attention to camera frame structuring social identity (clothing and manner)
P2	M	28	Cousin, roommate	privacy concerns attention to camera frame concern of external stimulus
P3	F	32	Spouse, son (1 yo), parent (mother)	lack of borders for family conflict between private and public (on the preference of technologic device)
P4	F	26	Parents (mother and father)	attention to camera frame structuring social identity (object and accessory pereference) conflict between private and public (on spatial preferences)
P5	F	26	Roommate	attention to camera frame conflict between private and public (on spatial preferences)
P6	F	26	Alone	attention to camera frame conflict between private and public (on spatial preferences)
P7	F	29	Alone	attention to camera frame conflict between private and public (on spatial preferences)
P8	F	33	Spouse, child (2 yo)	structuring social identity (clothing and accessory pereference) conflict between private and public (on the preference of technologic device)
P9	M	28	Parents (mother and father)	attention to camera frame persistance to maintain face-to-face practices
P10	M	27	Alone	disturbance from the interface of online meeting platform staring at himself (on screen) network connection problems
P11	F	27	Parents (mother and father)	conflict between private and public (on spatial preference)
P12	M	46	Spouse, child (1 yo), dog	persistance to maintain face-to-face practices
P13	F	33	Boyfriend, dog	attention to camera frame concern of external stimulus (by her dog) checking the spatial appearance on cam
P14	F	27	Parent (mother), dog	attention to camera frame checking her own appearance
P15	F	28	Parent (mother)	privacy concerns attention to camera frame structuring social identity (clothing preference) concern of external stimulus

tion of the space. Before the interview, the outputs of the literature research were briefly shared with the participants. Open-ended questions about conducting daily routines and roles were asked to the participants to create dialogues that aimed to trigger participants to share their experiences. Roles, interpersonal interactions, preparation, and planning processes for online meetings constitute the scope of these questions. After the interview transcription, the content analysis provided the significant issues column in Table 1, and the interview outputs were ordered systematically. The interview outputs were confirmed with the relevant literature and discussed under the following headings: representation of self; identity and social identity, object-oriented representation, privacy at home online, roles fit into the home; and representation of space; public vs. private, home as both formal and informal space, social practices in real and virtual space. Various constructs from the literature findings and the related narratives of the participants were compiled under the determined subject headings and presented in Table 2 and Table 3.

3. Findings and implications

In this part of the study, literature findings are presented by matching the narratives from the case study. As Krippendorff & Butter (2007) state, narratives shape meanings and reveal all the purposes associated with the artifact, as well as its use. In addition to the most mentioned and most striking participant narratives, narratives supported by other participants were also included in this study. The goal of sharing these narratives is to show how the COVID-19 quarantine affected participants' representations of identity and space at home. Situations affecting personal and spatial representation, such as domestic relations, attitude towards external stimuli, privacy concerns, technical failures, or longing for old habits, are listed in Table 1, where significant issues of the participants are listed. Understanding the reflections of the theories in daily life associated with the representation of self and the representation of space was aimed at handling theoric frames with narratives.

3.1. Representation of self

Individuals want to present their life statuses and experiences to create a positive image (Munar, 2010). As long as the role people are trying to qualify (Goffman, 1959/2020) and the way people present themselves are common, this is perceived as their true self. Although the representation of the self is a familiar concept for individuals when the change of space supports it, the transfer of social roles to the home via online platforms due to Covid 19 has caused differences in how individuals represent themselves. De Beauvoir (1953/1993) refers to some visible and invisible handcuffs worn on the body to maintain social roles. Some participants mentioned how they use headbands, earrings, or necklaces to be seen in online meetings, confirming this.

> "I have started to use a headband or earrings a lot. Because they are the only things that can be seen on camera to show my style." (P4)

Video meetings have become mandatory and caused people to see each other in real-time and engage in simultaneous dialogues, increasing their concerns about external appearance (Pfund et al., 2020). As seen in the narratives below, this increased activity online has forced people to pay more attention to their appearance on the screen and even the appearance of their background.

> "I am very careful about what I show on the screen. I always feel that I am trying to make an inference about people from the background I see." (P2)

Furthermore, when people play a role, they expect observers to take the performance seriously (Goffman, 1959/2020). Munar (2010) states that individuals find different ways to present and portray themselves and their virtual identities by using digital platforms and communication tools provided by technology. However, monitoring all of these presentations via these digital tools is hardly possible, as exemplified below.

> "I wear a blouse, but there are sweatpants underneath. I think, this semester, I attended almost every class with

pajamas or sweatpants." (P13)

"As long as above chest level looks acceptable, I can attend class. My top changes to a dress shirt if there are more formal meetings." (P1)

However, in today's conditions, the virtual identities of individuals and their real identities are intertwined due to the fact that online communication has become a necessity to carry out daily life, and many roles are carried out from home. This situation is evident in an online business meeting at home, a class attended by a student, or a teacher. Individuals' self-representations in the home and their self-representations in their social roles outside the home had to meet in a single context. In this case, the main factor that distinguishes between roles is whether to be online or not and whether the camera or microphone is turned on.

In this study, the presentation of self on online platforms is discussed under the titles of identity and social identity, object-oriented representation, privacy at home online, and roles fit into the home (Table 2).

Table 2. *Representation of self.*

REPRESENTATION OF SELF		
Keywords	*Author Reference*	*Related Narratives*
performans according to observer, performing a role seriously	Goffman, 1959/2020	*"As long as above chest level looks acceptable, I can attend class." (P1)*
possitive display of self, portraying/presenting self, building virtual identities	Munar, 2010	*"I have started to use a headband or earrings a lot. Because they are the only things that can be seen on camera to show my style." (P4)*
gender, social roles, feminizm	De Beauvoir, 1953/1993	*"That's what I did (referring to another participant who says she wears lipstick at meetings) and I even wore a necklace. I'm not sure if it's visible now though." (P15)*
online appearance concerns, simultaneous comparison between appearances, real-time viewing	Pfund et al., 2020	*"I am very careful about what I show on the screen. I always feel that I am trying to make an inference about people from the background I see." (P2)*
Identity and Social Identity		
self as a dynamic mechanism	Blumer, 1986	*"I try to dress formally in the classes I will be presenting, but I do not care at all in other classes I attend." (P2)*
multidimensional structure of self, contemporary identity, 'on-line' self-concepts	Fisher et al., 2016	*"There is always someone who takes care of my child at home. But because my son knows where I lecture, he usually comes outside the door and cries or bangs the door." (P3)*
positive image of self	Gal et al., 2005	*"I open the camera on the computer and see if my hair is crooked or my glasses are straight before turning it on for zoom meeting." (P5)*
social identity, identity as subset of self-concept	Owens, 2006	*"People try to maintain that corporate identity in the environment they work, even while working from home." (P9)*
multitude of possible selves	Prus, 1997	*"There are many other things we are currently responsible for or dealing with outside of this online session." (P13)*
manipulating the environment, shaping interactions, expectations of the role	Stets & Burke, 2000	*"When we work from home, the employer expects me to do any job at all hours. It wasn't like that in the office." (P9)*
self-esteem and commitment (psychological), self-categorization	Ellemers & Van Knippenberg, 1997	*"I wear a shirt to formal meetings, even online ones." (P12)*
dominant identity according to situation change, social identity umbrella, integrated social identity approach, ingroup and intergroup relations	Hogg, 2006	*"I try to dress relatively more formally when participating in a class I lecture/assist. However, I don't mind wearing a t-shirt or a sweatshirt while attending a class as a student." (P15)*
multiple self categories, self categorization theory	Reynolds, 2006	*"My students are embarrassed when their siblings enter the room while they are in class." (P3)*
Social identity, self-concept, self-categorization theory	Turner et al., 2012	*"When I was at the online university meeting with my students, there were parents waving in the frame. Students show that they are uncomfortable with this." (P13)*
self as an reflexive object	Turner et al.,1987	*"I wear a headband and earrings as they will show up on camera to show my style." (P4)*
Object-Oriented Representation		
boundary objects, new product development	Carlile, 2002	*"I think this object (mug) also says something about me, so I usually prefer it because it's a very plain and simple mug." (P13)*
boundary object, expression of social status, creating identities	Gal et al., 2005	*"I live with my family now. My mother's mugs and kitchen utensils have traditional patterns with lots of red roses. I'm a little embarrassed to drink with them." (P4)*
product choice as self-expressions, object to reflect/form the image of the individual	Norman, 2004	*"I have the same mug with a broken edge, I never use it in meetings so that it will not be seen." (P1)*

Table 2 (continue). *Representation of self.*

Privacy at Home Online		
zoom, sharing information on zoom, online privacy	Aiken, 2020	*"How far can we control the inside and outside of that frame, our image, the other people we share the environment with? It's completely out of our control if someone shares our image without our knowing it." (P1)*
data privacy, digital media functions	Auxemery, 2021	*"A student of mine took a screenshot while my son was on my lap in the online class and asked permission to share it on Twitter. I don't find it legal, the possibility of sharing what is private for me outside of my control creates a feeling of threat and harassment." (P12)*
data privacy, data-centric service economy	Chang et el., 2018	*"I bought a webcam cover with the concern of whether my camera was left open. Now I'm not sure about the microphone. Did I turn it off? I turned it off but can I still be heard?" (P15)*
privacy by design, digital connection, digital surveillance	Langheinrich, 2001	*"I have set up this background thinking about the possibility of it being shared somewhere without my knowledge and consent. It should not contain anything about me." (P15)*
personal space as a cognitive construct, stress level, mediating space	Evans & Howard, 1973	*"Look at the transition between private space and public space. What a fine line to be investigated." (P1)*
contemporary privacy crisis, online everyday activities, more online and the surveillance-aware world, technological affordances of privacy ideologies	Young, 2021	*"In the recorded sessions, it is possible for irrelevant people to watch, except for the standard participants. We don't know who we open to our homes, we can't control it." (P15)*
Roles Fit Into The Home		
variable boundaries along physical, behavioral, and psychological dimensions	Allen et al., 2014	*"A piece of paper with my deadlines hangs on the wall in the right corner. It catches my eye during the meetings, and I get distracted. The stimuli in the space differ a lot." (P15)*
boundary theory, permeability of home-work boundaries, salience of home role identity	Capitanoa & Greenhaus, 2018	*"I usually call my friends in my own room, but I moved my desktop computer to the living room for lessons. This is a very clear distinction for me." (P2)*
transitions between work and family roles, distractions while working at home	Desrochers et al., 2005	*"When I hear the sound of the door key, I turn off my microphone and shout that I am in class." (P2)*
different social words, management of one's presentation, seperation of roles and logic	Fisher et al., 2016	*"My mother said, I always wanted to watch you lecture; now at least I can come to the door and listen." (P15)*
permeability of the home role boundary for employees	Kreiner et al., 2009	*"When strangers come to our home, we advise them to be quiet." (P1)*
adaptation to different roles, multidimentional virtual identity	Munar, 2010	*"I try to foresee things like cargo, guests, orders, or my son's sleep time more than before. Trying to anticipate these as much as possible and adjust the hours accordingly." (P1)*
work and nonwork activities, work and family balance	Spieler et al., 2018	*"(Even I'm at home) there is always someone who takes care of my child at home, my mother or someone else." (P3)*
switching roles, fulfilling expectations	Wong et al.,2020	*"During a meeting, I feel that if the other person does not have a child, a dog, or any other household responsibilities that need to be taken care of, they cannot empathize with me." (P13)*

3.1.1. Identity and social identity

Self and identity are dynamic processes that emerge in interaction with others and must be understood within a community (Blumer, 1986). Prus (1997) argues that a multitude of people's identities and identities emerge because of an unlimited set of possibilities that arise in social interactions. He also exemplifies these possibilities with contrasting expressions such as helping or asking for help, integrated or isolated. During the pandemic period, when people maintain a significant part of their life flows through online platforms, the transition between identities takes place quickly without needing a spatial change. The "self" is not indivisible because people engage in multiple activities and interactions (Fisher, 2016).

Social identity, which is associated with the emotional, evaluative, and psychological state within the group (Turner et al., 1987), is addressed as self-esteem (evaluative) and commitment (psychological) in the perspective of the self-categorization component (Ellemers & Van Knippenberg, 1997). According to Hogg's (2006) definition, social identity theory is a social psychological analysis of the role of self-perception in group processes and intergroup relations, including many interrelated sub-theories and concepts.

Social identity theory argues that predominantly people try to perpetuate a positive image of their identity (Gal et al., 2005). Hogg (2006) states that the social identity approach is an integrated approach that can be analyzed under a single social identity umbrella, which includes the person's self-categorization, social influence, cohesion, and motivation within the group.

Carrying the identity required by a role necessitates meeting the requirements of the role and interacting with others in the same context, and even manipulating the environment (Stets & Burke, 2000). In the narrative below, it is noteworthy that the participants made plans and spatial arrangements to suspend their social identity of home life for a while in order to maintain their social identity of business life and fulfill their responsibilities, and prevent their home/family responsibilities from overlapping with their work responsibilities.

> "There is always someone who takes care of my child at home, my mother or someone else. But my son knows where I lecture; he usually comes outside the door and cries or bangs the door." (P3)

Changing the context and situation causes the individual's identity and expression of identity to change (Hogg, 2006). Accordingly, differentiation can be seen in people's appearance preferences, and this preference can be determined through people's clothing, as stated in the following narratives.

> "I try to dress relatively more formally when participating in a class I lecture/assist. However, I do not mind wearing a t-shirt or a sweatshirt while attending a class as a student." (P15)
>
> "I try to dress formally in the classes I will be presenting, but I do not care at all in other classes I attend." (P2)

As in the narratives above, although there was no spatial change according to the different social identities of the individuals in the online meetings, there were differences in their external appearance and clothing preferences. According to this, online meetings can be defined as an area where identity changes, even if the spatial context does not change.

3.1.2. Object oriented representation

In addition to being used to express belonging, boundary objects are also used as a tool to reveal social identities (Gal et al., 2005). Based on the narratives below, it has been determined that objects used to meet daily personal needs, such as drinking water or coffee in online meetings, where limited visual space is used to represent social identity, are used as boundary objects that convey social identity.

> "I live with my family now. My mother's mugs and kitchen utensils have traditional patterns with lots of red roses. I am a little embarrassed to drink with them. I mean, I do not use it."
>
> "I think this object (mug) also says something about me, so I usually prefer it because it is a very plain and simple mug."

Interview participants stated that the objects appearing on the screen give information about them. Therefore they avoid using objects that will indicate an identity they do not want to reflect. In order not to create different impressions in the new digital space, where individuals see each other only online, and to give information about themselves as they want, the objects they choose have unique qualities. Since the objects appearing on the screen constitute one of the limited areas where an idea about the character of the person can be obtained, the selection of these objects is made more carefully. In line with the references from the data provided by the participants from the interview, the "mug" is read as a representation tool. Individuals' product choices, even where and how they live and behave, are strong self-expressions based on conscious or subconscious reasons (Norman, 2004). In this research, "mug" exemplifies an object that reflects and forms the image of the individual and how others perceive this image, as stated by Norman (2004). This object is also an ideal exemplification for the representation of identity and social identity in a virtual platform.

3.1.3. Privacy at home online

Data privacy is one of the essential factors in the service economy where businesses want to access customer data (Chang et al., 2018). Although data privacy is mainly associated with online commerce and services, many responsibilities and interactions have been moved to online platforms with the obligations brought by the pandemic. For this reason, privacy has come into people's lives with unknowns and concerns that did not exist in the past, as seen in the following narrative.

> "Look at the transition between private space and public space. What a fine line to be investigated." (P1)

As seen in the above statement, in an environment where the distinction between private and public life is blurred, and business life is carried out online, employees are concerned about exhibiting behaviors that will be deemed wrong by their employers and sanctions to be applied for this reason.

Auxemery (2021) states that due to the penetration of technology into all areas of life, user information is made public on platforms where information is shared for purposes such as work, friendship, hobby, and users' data no longer belong to them. On the other hand, on platforms where cameras and microphones are also turned on, where there is simultaneous interaction, too much information about the users is transferred to other individuals involved in the interaction in such a way that the user cannot have complete control over it.

Personal space is a tool and cognitive structure that enables people to work under a reasonable level of stress and minimize interpersonal conflict (Evans & Howard, 1973). One of the most important reasons why the issue of privacy has turned into a problem and puts pressure on individuals is that people have difficulty determining the boundaries of their personal spaces in online meetings and are not sure that they can fully control the technological tools in these meetings as mentioned by the participant below.

> "I bought a webcam cover with the concern of whether my camera was left open. Now I'm not sure about the microphone. Did I turn it off? I turned it off but can I still be heard?" (P15)

The participants' statements reveal frequent concerns that their cameras and microphones are accidentally left on during or after online meetings, and people try to find solutions to these problems. There are concerns that as a result of using online video calling tools for purposes like business, family, and friend meetings, may be a source for blackmail, sabotage, and hacking by hosting conversations involving privacy, belief, and political views. (Aiken, 2020). These concerns enable online meeting platforms to re-question and reconfigure privacy and make privacy visible as a crisis, making the world more susceptible to online interaction and surveillance (Young, 2021).

3.1.4. Roles fit into the home

With the COVID-19 lockdowns, not only the social spaces but also the roles displayed in these spaces have been moved to the house. The representation of different spaces of the house causes the responsibilities associated with the house to affect this representation from time to time. Different representations of the home also impact the way of communication between people sharing the same space, home. People who work from home can efficiently switch from one role to another and fulfill expectations of these roles (both work and family) easier than people who work at the office (Wong et al., 2020).

> "There is always someone who takes care of my child at home, my mother or someone else. But because he knows where I teach, he usually comes outside the door crying or scratching and hitting." (P3)

As in the narrative above, the fact that the mother has a new role in the home that she did not have before caused her child to recognize this new role and develop a relevant response to it. Studies show role blurring is not just related to the frequency of home distractions disrupting work when working at home (Desrochers et al., 2005) but also to a more significant number of transitions between work and family roles (Desrochers et al., 2005; Matthews et al., 2010) and variable boundaries along physical, behavioral, and

psychological dimensions (Allen et al., 2014).

Different social worlds require control and management of one's presentation in those worlds to coexist for the self, yet their roles and logic can be kept separate (Fisher et al., 2016). The probability of a visual or auditory intervention during the online meetings brings along issues such as foresight and risk management.

> "I try to foresee more than before. Am I waiting for cargo for the next 3 hours? Will there be guests or orders from outside? My son's sleep time is very important. Anticipating these as much as possible and adjusting the hours accordingly..." (P1)

This possibility of an uncontrolled interruption, as mentioned by a participant above, requires the interviewer to anticipate any movement or sound that may take place at home and affect online communication. It could be the courier knocking on the door, a family member passing by the camera, the sound of electrical appliances, or a guest.

Before COVID-19, since the home was defined as a personal (family) space, an out-of-control division was not a problem. Still, now it is thought that the repetition of this type of behavior - which interrupts online conversations - will cause me to look unprofessional. Another point to be considered when it comes to sharing the space is to make room for oneself in the online world without affecting domestic communication.

3.2. Representation of space

Space comes into being as it is surrounded, captured, molded, and organized by mass elements (Ching, 2014/2016). At the same time, space affects an individual's behavior and who stays in it. Lynch's (1960/2020) argument strongly supports this idea: space emerges as a concrete concept that integrates people and their environment and refers to an area in which a person can perceive physically, determine self-limits, tangible, maintain, and end their own life. It can be deduced from this that space and people can shape and influence each other.

On the other hand, space is perceived differently by its designer, user, and observer and responds to the different expectations of these actors (Sahin & Varli, 2021). As space can have different meanings for different individuals according to their roles, it can also have more than one meaning for a single person. De Certeau (1980/2009), who describes the space as "a place frequented" and "the intersection of moving objects," emphasizes that what adds meaning to space is the sharing and experiences gained in that space. In other words, the meaning and even the function of the space can be shaped depending on the physical components as well as the experiences of the person interacting with space.

With the COVID-19 pandemic and lockdowns, spending a long time at home increased the interaction with the house. In this circumstance, which was distinctive from the usual experiences, the relationship of individuals with the space inevitably changed. In the conditions of COVID-19, many public spaces used in daily life have been replaced by houses. In this situation where there is a meaning shift, the meaning of house, space's perception, or meaning has changed (Sahin & Varli, 2021). Debord (1967/1996) used the definitions of a theater scene, a stage where individuals represent their roles, and a representation space. In today's online situation, these definitions still maintain their effectiveness, and the house is the stage for multiple representations. In that manner, individuals had to create an idealized space scanned by the camera for their roles that did not belong to the home before the pandemic but had to stage it online at home during the pandemic. The change caused by the pandemic in daily life practices has also had an impact on the time individuals spend at home and the roles they perform. In this context, the real and virtual concepts that Konuk (2020) defined through space and society are also intertwined. In other words, the place had to accommodate the contradictions within the situation brought by the pandemic.

These contrasts of the space, which have been discussed over the basic definitions, will be revealed in the fol-

lowing titles: public vs. private, home as both formal and informal spaces, and social practices in real and virtual space (Table 3).

3.2.1. Public vs. private

Evaluating the perception of space only through the part visible from the screen makes the screen a new public space. The fact that there is no border between the public and the personal spaces reveals the need to keep the area scanned by the camera separate from the personal. COVID-19, as a visitor that would not be turned out, had arrived via a Zoom screen, was transmitted via lecturer invitations to see temporalities, objects, and relations as an anthropologist might result in the immediacy of their own homes (Roth et al., 2021). The study revealed that when a person is uncomfortable with sharing about oneself or self possessions, he/she pays attention to his/her choices within the camera angle, as described below.

Table 3. *Representation of space.*

REPRESENTATION OF SPACE		
Keywords / definition	*Author reference*	*short narrative*
changeable meaning of space	Altan, 1993	*"I prefer to sit on the floor in online meetings with my friends. It's like we're gathered at a friend's house and drinking beer." (P4)*
organization of space	Ching, 2014/2016	*"The circulation of people in the house causes me to have the wall behind me during the course." (P5)*
theater scene, a stage where individuals represent their roles, a representation space	Debord, 1967/1996	*"When I am in online meetings, it is difficult to constantly correct myself, check what is visible and what is not, show a large area from my home." (P13)*
space as an intersection of moving objects	De Certeau, 1980/2009	*"Normally, when I sit at my desk, my room is completely visible, but when I started taking classes, I took the wall behind me. Therefore, there is a chair and a table in the middle of the room." (P14)*
intertwining of space and society	Konuk, 2020	*"Sometimes I get off the screen and snack. It would not be appropriate for me to eat in front of you." (P2)*
integrative space, limits of space	Lynch, 1960/2020	*"When I can't set the background when I'm going to the meeting, I get a neat background by going to the window side of the table and closing the curtain behind me." (P15)*
perception of space, actors of space, expectations for the space	Authors, 2021	*"Now, when buying or renting a house, there are many criteria such as where we can make our online meetings, where we can turn into an office." (P3)*
Public vs Private		
house as private space, house as public space	Marcus, 1992	*"How much of my private life should I make public? I have two choices: what to show and what not to show." (P1)*
Covid-19 as an unexpected visitor	Roth et al., 2021	*"We are transforming with the pandemic. Are we being introverts? How will we be after the pandemic is over? It will leave a lasting impact on our lives." (P1)*
house as publicized space, protection of privacy, meaning of the house, perception of space	Authors, 2021	*"I feel like I'm trying to make an inference from that background I see about people... My background is always white because I think I'm being watched too." (P2)*
Home as Both Formal and Informal Space		
multiple identities, different 'face' towards different social worlds	Fisher et al., 2016	*"I'm usually at the dining room table for educational purposes. But when I'm going to have a friendly meeting with friends, I'm online from my room and I don't really care what's behind me." (P5)*
emotions in relation to the home	Guiliani & Feldman, 1993	*"Since I'm at home, I feel a pang of conscience, wondering if I haven't worked hard enough. There is also an expectation by the employer that "you are at home, you can do this but also that". This brings a sense of responsibility and it becomes a state of being on tenterhooks." (P9)*
emotions associated with home, feelings about the places	Marcus, 1995	*"This strange state of loneliness, unhappiness... At least we know that with the pandemic, there is more sharing of loneliness. Are we even more equal in this respect?" (P1)*
Social Practices in Real and Virtual Space		
reshaping urban space by digitalized technologies, interface between real and virtual, real spaces and virtual societies	Konuk, 2020	*"When the pandemic hit, we noticed that our work is our home due to the screen. The house that we used as a hotel in the past has now become the place where we live constantly." (K14)*
digital simulations of working spaces, living spaces as live laboratories	Olgun et al., 2020	*"Even after I have ended the Zoom sessions, I fear that my room or my gestures may be presented to others." (P2)*
virtual space, real space, perception of virtual space	Özen, 2006	*"I honestly didn't like this being online thing because it feels so virtual. I like to get in touch with people face to face." (P2)*

Table 3 (continue). *Representation of space.*

New Definition of Home After Covid-19		
different representations of houses, polysemy of houses	Garber, 2020	*"When I was choosing my house, I decided without thinking that I would move the public spaces here... If I thought, I would prefer a different house... Now, if I choose my living space, I must have a room or a space that I can use for online meetings as well." (P13)*
idealization of performance	Goffman, 1959/2020	*"It is enough to determine a separate Zoom location and take it under control." (P1)*
longer online sessions, multitasking while online	Lowenthal et al., 2020	*"During an online meeting, you may be checking your email, booking a gym class, or even shopping. We can't normally do so many things at once in physical space, but now they can be sustained simultaneously." (P13)*
multiple identities of places	Massey, 1993	*"In new housing advertisements, they say, 'You can turn your house into an office in 5 minutes.' and a separator goes down. All of a sudden, it becomes a ready-made environment with that separator." (P14)*
purpose of Zoom, socializing from home	Yuan, 2020	*"…if I am going to attend an education-related meeting or so, I connect from my computer, but other than that, I always go online from my phone. I also take the phone everywhere." (P8)*

> "I feel like I am trying to make an inference from that background I see about people... My background is always white because I think I am being watched too." (P2)

Unwilling to give information about personal space to others, avoiding sharing private space, and sharing virtual space as much as wanted have changed the definition of the house as a public space and the definition of the public space as a house. As Marcus (1992) indicates, the house is both an interior space that belongs to one's privacy and a public space shown to those who come from outside or are invited. A new digital space has emerged, where daily life and public spaces are reduced to a single space. Therefore, people display themselves as much as they want to present in this new digital space where daily life experiences occur. The house is the publicized space exhibited within the area scanned by the camera; outside this area, it turns into a private space where privacy is protected (Sahin & Varli, 2021). The new digital space reveals a new physical space that is limited to what the camera scans. As the narrative below implies, many people prefer to create a designated area for online conversations and keep it under control.

> "It is enough to identify a zoom location and take control of it." (P1)

In the current situation, the issue of how much of the home -the private- will be publicized is constantly being questioned through the concepts of public space and home. As one participant stated below, the choices made in this direction are constantly reconstructed according to the situation.

> "For me, what can be seen is as important as what is not… How much of my private life should I make public? There is always this questioning. So, I make two choices; what to show and what not to show." (P1)

The blurring border between inside and outside causes not only the new "designated" public space but also the homes as a whole to be questioned again.

3.2.2. Home as both formal and informal space

During the case study, it was noticed that participants unconsciously tend to define online spaces in two different setups: formal and informal. While the time spent in front of the screen with family and friends was considered informal, online meetings such as work and education were considered formal. The required setups for these two formats affect the interior design of the home, as mentioned by participants.

> "I prefer to sit on the floor during a meeting with friends. It's like we're gathered at a friend's house and having a beer. So everyone sits on the floor. In a call with friends, it does not bother me that there is an image from the ground. But in the school meetings, I sit in a higher place." (P4)

> "I am usually at the dining room table for educational purposes. But when I am going to have a friendly meeting with friends, I am online from my room, and I do not really care what is behind me." (P5)

People decide on their representation according to the formality of the meeting in online meetings as well as in physical meetings. As distinct from physical meetings, online meetings, because the place is an essential part of representation, it is also shaped according to the formality of the meeting.

A user has the ability to engage different segments of her life with multiple identities and present a different 'face' towards different social worlds (Fisher et al., 2016). When talking to people with strong social and daily ties, such as friends and family members, the participants do not care much about which part of the house or which self-presented. When it comes to a meeting involving more formal structures such as work or school, the majority of participants stated that they prefer a desk setup. It can be considered that the choice of table/desk use for formal meetings can be the reflection of physical habits of the pre-COVID-19 period.

Another difference between formal and informal interviews comes to the fore in selecting the device to connect to the virtual places. A computer, which is a relatively stable product and requires a fixed layout, is used during formal meetings; during informal meetings, a mobile phone and the freedom it brings are preferred.

> "…if I am going to attend an education-related meeting or so, I connect from my computer, but other than that, I always go online from my phone. I also take the phone everywhere." (P8)

Although the home is associated with positive emotions as a place of refuge, people may develop different feelings about the places they live as a result of painful memories such as domestic violence, death, or divorce (Marcus, 1995). The studies of Guiliani & Feldman (1993) also showed the presence of negative emotions as well as positive emotions concerning the home.

During the pandemic period, the house has become a representative of different negative emotions, with the problems of the public sphere being brought to the house. Workplace or school problems, a bad workout, exam or meeting, and extended working hours are now problems at home.

> "Expectations are changing... There is an expectation that you can do everything 24 hours a day just because you are at home. But normally, when I go to the office, I have a certain check-in and check-out time. When I am at home, sometimes it is 8 pm, and I am still in front of the computer, trying to do work. So the concept of time begins to disappear." (P9)

As this participant emphasized, the perception of working hours, which disappeared in the case of working from home, caused unexpected new negative feelings about the home to emerge.

3.2.3. Social practices in real and virtual space

Computers, tablets, and smartphones have become the new mediums that allow people to join the public sphere. However, what can be achieved is limited by the possibilities provided by these technologies. As expected, they offer easy access to the public space, regardless of time and place. Online meeting platforms provide a democratic environment by offering the same opportunities to all participants. However, the participant with identical conditions in the digital field may not have homogeneous conditions in the physical environment. Housework, the responsibility of children and pets, the sound of construction going on nearby, a mailman appearing at the door, and such factors call the person from the virtual environment where he/she should be to the physical environment where he/she still exists.

> "I sometimes think I neglect my baby... It was especially a bit like that until the first six months. Things like being unable to go to him when he cries." (P1)

As in this case, the same performance cannot be expected from people connected from home to fulfill their public commitments.

Post-COVID relationships require different dynamics due to social distance rules and relationships that have moved online. As stated by the participants, conventional face-to-face communication will inevitably differ in front of the camera.

> "I honestly did not like this being online because it feels so virtual. I like to get in touch with people face to face." (P2)

Digital networks, which are used to keep social relations alive and simulate working spaces away from real places, have transformed these reduced living spaces into live laboratories (Olgun et al., 2020). However, it is impossible to maintain the behavior patterns that we have acquired in real public spaces and achieve the same results in the virtual environment. The new online public also gives birth to different forms of behavior, such as turning off the camera when requested, muting self, or expressing ideas with emojis. Since the virtual space is different from the real space, it consists of different elements and has its own perception, just like the real space (Özen, 2006). Compared to physical meetings, encounters and coincidences decreased in virtual meetings. In the virtual world, everything is more planned.

When the process of reshaping urban space by digitalized technologies is evaluated through the face-to-face communication and interaction of society, cities will be the "new interface" of the relationship between "real spaces" and "virtual societies" (Konuk, 2020). Moreover, the gradually increasing virtual society ties will inevitably affect face-to-face relationships.

4. Conclusion

The COVID-19 virus has taken societies out of the routine of daily life and led them to an unusual new one. This new routine necessitates the conduct of public life activities at home. This change process and new patterns have made people question the changing perception of the house from physical to virtual. In this new order, the internet has become the medium connecting people with public life.

With the relocation of public spaces, the house has become a multi-layered space. Dining tables have turned into meeting tables and school desks, sofas have turned into movie theaters, living rooms have been turned into gyms, and bedrooms have been turned into hospital rooms. On the other hand, as Norman stated (as cited in Garber, 2020), homes are not meant to be lived in 24/7. The factors that affected the lockdown experience were: the size of the house, whether it has an open space (such as a balcony or garden), its interior design, and with whom the house is shared. In addition, our relationships with other individuals with whom the house is shared have also been affected. With the transfer of public space's roles to the house, the house has become a place where multiple roles are exhibited. Today, places, like people, can have multiple identities (Massey, 1993). This approach, which Massey brought forward decades ago, has become more visible with the pandemic. Many roles sharing the same space had to be acted simultaneously. Sometimes family roles overlapped with work roles.

The houses are not designed according to the polysemy required by the pandemic to host different representations (Garber, 2020). Not only homes but also online platforms were not ready for this new order. Yuan (2020), CEO of Zoom application, addressed that they did not design the product with the foresight that every person in the world would suddenly be working, studying, and socializing from home in a matter of weeks.

Since the time spent at home before the COVID-19 outbreak was relatively short, participants stated that they used to prefer houses with low square meters but in a central location. Especially those who work or study used to spend limited time at home. The center-located houses used to have a strong relationship with the public space. Still, the virus has interrupted communication in the public space and has drawn attention to indoor facilities. The physical features of the house, such as daylight, airiness, or heat balance, began to come to the fore. This situation drew attention to the limitations on the use of outdoor space. In particular, the inadequate physical conditions of the homes in metropoles and the lack of individualized outdoor areas such as terraces, balconies, or gardens have also affected the choice of house and location. Participants stated that they prefer settlements far from urban centers and have more open space, a new outcome of the lockdown.

> "When I was choosing my house, I decided without thinking that I would move the public spaces here. If I thought that, I would prefer a different house. Now, if I choose my living space, I must have a room or a space that I can use for online meetings as well." (P13)

The fact that the house hosts many public spaces, such as business space, dining space, sports space, etc., necessitates interior appropriations. The study revealed that more independent workspaces were created at home. The house has begun reconfiguring as a public space to host new representations and social identities.

The different representations of the house impact the relationships in the digital space and how communication occurs between people who share the same house. It has been observed how interviewees use the spaces to reproduce the "self" and space seen from the camera frame to present their identities and roles. This discussion has revealed that the physical space is defined as the camera's frame. It has been observed that people pay more attention to the products used in front of the camera than they pay attention to their clothing, and their appearance, especially in areas where the camera is not scanning. This situation is evaluated through the effort to maintain formal meetings such as work and school "as before," "as in normal times." According to the conceptual framework and the data obtained from the interviews, the fact that physical life cannot be replicated in a digital environment with its whole self and originality reveals personal and environmental effects. Individuals have difficulties revealing their social identities, which they do not have any problems with within physical environments outside the home, online in the home environment, especially when they feel the need to state formality. For the performance of individuals to be close to the ideal, they should be supported by habitual actions, and behaviors that do not comply with the standard should be hidden from sight (Goffman, 1959/2020). Maintaining the usual ideal social identities and roles has become a challenge for individuals in an online space where the environment, conditions, and forms of interaction differ. The limitations of COVID-19, due to the necessity of continuing daily life practices in the online environment, result in differentiation of self-presentations of individuals, meaning shift in spaces and the house gaining importance in the representation of the individual.

The house, seen as a private and personal space, has defined public space in line with the householders' needs. In this context, the definition of public space imposed on the house has changed the expectations and demands of the place of residence. Home has moved away from its usual meaning and usage. The study showed that the home is insufficient at the point of representation.

5. Future implications

Although the intensity of the COVID-19 pandemic and the concerns about it are decreasing over time, its impact on daily life practices will continue. For this reason, this study aims to provide input for the retrospective reading of the change in the meaning shift of the house during COVID-19.

This study, which focused on representation, could provide direction for the expanding roles of the house in COVID-19 or possible future lockdown. In terms of personal and spatial representation, the possible applications for the house to find adequate consideration could be discussed for both virtual and physical spaces. Another issue that needs to be focused on in the lockdown situation, where there is a meaning shift in space, is how to more effectively carry out public practices such as business and education that jointly use online and physical space.

With the study's results in mind, the impact of accessibility to technology on representation and the effect of relations between the individuals who share the house on the representative roles of the house can be used to look more closely at sociological and psychological perspectives.

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Financial model adaptation for building energy efficiency retrofits in Turkey

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Abstract
Energy efficiency (EE) applications in buildings are supported by various financing mechanisms in many countries around the world. However, financial support systems in Turkey, especially in EE applications for residential buildings are quite limited. This research aims to propose a financing system that can be used for energy efficiency improvements of residential buildings in Turkey. The methodological framework of the study is based on literature research with the detailed content analysis. In the first step of the study, implemented or planned financial support systems within the context of energy efficiency are examined and successful case studies presented, especially focusing on Europe where the old building stock is concentrated. In the next step, the current situation in Turkey is examined within the scope of energy efficiency financing. Deficiencies in existing financial support systems and needs have been evaluated. In the third part, a proposal has been made for the financing system which does not include energy efficiency improvements in existing buildings in Turkey, and a financial model adaptation has been made for Turkey's conditions by taking advantage of good practice examples in Europe. While making this adaptation, singular suggestions in the available literature were referred and the obstructions in the current situation were attempted to eliminate with a holistic approach.

Keywords
Building energy efficiency, Energy efficiency financing mechanisms, Energy efficiency stakeholders, Financial model, Turkey.

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1. Introduction

Nowadays, more than half of the world's population lives in cities, and cities are responsible for approximately 70% of CO_2 emissions (International Energy Agency, 2021). Buildings are responsible for approximately 50-70% of emissions in cities and 38% of global emissions (Wei et al., 2021). In the '1.5°C Global Warming' report published by the Intergovernmental Panel on Climate Change (IPCC) in 2018, it is stated that if greenhouse gas emissions continue in their current form global warming will exceed the 1.5°C limits and there is a need for contingency plans to support decarbonization in order not to exceed this limit (IPCC, 2018). In this context, applications for building energy performance improvements have high importance.

Energy efficiency (EE) applications in buildings are supported by various financing mechanisms in many countries around the world. However, financial support systems in Turkey, especially in EE applications for residential buildings are quite limited.

This research aims to propose a financing system that can be used for energy efficiency improvements of residential buildings in Turkey.

In the first step of the study, implemented or planned financial support systems within the context of energy efficiency are examined and successful case studies presented, especially focusing on Europe where the old building stock is concentrated.

In the next step, the current situation in Turkey is examined within the scope of energy efficiency financing. Deficiencies in existing financial support systems and needs have been evaluated. In the third part, a proposal has been made for the financing system which does not include energy efficiency improvements/refurbishments in existing buildings in Turkey, and a financial model adaptation has been made for Turkey's conditions by taking advantage of good practice examples in Europe.

While making this adaptation, singular suggestions in the available literature were referred and the obstructions in the current situation were attempted to eliminate with a holistic approach.

1.1. Energy efficiency financing in the world

The financing of energy efficiency (EE) projects is provided by equity or outsourcing. In equity financing, companies carry out EE projects with their capital without any borrowing or interest. The most frequently used financing type is debt financing and outsourcing of energy efficiency projects is generally evaluated under three headings (Taranto et al., 2020).

1.1.1. Energy efficiency funds

Energy efficiency funds are resources specially created for energy efficiency project investments and provide long-term, low-interest capital financing. Examples of these funds are the Climate Investment Funds (CIF), the Global Energy Efficiency and Renewable Energy Fund (GEEREF), and the European Energy Efficiency Fund (EEEF).

In the report titled Energy Efficiency Solution: Financing Mechanisms, prepared by the SHURA Energy Transition Center in 2020, insufficient resources have been reserved for the funds are mentioned. It has been stated that effective planning of fund structuring and support design is required to respond to the need on a global scale and to provide support in the required term and amounts (Taranto et al., 2020).

1.1.2. Financing with ESCO model

Financing the investment is not the only problem with energy efficiency projects. Technical consultancy services are also needed to encourage investment. In this sense, the ESCO (Energy Service COmpany) model plays a key role in both identifying project needs and financing the project. The companies, which are defined as "energy efficiency consultancy companies that are authorized to carry out energy efficiency services" in the Energy Efficiency Law No. 5627 of the law, are currently Energy efficiency consulting firms (EVD) in Turkey and have emerged with the ESCO concept. The most well-known feature of ESCOs is that they guarantee post-investment energy savings with an energy performance contract (EPC). Energy Performance Contract, as

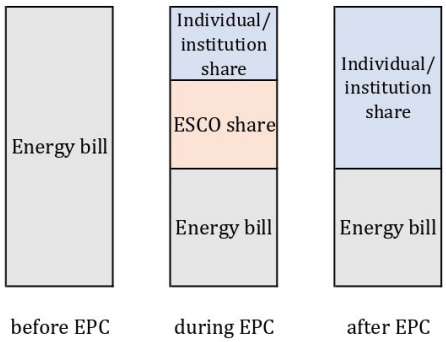

Figure 1. *Financing with ESCO model (Taranto et al., 2020).*

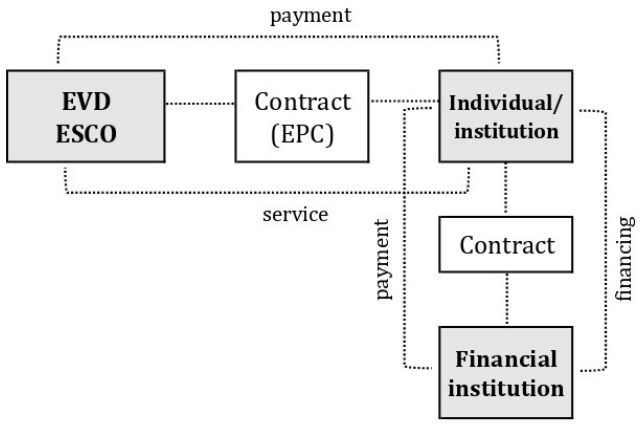

Figure 2. *Guaranteed savings EPC model.*

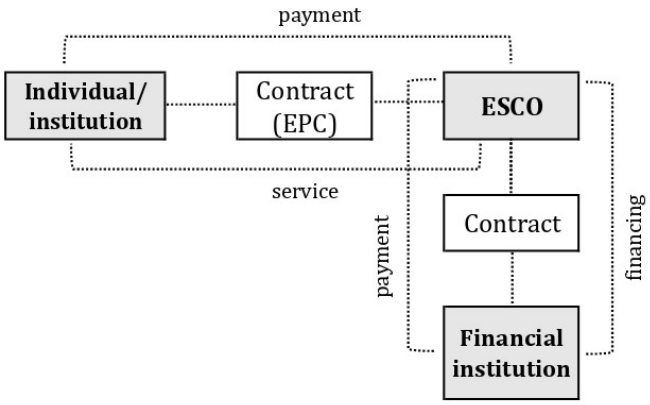

Figure 3. *Shared savings EPC model.*

defined in the law, is a contract based on the principle of "guaranteeing the energy savings to be achieved after the implementation project and paying the expenditures with the savings that will occur as a result of the implementation" (Republic of Turkey Official Gazette, 2007). Accordingly, the institution pays the amount it paid to the energy bill before EPC as a service fee to ESCO for the duration of the contract after the EE investment is made. At the end of the contract term, the amount saved from the energy bill remains with the institution (Figure 1).

Energy Performance Contracts (EPC) made by ESCOs can be of different models (Taranto et al., 2020). The most common models are the guaranteed savings EPC and the shared-savings EPC. In guaranteed savings EPC, the ESCO is responsible for technical risk (guarantees the amount of savings) while the institution assumes the financial risk (Figure 2). This type of contract is often used in emerging ESCO markets. In shared-savings EPC, ESCO assumes both technical and financial risk (Figure 3). This type of contract requires strong ESCO structures.

The stages that ESCO takes part in an EE project can be listed as follows (Taranto et al., 2020):

- Feasibility study for EE project (Determination of baseline energy consumption).
- Transfer of the guaranteed amount of energy savings to the contract (EPC).
- Taking responsibility for the project, engineering, procurement, construction, operation, and energy performance.
- Determining whether the energy saving is realized at the intended level with measurement& verification.
- Making payment if the performance guaranteed following EPC is achieved as a result of the measurement.
- Implementation of sanctions-penalties and the termination process if the guaranteed performance is not achieved.

By the year 2018, the country with the most ESCOs and the largest EPC market in Europe is Germany (EYODER, 2020). In the world countries, China is in the first place and the USA is in the second.

Even ESCOs have technical knowledge for EE project financing, their inability to provide appropriate financing conditions hinders EE applications. Besides, the stakeholders/ institutions in the energy efficiency sector do not trust the ESCO structure negatively affects the situation.

In this context, commissioning of risk-sharing mechanisms that strength-

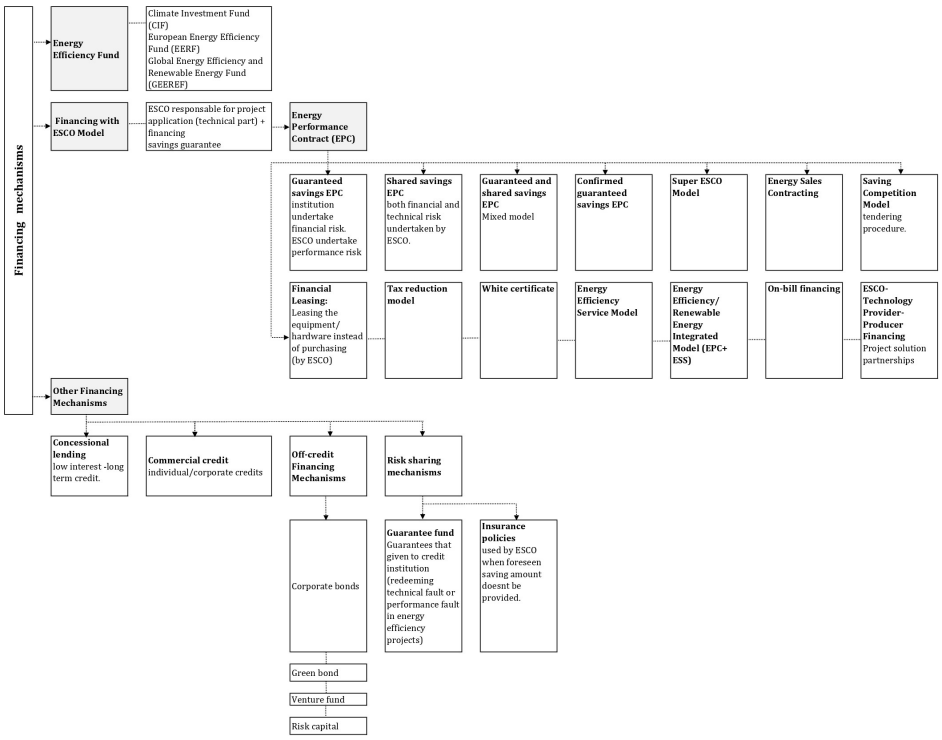

Figure 4. *Energy efficiency financing mechanisms.*

en the financial structure of ESCOs, the improvement of performance contracts in the sense of legal, the authorization and certification of ESCOs by competent bodies to increase confidence in ESCOs, and increasing public financial support systems, concessionary lending and EE funds that can be used by ESCOs are suggested (Taranto et al., 2020).

1.1.3. Other financing mechanisms

In this chapter, concessional lending, commercial loans, non-credit financing mechanisms, and risk-sharing mechanisms are examined. Concessional lending is low-interest and long-term loans provided by financial institutions in line with certain targets and can be provided by International Financial Institutions (IFI) such as the World Bank (WB), European Bank for Reconstruction and Development (EBRD), German Development Bank (kfW). Commercial loans, on the other hand, are individual/corporate loans provided by banks from their resources.

Green bonds, venture and venture capitals are discussed in non-credit financing mechanisms. Green bonds are bonds that are issued to support investments in issues such as sustainability and emission reduction. In venture and venture capital, companies with a new project are initially financed in exchange for shares. Once the project starts generating income, shares are offered to the capital markets or sold to those who want to become partners in the company (Taranto et al., 2020).

Risk-sharing mechanisms are an application to reduce financial costs and reduce credit costs. The most widely used of these mechanisms are public guarantee funds and insurance policies specific to EE projects. Public guarantee funds can be given to institutions that provide loans through international financial institutions. Insurance policies, on the other hand, are generally used by ESCOs and are activated if anticipated savings cannot be achieved. The energy efficiency financing mechanisms used in the world – especially in Europe – are summarized in Figure 4.

1.2. Energy efficiency financing: Case studies

In this part, case studies well accepted as successful in energy efficiency financing in the world are presented. Especially, application examples within the scope of energy efficiency funds and financing with the ESCO model are given.

The Thailand Energy Efficiency Re-

volving Fund (EERF), which is considered a successful application within the scope of the energy efficiency fund, was launched in 2003. The main objective of the EERF was to ensure that commercial banks in Thailand were willing to finance their investment in EE projects. In this context, ESCOs provided training to banks on how to evaluate EE projects and the payback period. The most important factors in the success of the fund have been the easy application and reporting processes, attractive conditions and interest rates, active promotional activities for the fund to be recognized by all banks, and the communication network established between the stakeholders (banks, private investors and ESCO). The government has primarily used EERF to finance tested products and launched it with almost zero risk as it has generated resources from petroleum taxes (Frankfurt School- UNEP Collaborating Center for Climate & Sustainable Energy Finance, 2012).

Another example of a fund, the Spanish National Energy Efficiency Fund (FNEE), was come into force in 2014. The primary objective of the Fund is to contribute to the achievement of the national energy-saving target set by Article 7 of the Building Energy Performance Directive 2012/27/EU (Spain Energy Efficiency & Trends Policies | Spain Profile | ODYSSEE-MURE, n.d.). In FNEE, EE obligations of energy supply companies constitute the source of funding. The fund is managed by an organization under the Ministry of Energy (IDAE), and the revenues from the fund are used in other energy efficiency programs (Taranto et al., 2020).

In France Government Grant, zero-interest loans, tax refunds, and third-party financing options are available. France has established an energy conversion guarantee fund. In residential buildings over 2 years old, 30% of the investment amount can be deducted from income tax in thermally insulated windows-doors, insulation, boiler replacement, heat pump, cogeneration, and solar water heating system (Schneller & Hennig, 2018).

The USA, China, and Germany come to the fore in successful ESCO applications in the world. Energy Performance Contracts (EPC) are widely used in the ESCO model, which is widely seen in the public sector in the USA. On the other hand, in China, which follows USA in the model initiated by the government, the Global Environment Facility (GEF), and the World Bank provided financial support by the national energy-saving information dissemination center has been established. The development bank, on the other hand, gave partial risk guarantees to commercial banks. This support model has been a substantial step for commercial banks to adapt to ESCO financing (Republic of Turkey Ministry of Energy and Natural Resources, 2017).

Germany, which has been applying the ESCO model since the 1990s, has strengthened its ESCO structure, especially with the awareness-raising activities of regional energy agencies that act as independent intermediaries (Republic of Turkey Ministry of Energy and Natural Resources, 2017). Apart from this, in the Digital Energy Sales Contract project (Thermondo Case) developed in 2016 to ensure energy efficiency in residences, a boiler-combi heating, and hot water system is installed in residential buildings by subscription-rental method over the internet. It is stated that 2.5 million EUR contracts have been made so far and with these optimization studies, 5% energy savings per residence has been achieved (Thermondo – Die Wärme von morgen, n.d.).

When various application examples within the scope of energy efficiency financing in the world are examined, it is seen that the financial support systems carried out with government support from the very beginning of the process are more effective and the fossil fuel taxes are used as a resource for the national energy efficiency funds. Besides, risk guarantee funds provided by the public have critical importance in terms of being adopted easier by financial institutions and other stakeholders, especially in financing with the ESCO model.

1.3. Market based policy mechanism tools in energy efficiency

A market-based policy mechanism is defined as policies that use the market to achieve certain environmental

goals. The most well-known of these policy mechanism tools are Energy Efficiency Obligation System (EEOS), energy efficiency competitions, and energy efficiency networks. As of 2017, 46 countries/states in the world are implementing the EEOS system, and three countries are in the transition process. Six countries use energy efficiency competitions (Stavins, 2003). In this study, EEOS and carbon tax have been examined in detail.

1.3.1. Energy efficiency obligation scheme (EEOS)

The Energy Efficiency Obligation System (EEOS) offers an approach that requires the commissioning of the entire energy system for cost-effective energy efficiency targets. In general, EEOS determines the energy-saving targets and the obligated parties for achieving this saving (Sarı et al., 2020).

Three actors take part in EEOS. These; responsible body, system manager, and obligated parties. The responsible body is an institution that sets EE targets and relays information. The system manager is responsible for the course of the proceeding. Obligated parties are the parties responsible for achieving the EE targets (Cin, 2018). The relationship between the main actors is given in Figure 5.

In the EU between 2014 and 2016, the most savings (33%) within the scope of the 2012 Energy Performance Directive was achieved with the energy efficiency obligation system (EEOS). Energy and carbon taxes were effective 23%, financial solutions and measures 18% (Figure 6). The contribution of the standard formation is also quite well (12%) (EYODER, 2020).

EEOS in France can be examined as an application that is already in progress. France has been implementing EEOS since 2006 and holding obliged for all energy retail and supply companies that produce above a certain volume. Energy efficiency measures are implemented in residential buildings (76%), public and commercial buildings (14%), and industry (7%). Savings are generally obtained from condensing boilers, roof insulation, and wall insulation. Obligated parties also benefit from the energy renewal fund,

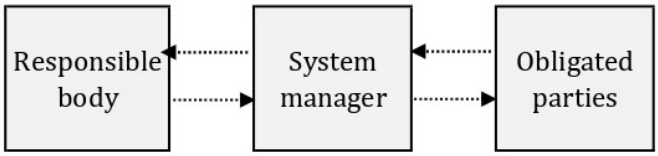

Figure 5. *Primary stakeholders of EEOS.*

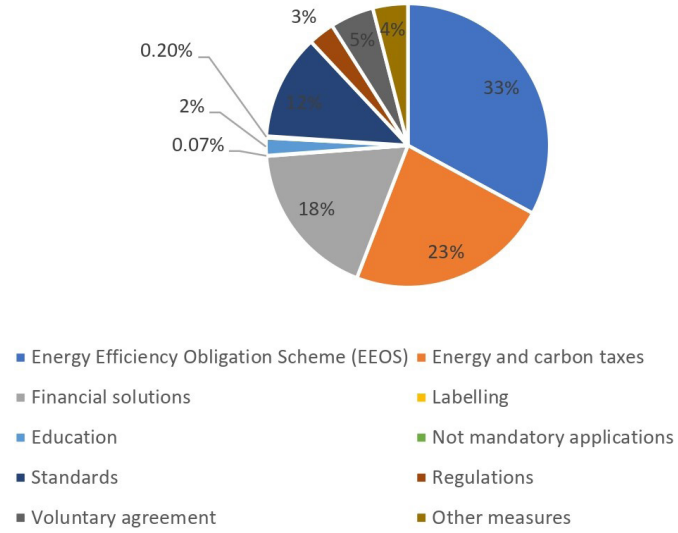

Figure 6. *Contribution of various financing mechanisms to energy efficiency in the EU (EC, 2019).*

which was put into practice in 2015 and provides loans for EE projects (Sarı et al., 2020).

There is no EEOS mechanism currently implemented in Turkey. However, in the National Action Plan published in 2018, the EEOS mechanism is mentioned under the title of Action Y11: Obligation Program for Energy Distribution and Retail Companies, and it is stated that the obligation program will be implemented between 2020-2022 (Republic of Turkey Ministry of Energy and Natural Resources, 2018). However, obligation program has not started by year of 2022.

Within the scope of a master thesis conducted by Cin in 2018, responsible body, system manager, and obliged parties in European countries that are currently implementing EEOS are examined (Cin, 2018). In this context, best practice examples are given, and a model proposal has been developed for the EEOS in Turkey, in which the responsible body is the Ministry of Energy and Natural Resources, the system manager is the energy agency to be established new, and the obligated parties are distribution and supplier com-

panies in all energy types (Cin, 2018).

It is stated that the efficiency of the system can be increased with the punishment and reward approach to be engaged in cases where the EEOS targets are exceeded or not been reached. In addition, in the studies conducted by the International Energy Agency (IEA), it is stated that it should be supported by legislation containing quantitative targets such as an annual measurement verification system to the long-term effectiveness of EEOS (Sarı et al., 2020).

1.3.2. Carbon tax in practice

Administrative sanctions and penal policies can also be a financial driving force in addition to the incentives and grants applied within the scope of EE in countries. The idea of benefiting from taxes in solving environmental problems dates back to Pigou in the 1920s (Sandmo, 2008). The carbon tax, which aims to reduce the negative effects on the environment, started from the "*polluter pays*" principle and was first applied in Finland in 1990 and was discussed in the Rio Environment and Development Declaration in 1992. The Kyoto Protocol, published in 1997, also has aimed to establish tax systems such as "excess taxation from those who produce too much carbon".

Carbon taxes directly affect the costs of using fossil fuels due to be market-based taxes. For this reason, individuals or institutions are encouraged to use fewer fossil fuels and turn to alternative energy sources (Hotunluoğlu & Tekeli, 2007).

The carbon tax is currently applied in various world countries such as Finland (1990), Netherlands (1990), Norway (1991), Sweden (1991), Denmark (1992), France (2014), Singapore (2019), Canada (2019). The money collected from carbon taxes has been transferred to the climate fund. This taxation system aims to reduce the global warming-pollution problems caused by fossil fuel users.

Studies are showing that the emission volume has decreased in countries that apply carbon tax. In a study conducted by the Swedish Ministry of Environment, it was estimated that there would be 15% more CO_2 emissions for 1995 and %20-25% more for 2000 in the scenario where there was no carbon tax (Johansson, 2000). Some studies have the view that this taxation system does not have a sufficient effect on emission reduction. In the study conducted by Hotunluoğlu and Tekeli (2007), the economic effects of the carbon tax in 18 European countries were examined and it was determined that it did not have a significant effect on emission reduction. It has been stated that the most important reason for this is the exemptions granted to those who use more fossil fuels (Hotunluoğlu & Tekeli, 2007).

Therefore, it is concluded that the legal framework must be well-drawn and exemptions in energy-intensive sectors must be kept to a minimum for the carbon tax to have a significant impact on emission reduction.

The European Union is planning to be gradually engaged the Carbon Border Adjustment Mechanism (CBAM) application, which was launched on 14 July 2021 as part of the European Green Deal, as of 01/01/2023. In practice, it has been stated that an additional taxation system will be applied to five products (cement, iron-steel, aluminum, fertilizer, and electricity) with a high risk of carbon leakage during the import process into the EU. In the regulation, it is stated that the CBAM declaration containing the embodied emission values and country of origin carbon costs of the relevant products will be sought (European Commission & Directorate-General for Taxation and Customs Union, 2021). Turkey, which has foreign business with the EU, has aimed to create a roadmap for this arrangement with the Green Agreement Action Plan published in 2021 (The Republic of Turkey Ministry of Commerce, 2021).

2. Energy efficiency financing in Turkey

In this section, the existing financial support systems in Turkey are examined, and the authorities and responsibilities of the stakeholders involved in this context are explained. An evaluation has been made on the limitations and deficiencies in the process of the current system.

Ministry of Energy and Natural Resources (MENR) has the primary authority and responsibility for energy efficiency in Turkey. There are two types of support that MENR currently carries out. These are Productivity Enhancement Project (PEP) supports and Voluntary Agreements. Industrial enterprises with an annual total energy consumption of 500 the ton of oil equivalent (TOE) and above and producing all kinds of goods can apply for the PEP support (MENR, 2008). Voluntary agreements, on the other hand, support institutions and individuals who, as an industrial enterprise with an average annual energy consumption of 500 TOE for the last three years, undertake to reduce their energy intensity by at least 10% within three years to make a voluntary agreement with the Ministry. In the *Implementation Procedures and Principles on Energy Efficiency Supports* published by MENR in 2020, a support payment of 30% (not exceeding one million Turkish Liras) of the energy expenditure of the year of the agreement is made to the enterprise that reaches the targeted energy intensity at the end of the agreement period (EVÇED, 2020). As defined in the law, the supports are mostly aimed at industrial enterprises, and EVD companies are assigned to carry out energy efficiency services in the feasibility and consultancy processes of these projects.

International Financial Institutions (IFI) provide funds for energy efficiency projects in Turkey as well as in other countries around the world. The concessional lending given by IFI is transferred to local financial institutions through the Development Bank of Turkey. The course of proceeding is shown in Figure 7.

Within the scope of energy efficiency financing, there is the Turkish Housing Energy Efficiency Financing Facility (TuREEFF) for projects funded by IFI through the Development Bank. The program, developed by the European Bank for Reconstruction and Development (EBRD) and supported by the Clean Technology Fund (CTF) and the European Union (EU), has provided financing for energy efficiency in residences.

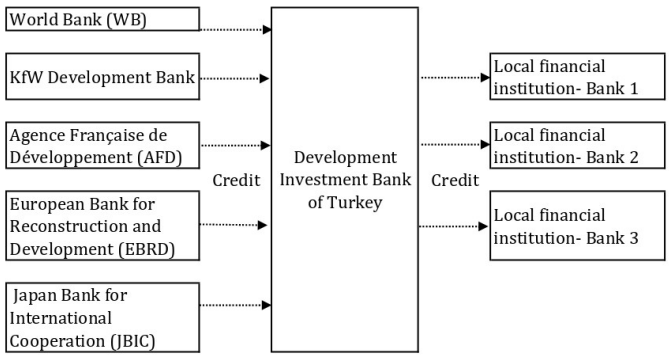

Figure 7. *Loan/credit transfer process.*

Turkey Sustainable Energy Financing Program (TurSEFF), also provided by the same fund, was established to meet EE investments in the public and private sectors. In the general process of TURSEFF, while the EU and CTF constitute the main source of capital, the loans offered through the World Bank were made available through local banks. Small and medium-sized enterprises (SMEs) and residences in the industrial and commercial sectors constitute the target market of the project (Climate Investment Fund & Carbon Trust, 2018).

There are seen bank loans for energy efficiency in residential buildings when the fields of activity of local financial institutions serving in the sector are analyzed. While mortgage loans are a suitable financing option in the purchasing process of energy-efficient buildings, existing buildings' insulation, replacement of window systems are not suitable for energy efficiency investments. Mostly, 5-year maturity restrictions and financing approximately 50% more costly than mortgage loans do not make it possible to repay the loan with savings on investment (Yakut, 2020).

Currently, these loans are loaded on the end-user or property owner and are not supported by any government incentives or grants. Therefore, it can be said that the state-led financial support for energy efficiency investments in existing buildings is quite limited. However, according to article 4.1.e of the Economic Reforms Action Plan published in March 2021, it is aimed to include buildings, agriculture, and service sector in the PEP supports with the amendment to be made in the Energy Efficiency Law (The Republic of Minis-

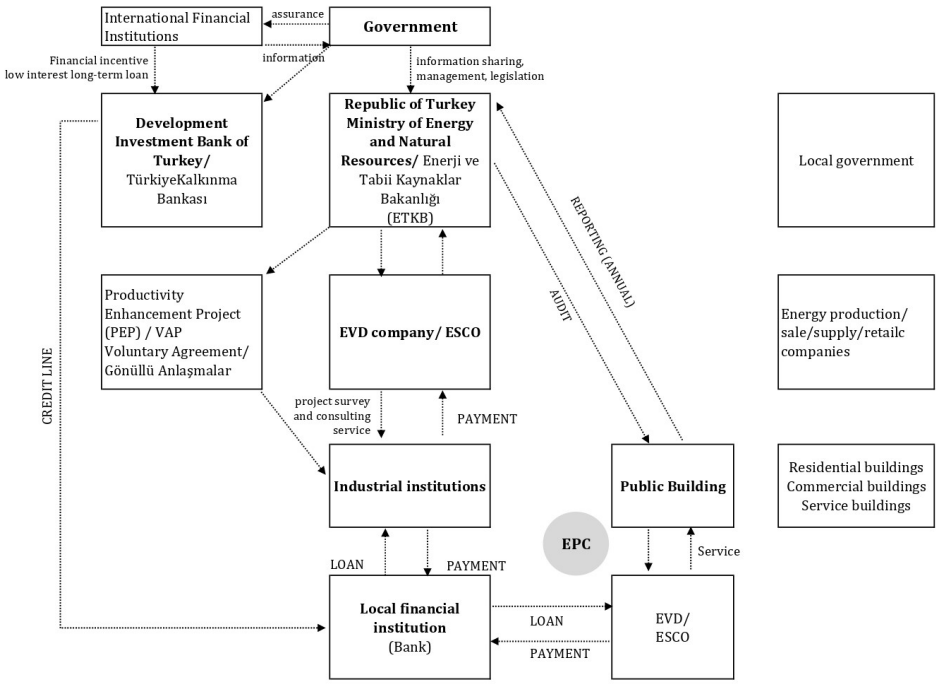

Figure 8. *Energy efficiency stakeholders: Current situation in Turkey.*

try of Treasury and Finance, 2021).

Recently, energy efficiency studies for public buildings have accelerated. With the *Presidential Circular on Energy Saving in Public Buildings* published in 2019, a target of minimum 15% energy savings has been set with the improvements to be made in public buildings until 2023 (Republic of Official Gazette, 2019). Within the scope of the decision on the *Procedures and Principles Regarding Energy Performance Contracts in the Public* published in 2020, it is stated that EPCs can be used for energy efficiency investments in public buildings (Republic of Turkey Official Gazette, 2020). It is foreseen that the use of these contracts will become widespread for the next few years.

The network of relations between the stakeholders involved in energy efficiency financing in Turkey (current situation) is shown in Figure 8.

As is seen from the figure, many stakeholders have duties and responsibilities within the scope of EE in Turkey. The current situation is summarized below:

- The government provides support mostly to industrial enterprises with concessional lending and grants from international financial institutions (PEP and Voluntary Agreements).
- EVDs have been providing feasibility and project consultancy. They currently have not assumed the technical performance risk of the projects as ESCO structures.
- EPC applications in the public sector, which came into effect as of 2020 with the 15% savings target required until 2023 with the Presidential circular published in 2019 accelerated the improvements in EE in this context.
- EE support for residential, commercial and service buildings is quite limited.
- Energy distribution and supply companies that directly affect the energy sector do not have any obligation in the process.
- Local governments, which act as a bridge between the end-user (individual/institution) and the ministry, have limited powers and activities within the scope of EE.
- Awareness-raising activities of MENR within the scope of EE are limited or insufficient.
- As of 2007, no action is taken for the verification/audit of the Energy Performance Certificate (EPC'), which is mandatory for new buildings and existing buildings as of 2020, by MENR. Measurement& validation and monitoring procedures are lacking. (For example, a building

registered as Class C does not have a control mechanism for how much energy it consumes).

Considering that energy performance improvements in buildings are discussed all over the world, and the concept of almost zero energy (even the concept of positive energy) is put into practice, different instruments and incentive mechanisms should be established to implement a major renovation wave like in the EU. In particular, the improvement processes and operation of residential buildings which constitute approximately 84% of the building stock in Turkey, should be clearly defined and supported by the government.

In this context, ESCO structures have a substantial role in energy efficiency investments in the world, especially in small-scale projects is known. ESCOs are firms made up of technical and financial experts that provide services for the financing of Energy Performance Contracts (EPC) and energy efficiency projects (Keskin, 2009). The feature that distinguishes ESCO from EVD is that their contracts are performance-based (EYODER, 2020). In previous studies, it was emphasized that the ESCO concept should be integrated into the existing financing system in Turkey (MENR, 2017; Taranto et al., 2020). In the ESCO Development Roadmap report published in 2017, it was stated that existing EVDs do not have sufficient equipment and experienced specialist personnel to provide ESCO-type services, and they are limited in terms of implementation and financial basis (MENR, 2017). In this context, the short, medium, and long-term actions determined to make the necessary transformation are summarized below (EYODER, 2020):

Short-term actions (1-2 years)

- Entry of the ESCO definition into the Energy Efficiency Law as "companies applying energy performance-based contracts".
- EVD companies to have initial ESCOs for capacity-building activities.
- Training of ESCOs continuously and specialization under the leadership of MENR.
- Creating simple contract types that contain basic information about the transaction to be made instead of the long and complex contracts currently applied.
- Standardization and implementation of measurement& verification procedures. (The International Performance Measurement and Verification Protocol should be adopted).
- Guaranteeing the pilot projects to be realized with the ESCO model with grants and guarantees to be given by the government. Adopting an approach that focuses on knowledge sharing.
- Small-scale ESCO projects: Supporting EE projects that focus on a simple, straightforward, single technology with short payback periods in the first place, for ESCOs to increase their business portfolio and gain experience in implementation.
- Capacity building and training programs for lenders: The problem is that lenders are not familiar with EE projects and are not competent to understand ESCO agreements. For this purpose, it is recommended that banks carry out training and awareness-raising activities for their employees and gain technical expertise on EE.
- Grant programs, tax rebates/rebates, subsidies (VAT reduction/exemption), tax measures (users with low energy consumption demand tax relief, those with high energy / CO_2 consumption pay more tax), low interest, and interest-free loans are suggested.
- To popularize EPC applications in the public sector, ESCO-public can jointly carry out promotional projects.

Medium-term actions (3-5 years)

- Identification of Market Developers: The Energy Efficiency Agency to be established within the MENR can act as a market developer. It can provide information sharing and support on technical and financial issues.
- Existing EVD firms can act as market facilitators and support ESCOs.
- Establishing an independent dedicated mechanism for use in dispute resolution, which is already separated from long and complex court processes, and consultation with relevant experts.
- Establishing a control mechanism

that will increase confidence in ESCOs in the EE market. MENR can determine the criteria and international certification standards can be used in this context.
- Utilizing EE networks in the industry, voluntary industry groups can be formed that will persuade them to make EPC investments. Sharing of knowledge and experience.

Long-term actions (5+ years)
- Tradable white certificates may be introduced to the market in order not to limit the existing incentives for ESCOs in long-term applications. The white certificate is given to organizations where energy savings are verified.
- The complexity of residential buildings/impact on long-term performance and ownership issues (multiple households) are barriers for ESCOs. A new regulation that contains EE measures with binding/mandatory provisions for landlords and tenants is recommended for this building typology.
- Establishment of ESCO database: Establishment of a national database for processing implemented ESCO projects.

The ESCO transformation mentioned in the report can only be possible with a determined and transparent senior management approach. For this reason, it is concluded that government-supported financing mechanisms should be engaged as soon as possible and the stakeholders in the process should act with a holistic approach with binding legislation.

3. Financial model adaptation for building energy efficiency retrofits in Turkey

In this part of the research, a financial model adaptation has been made to be used in energy efficiency improvements of residential buildings in Turkey. In this model, it is suggested that singular applications proposed in the energy efficiency financing of buildings in previous literature studies should be handled with a holistic approach.

The financial instruments proposed to be integrated to be used in energy efficiency improvements of existing residential buildings are listed below:
- Establishment of the Turkish Energy Agency (TEA).
- Financing with the ESCO model.
- Energy Efficiency Obligation System (EEOS) implementation.
- Establishment of the National Energy Efficiency Fund
- Carbon tax practice.
- Establishment of a guarantee fund.
- Tax exemptions for special applications.

3.1. Establishment of the Turkish Energy Agency (TEA)

The advantages of establishing a national energy agency within the MENR have also been reported in previous studies (MENR, 2017; Taranto et al., 2020 and EYODER, 2020). The institution, which will become operational after the necessary legislative arrangements are made, can be the system manager that will contribute to the development of the ESCO market. The TEA should act as a controller to take an active role in the annual reporting, measurement& verification, and monitoring procedures.

3.1.1. Financing with ESCO model

It is recommended that ESCOs, which play a key role in energy efficiency investments in the world, should be included in the system with the necessary legislative arrangements. The success of ESCO in small and medium-sized projects has also been seen in previous applications. Although issues such as the complexity of the ownership status of multi-story residential buildings and the long-term impact of the improvements to be made show that residential buildings are not very suitable for initial applications (MENR, 2017), it is predicted that this problem can be overcome with pilot projects to be supported by the government.

3.1.2. Energy efficiency obligation scheme (EEOS)

Following the targets set in the action plan, the savings targets can be achieved by increasing the obligation of energy distribution/supply companies in Turkey with the EEOS mechanism. Supporting the EEOS to be created with reward-penalty mechanisms and measurement& verification

requirements and transferring the penal sanction practices to the national energy efficiency fund to be allocated to be used in EE projects can accelerate energy efficiency projects. In this system, the responsible body is MENR, the system manager is TEA, and the obliged parties are energy generation, sales, supply, and retail companies.

3.1.3. National energy efficiency fund

The existence of a similar fund was discussed in the National Energy Efficiency Action Plan (UEVEP) report. However, there is no implemented system as of yet. Within the scope of the study, it is planned to transfer the fines to be applied as a result of the commissioning of the EE fund and various sanctions (such as failure to meet obligations, excessive CO_2 consumption) to this fund.

3.1.4. Carbon tax practice

Previous studies have shown that, in addition to the incentives and grants applied, administrative sanction and penalty policy applications can also be a financial driving force. It would be more meaningful to implement this tax system in the energy-intensive industry sector in the first place in Turkey and to gradually include the building and other sectors in this application. Carbon taxes are considered a source for the national energy efficiency fund.

3.1.5. Guarantee fund

Guaranteeing energy efficiency investments before the government is an important step towards reducing investment risks and building public confidence for a system that is still new. The guarantee fund may engage during the initial capital formation of ESCOs or in case the promised energy savings cannot be achieved (In this context, special insurance policies for EE can also be created).

3.1.6. Tax exemptions

The property owners may be exempted from some/all of VAT and/or income tax for applications such as thermal insulation, boiler replacement, insulated window-glass systems in the building EE retrofits. There are similar applications in the world. In this context, the government can manage and monitor EE retrofits through the necessary legislative arrangements and local governments. To increase the contribution and responsibility of local governments in the EE retrofits, a process proposal has been introduced by authors. According to this;

- The owners are informed about the EE retrofits through the local administration and the Ministry of Urbanization.
- Owners/end-users apply for building EE retrofit.
- According to the region applied, an ESCO firm is assigned through the database.
- ESCO conducts feasibility studies for the existing building. (EE savings feasibility study)
- Feasibility study and other required technical projects are submitted to the municipality.
- Building EÊ retrofit approval takes place (Fees and tax exemptions are provided for the property owners and end-users).
- EE retrofit permit is obtained by the municipality.
- The share obtained from the savings is paid to ESCO. (A similar progress payment system applied to building audit companies can be adapted).
- A savings verification report is submitted to the municipality on an annual basis. Measurement& verification procedure is applied by an independent organization.
- Data of the renovated building is processed on a database by the municipality (before/after energy consumption data, implemented technologies)
- Energy consumption data before and after renovations should be shared as open access.

Selecting a pilot area for building energy efficiency renovations and realizing EE projects with the government-local government-ESCO partnership will accelerate publicity and awareness activities. A fee exemption before the EE retrofit and an income/VAT tax exemption after the modification should be provided to the property owners and end-users.

For financial model adaptation to become reality, the following stake-

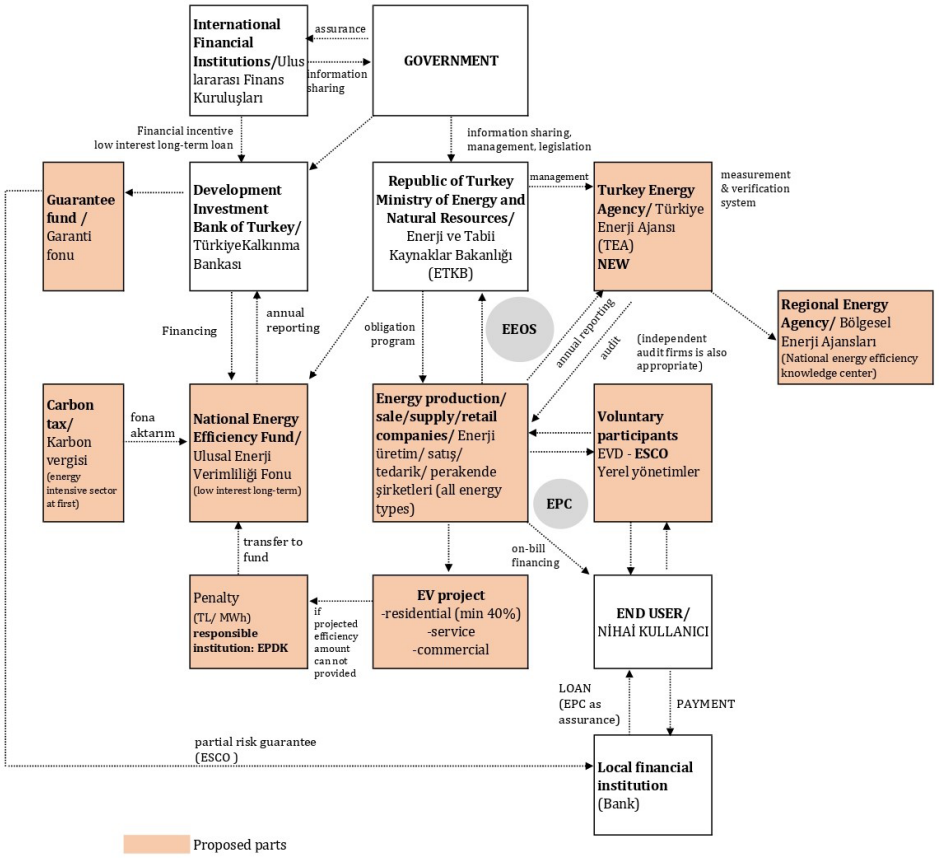

Figure 9. *Relation between stakeholders in financial model adaptation.*

holders should take an active role in the process:

1. International Financial Institutions (IFI)
2. Government
3. Ministry of Energy and Natural Resources (MENR)
4. Turkish Energy Agency (TEA) – newly established
5. Regional energy agencies
6. Financial institutions (Bank)
7. Energy Distribution Companies
8. EVD-ESCO
9. Investor
10. Supplier companies
11. Local governments (municipalities, non-governmental organizations)
12. End-user (owner, tenant)

The proposed relationship network between stakeholders is shown in Figure 9.

When the proposed financial model is analyzed through the input-output relationship, the contributions of the stakeholders that involved in the process to the system are shown in Figure 10.

Necessary actions and maturities for the foreseen financial model to be applicable are given in Table 1.

4. Conclusion

Energy and resource efficiency applications in cities and buildings are of critical importance in this period when worldwide has been dramatically faced the consequences of global warming. These applications impose an additional financial burden on the investment, especially if the building is not in the early design phase. It is known that energy efficiency practices in the world are supported by various financing mechanisms. The financial support systems currently implemented in Turkey are mostly for industrial enterprises and do not provide an adequate solution for EE applications of residential buildings.

In this research, a financial model adaptation has been made to be used in energy efficiency improvements of residential buildings in Turkey. In this model, it has been suggested that the singular applications proposed in previous literature research within the scope of EE financing of buildings should be handled with a holistic approach. Applications/systems that will work together are the Turkish Energy

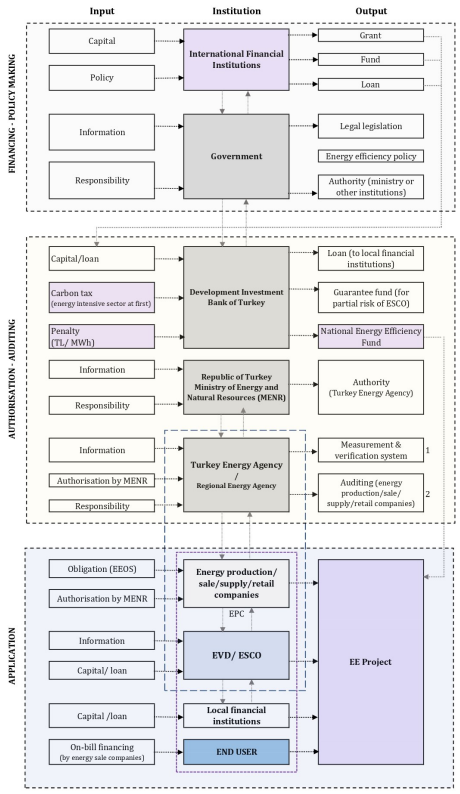

Figure 10. *Input-output relationship in the proposed financial model adaptation.*

Agency (TEA), ESCO, EEOS, the national energy efficiency fund, carbon tax practice, guarantee fund, and tax exemptions.

Although each part of the proposed financial model adaptation has been examined and evaluated in individual studies, there is no comprehensive study that deals with the system with a holistic approach. While creating a holistic approach within the scope of the study, it is planned to create a set up in the light of the suggestions in the individual applications in question. An evaluation will be made in the later stages of the study on the reliability of the research. In order to provide a holistic approach, it is necessary to implement some verification systems, such as the regulation of the relevant protocols and standards by the government to measure the efficiency of the system, and the periodic gathering of all active stakeholders in the model to evaluate the positive and negative aspects of the system.

It is thought that if the actions within this scope are implemented within the suggested terms, it will make a difference in the energy efficiency practices of residential buildings.

Table 1. *Actions and maturities required for financial model adaptation.*

Action Name	Responsible Body
First stage (1-3 years)	
Establishment of the Turkish Energy Agency (TEA).	Government (should make necessary legislative arrangements).
Establishment of National Energy Efficiency Fund.	Government, MENR
Establishment of public guarantee fund.	Government, Development Bank
Enforcement of carbon tax (primarily on energy-intensive sectors)	Government (should make necessary legislative arrangements).
Implementation of EEOS. Inclusion of energy distribution/supply companies in all energy types into the system.	Government (should make necessary legislative arrangements). MENR, TEA
Determination of pilot regions where energy companies responsible for implementing the EE target will implement EE projects.	Ministry of Urbanization, TEA
Second Stage (3-5 years)	
Enforcement of carbon tax (building sector).	Government (should make necessary legislative arrangements).
Creation of building inventory-database	
Inventory of existing residential building stock in Turkey (TABULA project example).	TEA, Ministry of Urbanization, local governments.
Primary measures for ESCOs	
Making necessary legislative arrangements in order to support financial of ESCOs.	Government
Organizing the necessary training in the process of converting EVDs to ESCO (training of the nondiscretionary employees within ESCO).	MENR
Measurement& Verification Procedures	
Financial incentive arrangements for independent auditors to access the necessary technological infrastructure for measurement& verification procedures.	MENR, TEA
Inclusion of measurement and verification procedures into all EE projects (Mandatory).	TEA, MENR
Translation and implementation of IPMVP (International Measurement and Verification Protocol) published by EVO (Efficiency Valuation Organization).	TEA, MENR
Third Stage (5-10 years)	
Integrating residential buildings into the ENVER portal *(transferring the measurement, verified/reported buildings to the database)*	TEA, Ministry of Urbanization.
Making the ENVER portal open access that is currently only open to Ministry personnel.	

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Technology-led evolution of interior space: Interiors becoming products

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Abstract
Information and Communication Technologies (ICTs) were hosted by industrial products since their emergence in the 1980s. They entered daily life through products – in the shape of black boxes – and changed habits, ways of executing tasks, and dynamics of interaction with each other and our surroundings. ICTs offered a revolutionary domain, the digital world, and used physical and digital representations and tools to manipulate this world. As offerings of the digital increased, human-computer interaction and its design gained importance, User Interfaces emerged to meet human diversity and dynamicity. Today ICTs' hosts are shifting from products to spaces. In this study, we investigated the relation between ICTs, products, and spaces to understand the needs of space as ICT hosts. Sensory diversity in user interfaces increased, physical restraints of hosts decreased, and new more adaptive technologies such as artificial intelligences and augmented reality emerged. The evolution of user interfaces indicates the goal is to implement natural interaction, placing the user at the centre and mimicking the way humans interact with the physical world. While both architecture and product design are user-oriented, product designers practised more on implementing ICTs to hosts as the initial hosts were products. Since ICTs are becoming embedded into spaces, interiority is changing, built environments will consist of conventional building elements, ICTs, and user interfaces. As the host is shifting, interiors are becoming a part of communications systems that needs a transdisciplinary approach to design.

Keywords
Architecture, Human-computer interaction, Interaction design, Interior architecture, Product design.

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1. Introduction

In order to train professionals who caInformation and Communication Technologies (ICTs) brought our lives a non-physical dimension – the digital world – which offers new ways of executing tasks without the limitation of the physical world. This non-physical dimension altered daily life and human-product-space relationships with new artificial intelligence and landscapes. Products such as computers, mobiles, etc. emerged, and ICTs become embedded in existing products such as cars and household products.

ICT embedded products dominated the physical world as their offerings were far greater than their disadvantages such as lacking sensory diversity, complexity, etc. Lack of diversity in senses, thus the whole experience, is caused as a result of depending mainly on visual and audial channels. Contemporary life takes visual as the primary of the senses, but humans perceive the world and learn through their whole body (Pallasmaa, 2005; Kirsh, 2013). Initial products of ICTs were also complex to use, depending on users' cognitive abilities such as memorizing, making it harder for users to adopt. The domination of technology and lack of human-centred approaches are criticised with claims that technology should serve human values and needs, by both architects, product designers, and computer scientists. Human-Computer Interaction (HCI) gained importance and the field of Interaction Design emerged. Interaction Design deals with ways of shaping everyday life and tasks with the help of digital artefacts (Smith, 2007). To develop better interaction, User Interfaces (UIs) emerged and the evolution of these UIs – both in the means of digital and physical representation – indicates that the goal of Human-Computer Interaction is to achieve a natural interaction between the physical and the digital worlds focusing on user experience. Core philosophies of architecture, product design, and ICTs are very similar, as they all aim to enrich human life. They offer, define, alter habits, tools, perspectives, habitats for living. They are integrating into interiors and offer new tools for interiority. Architecture, as a system approach, holds valuable knowledge about natural interaction between humans and their surroundings (Pask, 1969; Wright, 1953; Le Corbusier, 1923/2013; Glanville, 2009; Mallgrave, 2013).

Developments in technology affect architecture and product design profoundly. Economical, technological, and industrial changes reflect into the dynamics of design; the industrial revolution and second machine age affected society, therefore design (Hight & Perry, 2006). With ICTs, the communication age began, and similar to their predecessors, ICTs altered society and daily life in several aspects, including communication, new business models, and boundary-free. They also offered new mediums to interact, communicate and create, and these mediums became essential to today's living. As stated earlier while they enhanced life in many ways, they also weakened the natural interaction with the world. Though, as new ICTs and supportive technologies develop, current disadvantages such as lack of sensory diversity, physical dominance of technology, static products, and spaces will be eliminated.

ICTs brought several challenges, drawbacks, and limitations on issues like perception, representation both physically and digitally along with new opportunities for interaction. When the increasing effect of these technologies is taken into consideration designing the digital domain, its interface and tools gain importance. While ICTs' relation and effect on built environment and products are discussed individually in the literature, their effect of giving interior spaces product-like features without losing their architectural identity is mostly overlooked. Regarding to this, we took a transdisciplinary approach to understand theoretical connections between architecture, product design, and interaction design along with the evolution of ICTs, UIs as their digital and host products as their physical representations. Also, we hold a holistic perspective on built environment, without separating the interior and exterior, without addressing the applied differences in the professions of architecture and interior architecture.

2. Information and communication technologies

ICTs first initiated in the 1960s and Human-Computer Interaction research of the time was mainly about technological and technical aspects of executing tasks. Initial research on HCI began at universities and labs funded by major institutes such as NASA, and there is a 20 years gap between university and commercial product research (Myers, 1998). This gap is a consequence of the initial HCI research's goals, as it was to create digital assets to execute specific tasks.

The roots of ICTs rely on Cybernetics, a science field initiated in the post Second World War (SWW) era to investigate data flow and management systems, which later influenced fields like information gathering, economics, and computer science (Akman, 1977; Bayazıt, 2004). The whole process of data production along with data exchange and creating a common understanding are objects of this science. Earth, filled with unlimited data, consists of and depends on information and communication systems (Wiener, 1958/1973). Information and communication systems differ from each other in the process. Information systems are linear one-way processes with actors who are either recipients or sources. Data flows from source to recipient, and the interpretation process of the recipient is not taken into account. For example, fruit on a tree might be poisonous and its bright colouring might be the data that it spreads, though without proper knowledge the recipient can't translate this data. For information systems, time has a very limited effect. On the contrary, communication systems depend on time more, and they are circular and iterative two-way processes with actors who are both the recipient and the source to create a mutual understanding. Typical human-to-human interaction is an example of these systems and communication machines have similar processes to living beings' interactions (Wiener, 1958/1973). They sense, interpret data, and respond to different situations in an iterative motion.

Regarding creating a communication system with ICTs, 'Ubiquitous Computing' vision emerged after the ICTs become more integrated into daily life and dominated interior spaces with static computers in the 1990s. This vision offered to embed – and hide – computers into interiors and products which were present for centuries (Weiser, 1991). First generations of ICTs lack the ability of intuitive and comprehensive thinking, causing disintegration of users (Haque, 2007). Ubiquitous computing focuses on the actual complete interaction between users and computers to overcome this obstacle.

2.1. The virtual mind and new landscapes

Ubiquitous computing and the need for assistive technology to navigate through the digital world resulted in research on creating a virtual mind. A mind that takes over some technical processes that require thinking and memorizing such as coding and calculating from users. Initial research was to program these thinking processes into predefined situations but a system of predefined questions and answers cannot create novel responses and have common sense, and count as 'smart' (Haque, 2007; Kaku, 2011/2015). The concept of a true 'smart' asset is around since the 1950s, researchers claimed repeatedly that "in a couple of years" an artificial intelligence will emerge (Bostrom, 2014). Through seventy years there were many attempts to create an artificial intelligence (AI) – superintelligence – similar to the human mind. While superintelligence is still a future concept, we have AIs embedded in many areas of daily life doing tasks such as speech recognition, medical assistants, industrial robots, personal assistant AIs, etc (Bostrom, 2014).

Recent developments in AIs resulted in new intelligences in the digital world such as Ambient Intelligence (AmI) using Internet of Things (IoT), Machine-to-Machine (M2) along with other supporting technologies. Even though existing AIs are mostly task-oriented, they are hosted by many products such as mobile phones, tablets, etc. While the hosts of these AIs are commonly commercial products, developments in sensors, cameras, and actuators make it possible to implement them into spaces.

A digital environment should be able to assist users subtly and sensitively, understanding the needs of privacy, help, assistance, etc. while they perform tasks (Augusto, 2010). AmI and AI are still under development as these kinds of understanding and interaction require social intelligence. Though there is still a need for improvement in these technologies, with the help of IoT, it became possible to alter soft mediums – such as lighting, auditory, visual mediums – in interiors without actually being there.

Concepts of Virtual Reality (VR) and Augmented Reality (AR) emerged as an answer to determine the landscape of ICTs. VR offers an immersive experience for users, blocking the real environment completely to show a synthetic environment. On the other hand, AR offers a mix of realities, using markers, cameras, etc. to implement digital artefacts in the physical world (van Arnhem et al., 2018). Though they are both about creating a diversion from the physical world, the simulation types they offer are distant. In AR users both experience the virtual asset and physical surroundings simultaneously, though, in VR, experience is built upon the limited sensory channels (van Arnhem et al., 2018). All these technologies offer alternative landscapes to place ICTs, creating new channels to impact daily life.

2.2. Between the human and the computer: User interfaces

User interfaces are the connection between digital and physical worlds, and developments in supportive technologies in both domains affected their evolution. User interfaces can be examined under these groups: Command User Interface (CUI), Graphical User Interface (GUI), Tangible User Interface (TUI), and Next-Generation User Interfaces (Next Gen.UI).

First digital computers used command lines, without any operating systems. The visual representation of the interface was lists of documents, programs, etc. on black screens, and users needed to know specific codes to navigate through the system, execute tasks, and run programs. CUIs load users a cognitive load on memorizing all the codes and their purposes. Operating systems with overlapping windows emerged to overcome these obstacles (Myers, 1998).

Graphical User Interfaces (GUIs) used operating systems with windows, icons, menus, and pointers (WIMPs), hid the technical process, and visualized tasks. GUIs' innovation over CUIs was bringing graphical representation, creating a more direct 'see, point, click' interaction using WIMPs (Ishii, 2008a). Graphical User Interfaces made it easier to operate computers but they had their limitations of using screens and keyboards and interacting mainly on visual and audial channels. These limitations are criticised widely as the natural interaction between human-product-environment requires a whole-body interaction and GUI interaction is distant from it (Weiser, 1991; Wellner et al., 1993; Ishii & Ullmer, 1997; van Dam, 2000).

Tangible User Interfaces (TUIs) emerged to overcome GUIs' dependence on visual and audial channels. One of the earlier examples of TUIs is the Graspable User Interface from the mid-90s, which uses physical wooden objects with assigned attributes to manipulate digital objects. Multisensory perception plays a bigger role in encompassing 'realness/sureness', and using peripheral senses to perceive and manipulate the digital with physical is the key concept of TUIs (Ishii, 2008b; Shaer & Hornecker, 2010). A child's abacus is a perfect example of TUIs as its capabilities can be easily understood without a written description because of its simplicity (Ishii, 2008a). Also, it has both intangible and tangible assets, users have the flexibility to assign beads and rods a number according to their need and calculate. This flexibility allows users to calculate a broad selection of numeric quantities with its limited physical quantity. In TUIs, physical objects might represent digital assets rather than intangible and physically non-existent graphics. For example, game consoles such as Nintendo, Xbox, and Playstation use TUIs on different levels. While Xbox Kinect offers an interactive platform that can track movement without any tangible tool, Nintendo Wii and Playstation Move offer platforms to track movement with the help of tangible tools such as boards or sticks. In

all these platforms, users' actions are tracked and processed with the help of an artificial intelligence (AI) to evaluate their performance in the games.

Physical restrictions such as the rigidity of physical objects are creating a contrast with limitless digital fluidity (Lakatos & Ishii, 2012). Developments in related fields such as materials, biology, nanotechnology, and programming decreased this rigidity, and the next generations of UIs offer more flexibility. Materials that can change form and appearance in a dynamic way as digital pixels are offered as a way to overcome mentioned obstacles (Coelho & Zigelbaum, 2011; Lakatos & Ishii, 2012). One of the limited examples of such an interface is MIT Tangible Media Group's LineFORM (URL-1), which uses little servo motors to change the shape of a line-formed product to answer different needs. It can act as a phone, create a surface, fitness tool, or a lamp with some extensions. Another example, Second Skin (URL-2), uses living organisms to interact with the human body. Second Skin is an article of clothing for athletes, dancers, etc. This clothing has little patches embedded with hydrophobic bacteria through nanotubes, which helps with ventilation when the user sweats. Second Skin project expresses a subtle interaction similar to real-life experiences by using living organisms.

Another promising work is Digital Nature Group's Fairy Lights in Femtosecond (URL-3) project, as it offers a non-material but touchable interface. Researchers investigated the nature of the touch sense and created a mid-air hologram – a half digital half physical asset – that burns the skin so slightly that it does not hurt while mimicking the sense of touch.

3. Hosts of ICTs: Products and spaces

Initial ICTs were hosted by products and as a result of the physical and digital limitations of the time, they entered our life as black boxes (Marzano, 2005). Through time both the digital world's offerings get diverse and the physical world's limitations in production, material, sensing, monitoring, and computing assets decreased. Therefore, it became possible to have varying ICT hosts. Philips Design's High Design concept focuses on the past, present, and future of life through a sketch of a living room, envisioning a future living similar to the past but with the capability to connect the digital world through ICT embedded products instead of the dominance of black boxes (Marzano, 2005). Wearable products such as watches are a good example of this shift, as ICTs are used in these existing products in an enhancing way by combining centuries-long non-digital interaction and new digital interactions. HCI should shift its focus from techno-centric to human-centric, in order to reach a natural interaction between humans and technology, as it is not logical to further develop a specific technology without considering the needs, wants, and capabilities of the user (Mau et al., 2004). Though the dynamicity of humans is not yet met with digital dynamicity, technological capabilities change faster than human capabilities. ICTs become varied, digital artefacts or the physical presence require different features. Since their emergence, products born as a result of ICTs such as computers and mobiles changed both physically and digitally as they become smaller and portable. Existing products such as watches, kitchen appliances, and cars become embedded with ICTs. In between these existing products automobiles stand out as a good example of ICTs' relevance to both products and spaces.

3.1. From ICT dominant products to products with ICTs: The example of the automobile

Automobiles are special industrial products as they offer interiority. Both exterior and interior design of a car is involved in the users' experience. Therefore, ICTs' inclusion in automobiles holds important clues about their effects on both product level and space level. ICTs are embedded in cars in many ways including technical, entertainment, and information systems. Though many of these technologies are embedded into the vehicles' technical systems such as Anti-Lock Braking System (ABS) or Electronic Stability Program (ESP) to make driving safer, these kinds of ICTs are not creating a rich interaction with

the user. When user-related ICTs are taken into account, one of the earliest embedded ICTs is the car radio system. The first radio, as one of the main mass information systems along with televisions, dates back to the 1900s, while the first radio-mounted cars emerged in the 1930s. First versions of car radio systems consisted of a radio with a small turntable (Brandt, 2013). Later with the developing technologies such as cassettes, CDs, and Mp3s, car radio systems began to evolve with built-in cassette players, CD players, USB connections, etc. Music – an intangible medium – became portable with ICTs, and changed the perception of automobiles' interior space by turning interiors into specialized private space without losing its public space features (Bull, 2004).

Similar to computers and mobile phones radio systems become embedded in road computers with screens. Along with radio systems, new features such as navigation, air conditioning settings, hands-free phone/application connections, and driving-related settings become a part of these screens. 'Center Fascia' – which is the middle part of the Instrument Panel – evolved around road computers' screens (Kim & Han, 2014). Considering driving safety issues, interacting with a screen during the drive can be counted as a distraction. Designers, engineers, and researchers try to embed AR technology in cars to eliminate this distraction. Head-Up displays emerged as a result of these efforts, making it possible to get informed about navigation or driving information without getting driver's gaze off the road. Artificial Intelligence also influenced the car environment by adding self-driving, self-parking, line tracking, fatigue detection systems. Several car manufacturers such as Tesla and Volvo are investing in complete autonomous cars. If ethical and technical issues are solved and these autonomous cars enter the market, they will change the whole experience of a car ride; turning cars into moving offices or recreation spaces (Brandt, 2013). All these indicate that on the scale of space perception, ICTs caused and will cause significant changes. It is important to understand the power and impact ICTs have on humans' perception of the world.

3.2. Interiority: Boundaries and perception

The prior example of ICT-embedded automobiles and the change of perception with the help of ICTs indicate the way to perceive a space depends on its intangible features as much as its tangible boundaries. While former approaches to interior architecture are more conservationist dealing with forms, materials, geometry, etc., later approaches recognize that perception of an interior is also affected by feelings, atmosphere, and spatial presence (Taylor, 2018). The latter approach aligns with music changing the perception of automobile interiors from public to private and vice versa.

Interiority is discussed in interior architecture literature to understand the dynamics of space. Interiority is about the recognition and definition of an interior space beyond its physical boundaries, including intangible factors which indicate dynamicity and elasticity (McCarthy, 2005). Interiority can also be explained as the identity or the personality of a space which can be given by taking a holistic approach to the building connecting both the physical envelope and interior elements (Perolini, 2014; Rice, 2007). Taking such an approach needs the involvement of both architects and interior architects in the design and actualisation processes.

Interiority is considered an abstract concept without a concrete definition or formula, with changing boundaries (McCarthy, 2005; Perolini, 2014). It is rooted in the relationship between humans and built spaces, which at its core is based on the sensory channels of humans. Advances in interactive technologies, with the ability to interact in real-time and be sensory-inclusive, reflect changes in the engagement with built spaces on both physical and psychological levels (Taylor, 2018). The way electricity changed the daily routines and perception of spaces at night is given as a concrete example of the power technology holds on space perception (McCarthy, 2005). Similar

to the effect of ICTs on products, ICTs hold potential effects on interiority – both on tangible and intangible factors, which reflects the importance of understanding the dynamics of space and investigating potential applications of new interactions.

3.3. Architecture: Meaning of a space as a data system

Though cars offer interior spaces, it differs a lot from the built environment as it limits body movement. Cars' main purpose is transportation, while architecture's main purpose is to create a whole living environment for humans, benefiting from science, art, and technology. Architecture has far more variables, humane and social requirements than a transportation machine. The need for a shelter is essential, even though the form of it changed through centuries. While nature is inclusive to architecture, architecture itself is inclusive to humans. The relation between body and space, along with the main purpose of architecture is constant. All senses work together and come from the skin, and architecture is perceived through them all (Pallasmaa, 2005). They are altered, specialized versions of the skin itself, making the whole body the sensing channel – an asset in the system. Architecture uses visual and volumetric clues to guide its inhabitants along with peripheral senses, indicating an information system in which the built environment is the source and the inhabitants are recipients. Architecture in its nature is a user-oriented process, it offers more than form and function. Architecture without the inhabitants is meaningless and the 'Delight' of inhabitants is considered essential for architecture (Glanville, 2009; Pallasmaa, 2005; Wright, 1953; Le Corbusier, 1923/2013). Factors of 'delight' vary in different cultures or in time, but it is required to adapt to changes in society and inhabitants' needs (Chalk, 1966/1999; Fuller, 1929/2007). Technology, in general, is seen as a way to answer these needs even before ICTs emerged (Haque, 2007; van der Rohe, 1950/2007).

Richard Buckminster Fuller, Cedric Price, Yona Friedman, Archigram, and Superstudio supported the idea of technology as a servant of humans. They didn't deny technology and its added value, offer systematic approaches, and use technology as a way to enhance the human-space relationship. Fuller's geodesic domes – 1967 – offered adaptive climatization, Cedric Price's Fun Palace – 1964 – turns building into a mechanical organism by having no fixed elements inside the building other than load-bearing elements allowing changing spaces inside (Hatch, 1974; Price & Littlewood, 1968). Superstudio's Continuous Monument – 1969 – and Yona Friedman's Spatial City – 1959 – offer a similar approach of transferrable, repeatable, and dynamic architecture with flexible modules (Quesada, 2011; Gürbüz, 2009). Archigram created the utopian concept of giant moving structures/machines equal to cities in their Walking Cities vision, that can move without the restrictions of land and boundaries. Sadler (2005) states that even though this concept raised several questions, Walking Cities stands as a reminder of what modernist ambitions once about, extending human domination and giving value to inhabitants' relation to society, and environmental elements. On an individual or a small group scale, product-like architectural concepts were offered by Fuller and Archigram. Fuller's Dymaxion House concept was designed as a mechanism in which spaces can be altered at the inhabitant's will easily. Fuller intended to create a mass-produced house, with a similar understanding and production of automobiles (Baldwin, 1997). He tried to design with fewer materials and more dynamicity, using inflatable or continuous, changing elements in the house, with an attitude of involving natural principles in the whole process of living, doing more with less (Baldwin, 1997). Archigram's Cushicle/Suitaloon concept consists of a portable mechanical system – a product – that can be inflated to create a personal space regardless of location. The perspective in this concept takes space as an extension of the body, using the flexibility and dynamicity the human body offers to create a modifiable space. All these concepts envisioned a future without physical restrictions, making it possible to create

adaptive environments to answer the needs of a changing society.

Tendencies in the post-war era to create product-like customizable environments affect contemporary architecture and 21st-century architecture is using ICTs and sensor technologies to answer these tendencies (Onbay, 2009). The user-oriented basis of Interaction Design along with new ICTs related tools and techniques gives architecture new tools to create responsive, adaptive, and inclusive spaces. ICTs, especially computers, altered the relationship between space and inhabitant into a more dynamic relation, causing a change in the experience of architecture and space (Ak, 2006; Bouman, 2005). Initial integration of ICTs in architecture was to control physical environment conditions, using informational systems to adjust heating, air conditioning, lighting, etc.

Research on the architectural relevance of ICTs increased after the 1990s with the wide use of computers. MIT Tangible Media Group, PHILIPS Design, DSRYN, and many architects investigated ways to include ICTs into spaces. MIT's ambientROOM, House_n Consortium projects offered adaptive spaces embedded with natural ways of interaction to answer inhabitants' needs on different scales. PHILIPS Design's Reading Room 2020 concept offers a consultation room embedded with ICTs without the domination of screens. As stated on their website (URL-4), the goal is to create a non-disruptive knowledge-sharing environment that benefits from technology. On the perspective of overcoming the dominance of technology and creating technology-supported experiences, several other concept projects are built such as Blur Building, Hyperbody Interactive Wall, and deCOi's Hyposurface. Blur Building of 2002 Swiss EXPO is a lightweight structure placed over the lake to create a special foggy atmosphere by offering a space experience without walls but with limited vision. After visitors are tagged according to their answer in the pre-enter questionnaire, and when they encounter others inside the building, they are informed about their similarities and differences subtly (Picon, 2010). Designers aim to eliminate the dominance of audial and visual interaction channels with fog to create deeper interaction with other visitors. Hyperbody Interactive Wall and Hyposurface are very similar as they both offer dynamic partition elements that change their shapes when interacting with a person from different interaction channels such as movement, light, and sound. Lines: an Interactive Sound Art Exhibition in 2016, Umeå, demonstrates a new interaction of body and space to create music (URL-5). When visitors touch, caress or place objects on the coloured lines across the walls and floor, they create music. All these concepts focus on the individuals' input into space and try to reach the diversity of natural interaction channels of humans.

4. Discussion

Information and Communication Technologies altered daily life in several aspects with new mediums to interact, communicate and create, and these mediums became essential to today's living. Both digital and physical worlds are enriched with both great offerings and disadvantages. While the ability of computing, executing complex tasks at ease, availability of information without boundaries are innovative; lack of sensory diversity, physical dominance of technology, static products and spaces can be counted as the disadvantages that arose with ICTs. Though, with developments in ICTs and supportive technologies such as AI, AmI, AR, etc., these problems will be eliminated gradually. Technologies about the landscape and the mind of the digital world hold valuable ideas and future possibilities to create a well-functioning interface between the two dimensions: physical and digital.

Lack of sensory diversity, one of the main disadvantages that ICTs brought to life, is a widely discussed topic both on architecture, product design, and HCI. Humans' natural interaction with their surroundings, objects, and other living beings holds important clues. Cybernetics, being the core of computing, emerged from analysing this interaction system. Technology is a way to enhance human life not a way to place limitations on it. Architecture also

serves its inhabitants, creating 'delight'. Therefore, it is possible to state that human values and needs are essential both in technology and architecture, and these two are connected. While technology and architecture seem to place humans in the centre, contemporary life focuses on a fragment of humans by turning into mainly visual culture. Humans sense with their whole body not just with their eyes or ears, but both with primary and peripheral senses. Therefore, creating mediums mainly based on visuals cause problematic or limited interactions. User interfaces evolved from CUIs to GUIs to TUIs and to Next Gen. UIs to eliminate these limitations of being based on just a few senses. First generations of UIs depend more on visual and auditory channels. In later generations, tactile and whole-body interactions are included in UIs, and existing visual and auditory interactions are enriched. UIs became more adaptive, responsive, and manipulatable. The goal of HCI altered from executing specific tasks to create a natural interaction.

Similar to initial UIs architecture became an object of visual satisfaction. This is criticised by architects such as Le Corbusier, Frank Lloyd Wright, etc as architecture is dealt with as a matter of vision rather than answering the varying needs of human living. Discussions in the post-war era and criticism of modern architecture are aligned with the ones about products as they both address the rich diversity of human senses. For the last decades, AI, AmI, and supportive technologies such as IoTs are used in architecture to create multisensory experiences. When the core values of HCI and architecture are compared, it is possible to say that both aim to achieve natural interaction at most. The way of interaction becomes more natural as the limitations and interruptions of initial ICTs decrease with developments in the field.

Another disadvantage emergence of ICTs caused is the domination of technology in daily life. Technology dominated interiors and life with the products born out of it. These products appeared as black boxes with screens and buttons. As UIs evolve, host products become altered. ICT-embedded products become smaller and portable, and existing products such as wearables or automobiles are integrated with ICTs. The effect of ICTs on interiority can be seen in automobiles.

The integration of ICTs in automobiles began with music systems and indicates that even intangible mediums hold the power to change users' perceptions about products and their surrounding space. Recent driving tools and future concepts of self-driving cars have the potential to alter the whole experience of cars, turning their interior into recreational space. The driving experience of today is also enriched with ICTs using AR systems to inform drivers without distracting them. As ICTs become more ubiquitous both physically and digitally, the domination of technology decreases. Next Gen. UIs offer more organic and natural interactions, and host products, therefore it is possible to say they will and are affecting designing principles. Design process of a static product and a shape-shifting or living-embedded product such as SecondSkin would differ drastically. As the restrictions on physical attributes of ICTs hosts decreased, the host itself along with the nature of actions will change again.

One of the disadvantages of ICTs is though they offer a high level of flexibility and a vast variety of actions in the digital domain, they are not responsive enough to match human dynamicity. Humans are not static entities, their habits, wants, needs change constantly. In contrast, products and built-environment are designed to be static, not meeting with the dynamicity of humans. To achieve a rich conversative environment, spaces should be able to adapt and match human dynamicity. Architecture is a system activity and its pattern suits the information system flow, architecture being the source and inhabitants being recipients. ICTs such as AIs, IoT, etc. brought the opportunity to turn this system into a communication system. Even though architects are the designers of a building and create a possible space, and interior architects define interiority, inhabitants are the actual users living and changing with that space. Even though the architecture is static, interiority and inhabitants

are dynamic. Inhabitants' contribution is essential, though it is underestimated. As each asset in a system is an observer whether their perception, observation, and interpretation differ, when the built environment is considered as a source, the message of the space gains importance. And this message needs to be implemented into space carefully considering these arguments.

Futurist architects such as Fuller, Friedman, Archigram, and Superstudio criticised the static design of built environments, offered systematic approaches to meet with inhabitant's flexibility. Their concepts envisioned a future without physical restrictions, making it possible to create adaptive environments to answer the needs of changing society. Even though these concepts are still questionable in the means of construction, core values of them such as inhabitant involvement and a systematic approach to meet users' needs are still up-to-date. At this point, it is possible to claim that ICTs offer ways to enhance human life and their environment, with systematic approach and needed flexibility. Shapeshifting interactive space elements, responsive interiors are actualized with help of ICTs. Though these still do not meet the level of flexibility or diversity in post-war era design concepts or the actual human dynamicity, they can be considered as starting points. Examples of dynamicity in the built environment, such as Hyposurface, Hyperbody Interactive Wall, Blur Building, and Lines exhibition along with the visions about the nature of architecture, its relevance to technology, and developments in ICTs indicate that architecture is becoming the host of ICTs to enhance and restore human-space relationship along with the ability to create new experiences.

5. Conclusion

The physical and digital worlds are merging more and more with developments in ICTs. While UI was mainly a matter of interaction and product design, UIs begin to merge into spaces, turning physical walls into screens, creating non-physical but touchable buttons. Interior spaces are gaining interactive features that once were implemented products. Product Design profession dealt with these features from user experience perspective for several decades. ICT embedded products went through the issues of being dominated by technology, lacking sensory diversity, and not meeting human dynamicity. Product designers gathered valuable insights on implementing these technologies. On the other hand, even though architects dealt with ICTs on the information systems level, communication systems are new to this practice. Interiors are becoming products, consisting of conventional building elements, ICTs, and user interfaces all at once, gaining new tools to enrich interiority. Therefore, it can be claimed that the nature of architecture and creating built environment are becoming more interdisciplinary and to achieve a natural interaction with interiors it is crucial to have a collaboration between architects, HCI practitioners, ICT developers, and product designers, as each profession have a different but complementary perspective.

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A unique representation of Ottoman residential architecture: 19th century summerhouses in the Kadıköy District, Istanbul

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Abstract
In Ottoman architecture, the eighteenth and nineteenth centuries are known as the Westernization Period of Ottoman Art. All of the various types of structures of Ottoman architecture display a concentrated western influence in these period. In particular, with the era of Sultan Abdulhamid II (1876-1909), European-based architectural movements can be said to have virtually invaded the land, producing as a result a rich diversity of styles. The summerhouses emerged as a new residential typology in the nineteenth century and appeared in Istanbul's coastal districts and the Princes' Islands. The aim of this article is to present the wooden summerhouses that were products of the era in which Ottoman culture turned its face to the west, creating a unique group of residential architecture in the 19th century. Toward this end, various nineteenth century examples of these houses in the Kadıköy District of Istanbul have been explored in terms of their plan designs, the new elements of their layout, and the formation of their facades.

Keywords
Late Ottoman architecture, Westernization period, Summerhouses, Foreign architectural influences.

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1. Introduction

As relations with France expanded at the beginning of the eighteenth century, Ottoman architecture entered upon a period of "westernization." Beginning in the Tulip Period (1718-1730), this westernization movement in Ottoman architecture was followed by a series of Ottoman westernization programs that were enacted into law such as the Reforms of 1839 (*Tanzimat*), the Imperial Edict of Reform of 1856, the First Constitutional Monarchy (1876), and the Second Constitutional Monarchy (1908). A series of restructuring plans that encompassed institutional, legal and urban reorganization signaled the start of "westernization" and was influential not only in terms of political and social change but also in the sphere of architecture.

The greatest impact of the process of Ottoman westernization on architecture and the changes made in Ottoman architecture was the collective architectural styles that drove the cultural dynamic. Leading these architectural styles were Rococo and Baroque, two artistic movements that began to make an imprint on Ottoman architecture at the beginning of the eighteenth century. These styles were utilized in a widespread architectural program that included all types of structures, not the least of which were the mosques, which were considered the bastion of Ottoman architectural tradition (Ünver, 2001; Bakır, 2003).

The process of westernization and modernization also made an impact on Ottoman residential culture. It is accepted that the most significant indicator of the westernization of Ottoman residences goes back to the era of Selim III (1789-1807), one of the most influential sultans in the period of Ottoman westernization. Selim III had invited the Austrian artist and architect Antoine Ignace Melling (1763-1831) to Istanbul and it is the mansion of masonry, with its Neo-classic facade arrangement, the architect built for himself adjacent to the wooden Shoreside Palace built for the Sultan's sister Hatice Sultan at Defterdarburnu that stands as a symbol of the westernization of Ottoman residential architecture (Kuban, 2001). Another structure by Melling, known as Valide Sultan Yalısı, built for Esma Sultan, the daughter of Abdulhamid I, at Eyüp, is also an adaptation of western style with its Neo-Classic pediments in the front facade of the Sultan's Quarters overlooking the Golden Horn (Artan, 1994). Most of such buildings boast of a Baroque-Rococo style of interior decor. The interior of a salon that carries the signature of Thomas Allom in Esma Sultan Palace features an engraving that is indicative of the sumptuous nature of Baroque-Rococo decorative art in Istanbul. A traveler to Istanbul at the end of the eighteenth century, Dallaway, describes the ornamentation of the period of Louis XV that he saw in these palaces with great astonishment (Kuban, 1994).

Prominent statesmen, aristocrats and the affluent of eighteenth century Istanbul made use of western architecture and its decorative tastes in the houses they built. The central *sofas* of the large shoreside houses (*yalı*) and the elliptical center *sofas* of the mansions (konaks) of this period became essential elements of these types of residences (Eldem, 1954; Eldem, 1984). Again in this period, *iwans* ended in an oval form that revealed a Baroque influence (Kuban, 2001).

Another western influence in this era was the "kalemişi" decorations and murals tradition that took the place of the Ottoman geometrical and vegetative architectural decorations that had once prevailed in palaces and konaks. Such paintings became the fashion and, besides vegetative designs, city panoramas–particularly of Istanbul and the Bosphorus–boasting of urban landscapes and scenery that did not include people, as well as architectural works of art were their predominant themes. The tradition of wall paintings first took hold in the Istanbul palace and in cities like Izmir, where a wealthy merchant class thrived, later penetrated the whole of Anatolia (Kuyulu, 2000). These paintings began to be seen not only in the homes of non-Muslim and foreign families but also in the homes of affluent Muslim Turkish families. The works of art were generally commissioned to foreign artists from the embassy communities to

be put up in the konaks and yalis that were being built for foreign embassies (Kuban, 2007).

The oval-elliptical *sofa* and i*wan*s, with their *kalemişi* and murals paintings continued to flourish with the reign of Mahmut II (1808-1839) at the beginning of the nineteenth century (Eldem, 1954). Starting from this period, houses and mansions begin to resemble each other more, both in terms of plan and dimension. It was in this period that people aspired to give their houses the appearance of a kiosk in terms of plan and character (Eldem, 1954).

The era of Mahmud II was a time of westernization and a period in which the Empire style showed a marked influence in Ottoman residential architecture. Mahmud II's ambition was to use the Empire style in public buildings of state and ultimately make this design a symbolic representation of the empire. Toward this end, he had the "New Beşiktaş Palace" built in the French Empire style over the period 1834-1841 on the shores of Çırağan (Gülersoy, 2014).

The Empire style thus became a major influence in Ottoman residential architecture at the beginning of the nineteenth century. Simplicity in facades and an intense interest in symmetry can be seen in this period. The Empire style is thus characterized in facades by increasing simplicity, triangular pediments, and a decrease in projections and decorative elements (Günay, 2017). The corners of houses are accented with pilasters with Tuscan-Doric column capitals. The triangular or semicircular pediments above the windows reflect the Empire influence.

With the era of Sultan Abdulhamit II (1876-1909), the Neo-Classic, Neo-Baroque, Neo-Gothic, Orientalism, Art Nouveau, Eclecticism, Swiss Chalet and English Victorian styles as well as other European-based architectural movements can be said to have virtually invaded the land, producing as a result, a rich diversity of styles. During this period, notables of the state and the non-Muslim affluent begin to build shoreside mansions, pavilions (kiosks), embassy buildings and small palaces, shore palaces and summer houses along both banks of the Bosphorus.

Summer houses, one of the new building types that emerged in this period, began to be built by foreign architects and non-Muslim Ottoman architects living in the Empire, especially in the capital city of Istanbul. Some of these houses, which belong to the wealthy Ottoman elites, reflect the traditional Ottoman housing pattern with their plan and architectural elements, but most of them have architectural features similar to Western cottage houses and mansions in terms of form and style.

2. Methodology

European architectural styles started to influence Ottoman aristocratic residences as from the beginning of the 18th century, impacting plan types, facade arrangements as well as interior decoration. The urban physiognomy, with its metropolitan residences, exhibited important changes in this period. While at this time, the local culture of the impoverished population was represented by functional, simplistic housing architecture created by ordinary builders, the new cultural elements imported from the West were making their way into the homes of the wealthy. This brought on the advent of the fashionable "summerhouse" trend among the affluent residents of the capital who had abandoned their old lifestyles to establish residences in the shoreside districts of Istanbul such as Kadıköy, Göztepe, Ziverbey, Erenköy, Yeniköy, İstinye, Sarıyer, Büyükdere, Bakırköy, Yeşilköy and the Princes' Islands. Built as mansions or kiosks built of wood atop a basement of masonry and surrounded by spacious gardens, vineyards and woods, these residences were picturesque in the way they brought together landscaping, a spacious view and nature. The plans and facades of most of these buildings were created by foreign architects and carried western elements as well as those of traditional Ottoman residential architecture.

This article attempts to introduce and describe the wooden summerhouses that comprise a unique group of structures in 19th century residen-

tial Ottoman architecture. Various nineteenth century examples of these houses in the Kadıköy District of Istanbul, all of which emerged as products of the westernization of Ottoman culture, have been explored in terms of their plan designs, the new elements of their layout, and the formation of their facades. Also described are the western architectural trends that influenced the emergence of these houses, the parameters of the process by which these trends entered Ottoman design, and the precursors of these structures in Ottoman architecture.

3. Factors influencing the development of residential buildings in 19th century Ottoman architecture

During the period of Reforms (*Tanzimat*) (1839), as in all other aspects of culture, new models of organization and legislation were introduced in the field of architecture as well (Batur, 1983). A striking development in architecture in this period was the permission granted to architects to open up independent architectural offices. The first architect to establish an office was Gaspare Fossati (Yazıcı, 2007).

With the proclamation of the Imperial Edict of Reform, the principle of equality between Muslims and non-Muslim Ottoman citizens was adopted, being put into force in market terms with all legal restrictions lifted. Among the clients of the non-Muslim Ottoman or foreign architects educated in Europe were the Ottoman elite and the Levantines who took their place in Ottoman society. While some of the architects taking on the projects of Levantine clients were foreigners, some had either lived in Istanbul for a long time or, as children of Levantine families that had settled in Istanbul, were directly a part of the Levantine community.

The architects who were active in this period included non-Muslim architects (*kalfa*) who lived in Ottoman society as well as many European architects who had come into the Empire from Europe. Among these architects were well-known figures such as Alexandre Vallaury, Raimondo D'Aronco, Guilio Mongeri, Philippe Bello, M. Rene Dukas, August Jachmund, A. Berthier, Otto Ritter and Helmuth Cuno. Some of them took on positions at *Sanay-i Nefise* (Fine Arts School) established by Abdulhamit II (Batur, 1983).

This period, in fact, is referred to in Ottoman architecture as the *age of civil architecture* based on the intensive construction activity that produced palaces, kiosks, summer palaces *(kasır),* and residences (Yazıcı, 2007). These buildings were commissioned by the dynastic family, foreign ambassadors, and the wealthy administrative staff members to be built on both sides of the Bosphorus. The lifestyles and tastes of non-Muslim and Levantine Istanbulians were closely connected to western architectural styles and consequently had an impact on the residential architecture in this period (Yücel, 1996). Districts of the city such as Galata-Pera, Nişantaşı, Şişli, Tatavla, Teşvikiye and Ayazpaşa on the European side and Yeldeğirmeni and Mühürdar on the Anatolian side were the first to display the novel typologies.

With the advent of the era of Sultan Abdülhamit II, traditions faded and a taste for the eclectic facade dominated the beginnings of an architectural movement that had its origins in Europe. Among the trends were Revivalist movements such as Neo-Classicism, Neo-Baroque, Neo-Renaissance, Orientalism and Eclecticism and other new styles that included Art Nouveau, Swiss Chalet and English Victorian. These styles, which were reflections of western cultural tastes, started to be implemented by foreign architects and non-Muslim Ottoman architects living in Ottoman society, in all types of structures but especially in the houses of the Ottoman intelligentsia, and on both banks of the Bosphorus, shoreside houses, kiosks, pavilions, embassies and small palaces, shoreside palaces and summerhouses began to be constructed for members of the higher echelons of state and the non-Muslim affluent. It was in this way that a residential style that was unique to the capital (Istanbul) was born (Kuban, 1994a). The changing social structure played a role in this. Since the period of

reforms known as Tanzimat, the commercial elite and bureaucracy of Istanbul developed a liking for the bourgeois manners, dining customs and furniture styles of European culture (Bozdoğan, 1996). The westernization policies adopted in this era led to a preference for the use of western-styled furnishings such as sofas, chairs, mirrored consoles, tables and table clocks in interiors alongside of customary Ottoman furniture (Bozdoğan 1996, 315). While the westernization movement first began as a strong inclination for the life and cultural styles of the West on the part of an elitist group in society, it was soon to make its way slowly through the other segments of the population (Yücel, 1996).

4. Antecedents of summerhouses

The diversity in residential architecture that started at the beginning of the reign of Sultan Abdulhamit II featured a new type of residence–the summerhouse. These houses belonged to the wealthy Ottoman elite and while some of them reflected the traditional Ottoman residential fabric in their plans and architectural elements, a large number carried the architectural characteristics of the summerhouses and mansions of the West in terms of style and manner (Yücel, 1996). These structures, which grew more prevalent in the era of Abdulhamit II, exhibited the features of the Neo-Baroque, Neo-Gothic, Neo-Classic, Orientalist, Art Nouveau, Eclecticism, Swiss Chalet and English Victorian styles.

Wooden kiosks were brought in from Switzerland and Russia to be erected in the gardens of the *harem* at Yıldız Palace during the reign of Abdulhamit II. These small kiosks were called "chalets" in that period (Batur, 1994). The first example of this type of kiosk was Chalet Kiosk that Abudlhamit II had constructed for the German Emperor Wilhelm II and the Empress upon the occasion of their visit to Istanbul. The kiosk consisted of three structures tied together linearly by different architects at different times. The first part of the kiosk to be built was erected before 1879 and boasted of elements that echoed the chalet character such as the upright gabled roof supported by a projecting entrance and the tympanum lattice infilling on the front facade of the gabled roof (Figure 1). The horizontal and vertical wooden framework on the facade is another enhancing element (Batur, 1994). The second structure making up the kiosk is the section built by Sarkis Balyan over the period 1887-1889. This section was annexed by the architect to the first building using the same frontal arrangement and again, the entrance axis was projected over the main mass and as in the tympanum in the first section, was covered with a steep gabled roof with a tympanum of lattice infilling. The foreign element that Sarkis used in the plan of the structure was two salons facing each other that were made up of triangular projections and a corridor. Raimondo D'Aronco, who was the architect of the third part of the building that was constructed in 1898, added the foreign element of a corridor and then annexed an octagonal tower projecting out from each side of the entrance to this section (Barillari, 2010) (Figure 1).

The precursor of these types of structures can be cited as Cihannüma Kiosk, built again at Yıldız Palace by Abdulhamit II. The steep gabled roof projecting outwards and over the raised entrance axis and the eave moldings as well as the wide-eaved steep gabled roof stretching over the attic windows also point to the chalet influence (Figure 1).

Another building constructed in the chalet style in this period was Imrahor Kiosk, built on the shores of Kağıthane Stream, a locality that was one of the city's most popular recreation areas. Soltan Abdülaziz commissioned the building to Sarkis Balyan in 1860 (Eyice, 2000). In terms of its plan, the structure was a traditional Turkish house with an "interior sofa" and architecturally resembled the large villas and summer mansions seen in 19th century western Europe (Eyice, 2000) (Figure 1). The facade looking out toward the Kağıthane Stream had a projecting entrance veranda at its center. Above the balcony was a pedimented eave decorated with festoons, typical of structures in the chalet style. Having an attic floor, a feature that was also typical of the era, the building

had closed, circular protrusions on the side facades. Side entrances had been opened under these projections. Access to the entrances was by means of marble stairs on all four facades (Eyice, 2000). The kiosk had a gable roof and the eaves were again adorned with festoons, a form that was foreign to Ottoman architecture at this time .

Emirgan Sarı Kiosk is another example of the Chalet style in Ottoman architecture. This was built as a lodge for hunting, picnics, leisure, and recreation, and commissioned to Sarkis Balyan *by the Khedive of Egypt, İsmail Pasha, in* 1872-78. Designed in the manner of romantic English gardens, the kiosk was constructed on a traditional Turkish house plan, and openwork patterns can be seen along the axes of its main and side facades. It is covered with a gable roof with eaves in the Chalet style. The chimneys were built in such a way as to be differentiated from afar, a characteristic unique to these types of structures (Figure 1).

Other antecedents of this style can be seen in the summer pavilions of the German and British embassies. The plan of the German embassy summer residence along the shores of the Bosphorus at Tarabya was designed by Wilhelm Dörpfeld and implemented by the German architect Armin Wegner in 1885-87. The building's crested gabled roofs, towers and its steep gabled roof windows provide foreign architectural touches to a basic Ottoman style (Figure 2). The plan of the building also exhibits various novel elements. These are the entrance hall, encircled with glass; a small vestibule accessed by the hall stairs; a spacious medium-sized hall accessed from the vestibule with rooms stretching beyond, and a pentagonal corbeled room that is a traditional feature of Ottoman architecture (Kalatafoğlu, 2009). The arches on the balcony on the facade, situated on the central axis of the building, are polylobed Moorish arches. The tower is in the Chinoiserie style. The spear-shaped features on the ends of the eaves are also evidence of newly adopted decorative elements (Batur, 1994a). Similarly, the decorative eaves, the polygonal high tower and the steep gabled roofs of the British Summer Embassy thought to be built by Mıgırdıç *Kalfa* in 1884 and that burned down in 1910 also carried marks of western architecture (Figure 2).

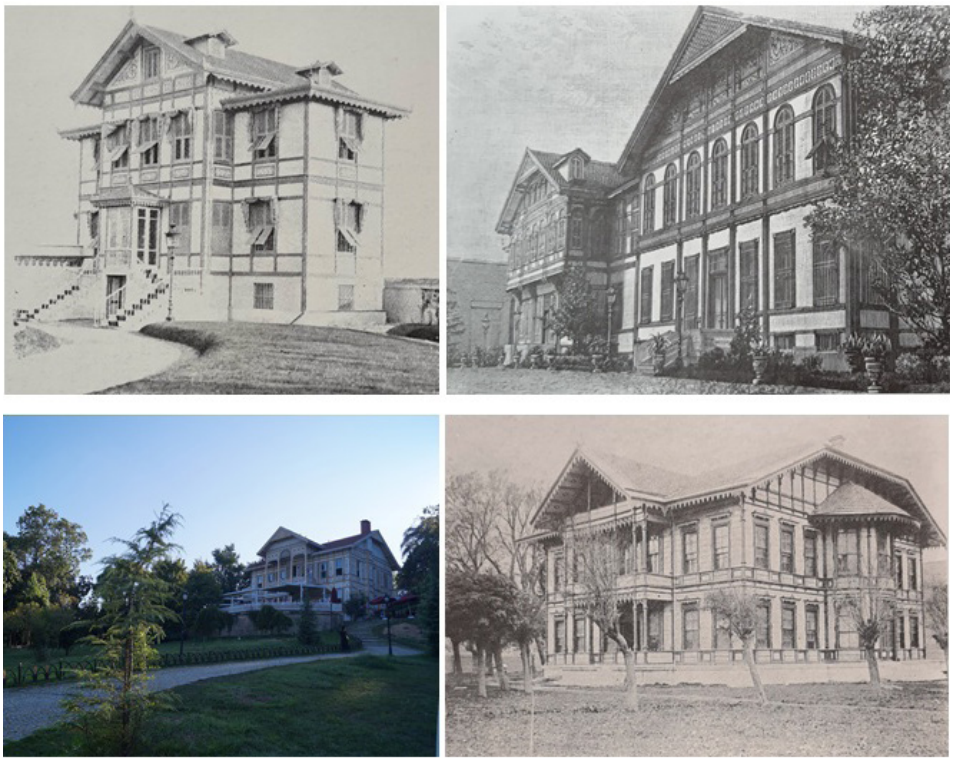

Figure 1. *Above Right: Yıldız Palace Chalet Kiosk (Tuğlacı 1981, 299). Above Left: Yıldız Palace Cihannüma Kiosk (Tuğlacı 1981, 299). Below Right: Yıldız Palace Imrahor Kiosk (Tuğlacı 1981, 267). Below Right: Emirgan Sarı Kiosk (Author).*

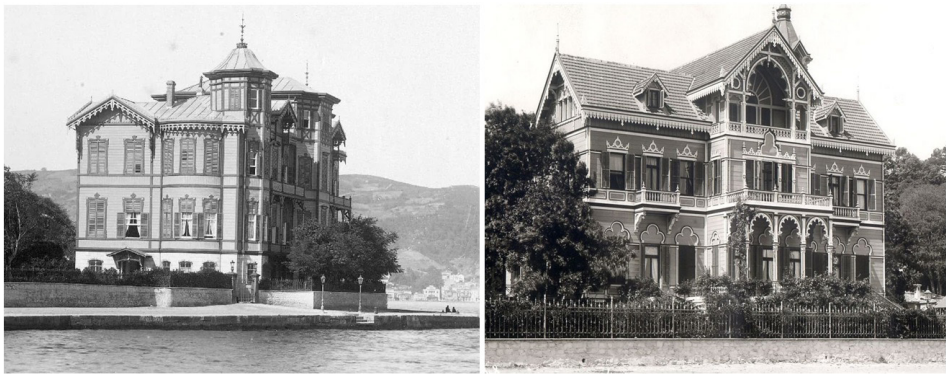

Figure 2. *Right: Tarabya German Embassy Summer Residence (Adapted from Eldem 1984). Left: Summer Residence of the British Embassy (Adapted from Eldem 1984).*

5. Ottoman summerhouses

"Summer houses" constituted a new type of residence that emerged in 19th century Istanbul. At the end of this century, members of the palace, high-ranking civil servants, soldiers, affluent Ottomans, embassies, Levantines and prominent non-Muslims began to build houses on the Anatolian banks of Istanbul–in Kadıköy, Göztepe, Ziverbey and Erenköy–as well as on the Rumeli side–at shoreside districts such as Yeniköy, İstinye, Sarıyer, Büyükdere, Bakırköy and Yeşilköy. Istanbul's Princes' Islands were also chosen as spots on which to built summer homes. This trend, which started in the capital (Istanbul), steadily spread to reach points along the railroad routes and commercial centers on the coasts of the Marmara and Black Seas, carrying the concept of the summer home to the suburbs of Edirne, Trabzon, Samsun, Bursa and Izmir (Yücel, 1996). The shores of the Black Sea, in particular, were soon filled up with the summer houses of notable families in the region. These wooden residences were generally erected by Greek and Armenian undermasters of Turkish nationality, supervised by foreign architects, who designed the houses to reflect western tastes. Built in a style that did not appear in winter residences, the summer homes erected by affluent Ottomans were modeled on the summer residence buildings of the German and British embassies.

The houses were intentionally built among spacious vineyards and agricultural land along the coasts and had expansive gardens, private vineyards and groves that abounded with pine, cedar and magnolia trees. The kiosks or mansions provided a picturesque perspective where the house itself was blended in with the scenery and nature.

The mansions belonged to the aristocrats, and the organization of their plans consisted of a raised basement floor of masonry with generally two regular floors (ground+first) and an attic floor. Some were built on a wooden frame, some were brick covered with wood (Batur, 1994a). Those built in the timber frame system sometimes had wooden cross connections on the facades. These connection elements were often emphasized in different colors (Saner, 2008). The distribution of spaces in the mansion placed the kitchen, storage rooms, pantry, laundry room, servants' rooms and other service units such as baths and toilets on the basement floor. The main floor plan (ground floor) displays a trio of specialized public rooms–a parlor, library or office, and a dining room (Ekdal, 2000). These three rooms are sometimes accessed through a central hall (sofa) and sometimes through a corridor. Also on this floor is a toilet/bathroom and back entrances and service stairs for servants. The first floor contains the bedrooms. All of the rooms have high ceilings and ornate lighting (Ekdal, 2000). One of the novelties in these structures was the attic, which was an element that was not a traditional part of the Ottoman house.

Another new element not found in the traditional Ottoman home was the entrance hall. This hall was directly accessed from the stairs, decorated with stained glass and had a separate door leading out into a corridor. Sometimes

standing in front of the entrance hall was a decorative, arched porch, another stylistic element of foreign origin. The decorative arched porch was particularly a new motif that was adopted especially in houses that had no entrance hall where the door opened out directly into the *sofa*. The houses usually had another entrance at the back that was accessed by steps. The vestibule, central hall, corridor and stair area were architectural archetypes of the period.

Unlike in the traditional Turkish house, the entrance did not always stand on the central axis but was sometimes set to the side or in the corner. If the entrance was positioned on the central axis, this section of the house was designed to project outward, with its own roof and always having an arched balcony with a wooden banister. An emphasis was thus inevitably placed on the entrance to the house.

At the same time, the simple or L-shaped verandas on the front and back of the ground floor, the windbreaks or terraces and the triangular, hexagonal or polygonal rooms, as well as the three-cornered balconies were among newly adopted architectural elements. The towers and octagonal gazebos (*cihannüma*) were features that were foreign to the traditional Ottoman home. The clay roofing tiles used in these structures also represented foreign influence.

6. Characteristics of the plan

The layouts of the summerhouses of the period featured the novelty of a corridored plan. It was also seen that the traditional Turkish house plan continued to be used with certain modifications. The most striking feature on the new plan was the asymmetry. The Turkish house plan is traditionally symmetrical but these houses were designed on an asymmetrical plan. The hall or corridor is a new element of house plans that began to be seen in residential architecture as from the nineteenth century. The period was characterized by the transfer of the monumental imperial staircases of large shorefront houses and mansions to the sections of the house between the *harem* and *selamlik,* with corridors around the stairs connecting the *harem* and *selamlık sofas* (Eldem, 1954). As from the middle of the 19th century therefore, the central *sofa* plan was replaced by halls (corridors) on the symmetrical axis and stairs that led up to these halls (Batur, 1994a). In other words, the *harem* and *selamlık* were joined in the same building mass by means of the stairs between the two buildings and the surrounding corridors. Significant examples of this new type of plan that emerged in the Ottoman house under the western influence are the Rumelihisarı Kadri Raşit Pasha *yalı,* Kanlıca Saffet Pasha *yalı* and Bebek Halim Pasha *yalı.*

Corridor plans were widely used in summerhouses. One of the major kiosks of the times, Ali Şefik Pasha Kiosk (Esad Totani Pasha Kiosk) was built in Kızıltoprak by Ali Şefik Pasha, the army commandant in Erzurum. The architect of the structure, which is today being used as the Kızıltoprak F.Şadiye Toptani Teacher's Residence, is unknown; it comprises a basement of masonry, two floors of living space made of wood, and an attic. In the middle of the building, running north-south, is a transverse corridor that divides the structure into two. At the east of this hall, on the ground floor on the side that looks out onto the main facade of the kiosk, there is a parlor that projects outward from the central axis and beside it on one side, a recessed room, with an entrance hall on the other side (Figure 3). An imperial staircase stands at the west end of the hall in the corner. The wet areas on the two stories are situated alongside the stairs. The first floor of the house is based on the same plan and contains the bedrooms. The ground floor parlor is a room that has a decorative wooden balcony in front. The attic floor of the kiosk has been designed in the same layout as the first floor. On this floor again, there is a parlor with an arched balcony with a wooden banister that sits on wooden posts (Figure 3). The house has been set on an asymmetrical plan, where the entrance is not on the central axis but on the side. One characteristic feature of the house in the period is a porch out in front that is accessed through a glass entrance hall. This entrance hall leads directly into the corridor. The

structure can also be accessed from entry stairs on the west and from an entry hall in back that also opens out into a corridor.

The house plan that included corridors, a trend that was widely seen in summerhouses, can be seen in another example that was built by an anonymous Italian architect–Arif Hikmet Pasha Kiosk, built with Romanian lumber in 1900 for Arif Hikmet Pasha, First Lord of the Admiralty. The four-story structure, together with its service areas, is made of masonry and has two stories above its basement and an attic floor. Its ground floor plan features a hall (corridor) with living spaces situated around it which is accessed from the entrance hall (Figure 4). At the tip of the long and narrow hall or corridor are U-shaped stairs. The other staircase in the building is in the section of the house opposite the entrance hall. On this floor, the hall has two rooms facing each other, with a bath and toilets between them, each having their own corridors. The most resplendent room on the ground floor is the parlor, which is situated as a rectangular and horizontal projection looking out onto the front of the house (Figure 4). On the first floor of the kiosk, the ground floor hall (corridor) has been modified and turned into an almost square *sofa,* to which an addition of a balcony has been made at the end that faces the side of the house (Figure 4). Similar to the one on the ground floor, the parlor facing the front of the house has an additional balcony attached to the end. The same plan is used on the attic floor, and again, a wooden-banistered, arched balcony resting on wooden posts stands in front of the parlor (Figure 4). Both floors of the kiosk are arranged on an asymmetrical plan. Entry into the kiosk is from a closed entrance hall accessed by curved stairs that stand in the corner at the rear of the outward-projecting parlor (Sürmeli, 2019). The closed entrance hall leads into a small staircase hall. It is from here that the main hall (corridor) of the house is reached (Figure 4).

Figure 3. *Above: Ground and first floor plans of Ali Şefik Pasha Kiosk (Esad Toptani Pasha Kiosk) (Redrawn from Kalafatoğlu 2019, Fig 10). Below: Ali Şefik Pasha Kiosk (Esad Toptani Pasha) (Author).*

Figure 4. *Above: Ground and first floor plans of Arif Hikmet Pasha Kiosk (Redrawn from Sürmeli 2019, Fig 18). Below: Arif Hikmet Pasha Kiosk (Author).*

Another layout used in the summer kiosks was the "interior *sofa* plan" and its variants, which were among the most popular designs utilized in the traditional Turkish house. The most widely used layout variant in the summerhouses of this period was the "*sofa* and interior stairs" type. At the beginning of the 19th century, houses with interior *sofas* had a staircase at one end of the *sofa*, and half of the *sofa* was allotted to the stairs (Eldem, 1984). Sometimes the section of the room where the staircase stood had a door. In shorefront houses, the side of the house where the sofa and stairs were situated looked out into the garden. This type of plan where the stairs stood on the innermost side of the sofa is called the "*sofa* and interior stairs" plan (Eldem, 1954). This layout, with its monumental imperial staircase at the end of the *sofa* can also be seen in the summerhouses of the period.

Cavit Pasha Kiosk, Kadıköy Bostancı, is one of the examples of this type of plan. Made up of a ground floor, a first floor, and an attic floor, the wooden kiosk has a single-story pantry section of masonry adjacent to it (Sürmeli, 2019). The plan used on all of the floors is of "*sofa* and interior stairs" design. As in traditional Turkish houses, the entrance is on the central axis and directly leads into the *sofa* (Figure 5). This time, however, as a novelty peculiar to this particular era, a decorative arched porch sitting on wooden posts stands in front of the entrance hall (Figure 5). On the ground floor, the front part of the *sofa* functions as an entrance hall. At the end of the *sofa* is a door that leads to U-shaped stairs. A design that differs from the traditional Ottoman house is the projection of the *sofa* not toward the front but toward the back and the north. On this floor, there are two rooms on one side of the

Figure 5. *Above: Ground and first and attic floor plans of Cavit Pasha Kiosk (Redrawn from Sürmeli 2019, Fig 16). Below: Cavit Pasha Kiosk (Author).*

sofa and on the other are situated a room and a hallway that opens out into the service area (Figure 5). On the first floor of the kiosk, there is a *sofa* that serves as a parlor and is situated on top of the entrance hall on the ground floor. The plan of this floor is symmetrical and the spaces in the two wings of the sofa have been arranged symmetrically. A decorative wooden-banistered balcony stretches out in front of the *sofa* or parlor (Figure 5). On this floor, on two sides of the *sofa* (parlor), there are three-sided balconies on each side of the rooms facing the front of the house, a feature that is foreign to the traditional Turkish house. The attic floor of the kiosk has been designed in the same layout as the first floor. On this floor again, there is a *sofa* or parlor with an arched balcony with a wooden banister that sits on wooden posts (Figure 5).

The template of the house with "*sofa* and interior stairs" presents another example in the form of Mihran Efendi Kiosk in Erenköy. Also known as "Kuleli Kiosk", this structure is made up of a ground floor, a top floor and a cihannüma floor (attic room). Another feature of the period can be seen in the way the interior sofa projects out toward the back instead of to the front. The kiosk's *sofa* was assigned an entrance hall function on the ground floor and served as a hall on the upper floor (Figure 6). Arranged around the stairs at the end of the *sofa*, or entrance hall, on the ground floor, are a kitchen, toilet and bath. On the upper floor, there is only a toilet situated at the stairs. There is a room on each wing of the *sofa* (entrance hall) on the ground floor. While one of these rooms ends at the same point as the *sofa,* the other projects out toward the front. The room ending at the same point as the *sofa* has a wooden-columned veranda stretching out in front, a feature found in the summerhouses of the period that were not included in a typical Ottoman house (Figure 6). The house is accessed from the veranda, which is reached with a few steps that lead in from the

Figure 6. *Above: Ground and first floor plans of Mihran Efendi Kiosk (Kuleli Kiosk) (Redrawn from Sürmeli 2019, Fig 11). Below: Mihran Efendi Kiosk (Kuleli Kiosk) (Author).*

garden (Sürmeli, 2019). Above the veranda on the upper floor is a balcony that is of the same width as the veranda. On the first floor of the kiosk, there are two rooms that are situated above the *sofa's* outward-projecting room. Above the room overlooking the front of the building is a mansard roof with a wide cornice, an unfamiliar element in Turkish architecture (Fig 6). The most characteristic part of the house, however, can be said to be the emphasis on the view in the form of the tower-like *cihannüma* or roof pinnacle (Figure 6). Situated at the attic room, the cihannüma is covered with a crested cone.

Another type of plan scheme used in the summerhouses of this period is the "interior *sofa*" plan with its "zülvecheyn" or reception hall, stretching out from one end to the other, a feature that was seen in classic Ottoman houses. The plan, however, departed from its popular usage in the traditional Turkish house with the use of different elements that characterized the era. Blending in with the trends of the period, this type of plan can be seen in the example of Dr. Cemil Topuzlu Kiosk in Kadıköy. Built in 1900 by the architect Alexandre Vallaury, this is a structure made of masonry that has four stories above the ground floor (Batur, 1994b). One of the differences in the plan of this building was its asymmetrical design. Asymmetry was a feature of the era and this can be seen in the size and positioning of the rooms on the two wings of the *sofa* in the kiosk. Entry to the house is through a porch that is accessed by imperial stairs that stand in front of the *sofa*, which has been placed on the central axis. This leads to the *sofa* or parlor (Figure 7). Two of the rooms around the *sofa* jut out in a triangular projection on the ground floor, an application that was foreign to the Turkish house at this time. On the side of the house looking out onto the sea, there is a wooden-columned L-shaped terrace or veranda, which is another new element introduced in this era (Figure 7). On the upper floor, this terrace or veranda takes the form of a balcony. On the west wing of the *sofa*, the room juts out toward the back, looking out toward the sea, thus forming a boundary to the terrace/veranda in this direction. This room has wide eaves and is covered with a gabled roof.

The most striking element of the structure is the staircase tower on the northeast corner. These stairs are situated on one side of the *sofa* and are

Figure 7. *Above: Ground floor and first floor plans of Cemil Topuzlu Kiosk (Redrawn from Sürmeli 2019, Fig 15). Below: Cemil Topuzlu Kiosk (Author).*

accessed through a corridor (Figure 7). The tower is taller than the house and is topped by two wide eaves closed off with a conical, pyramidal covering. The upper story of the tower is the *cihannüma* story, where there is a single room. There is an observation deck situated around this room. Besides this striking tower at the corner of the house in front, the other element that captures the attention is the decorative wooden arch seen on the balcony in front of the upper floor *sofa*. Vallaury has used the Seljuk style of pointed arch (Figure 7). A wide eaved hipped roof covers this section of the kiosk, accentuating the entrance axis. This axial entrance with its monumental arch and double-eaved tower defines the identity of the structure.

Another example of the Zülvecheyn "interior *sofa*" plan can be seen in the kiosk located in Göztepe belonging to Zülüfü Ismail Pasha who was aide-de-camp to the sultan. Built as a structure of masonry with two regular floors and an attic on top of a basement floor, the layout of the kiosk includes an interior sofa plan situated on the central axis. There is a wooden-columned porch in front of the sofa on the ground floor. On this floor as well is an entrance hall in the front of the *sofa* that is a feature reflecting the trends of the times, with a salon or parlor in the back (Figure 8). There is a balcony over the porch on the first floor (Figure 8). The entrance hall on this floor is the parlor. On the two sides of the *sofa*, there is a rectangular room on both floors looking out to the front of the house, and looking over the back, there are octagonal rooms with windows on all walls, a foreign element that cannot be found in the traditional Ottoman home (Figure 8). These octagonal rooms have wide eaves and a *cihannüma* above them. The kiosk stairs stand on one side of the sofa between the rooms and there is a *cihannüma* on the attic floor. The toilet, bath and other wet spaces are arranged in-between the rooms on the other side of the *sofa*, separated from the other spaces by a corridor (Sürmeli, 2019).

Figure 8. *Above: Ground floor and first floor plans of Zülüflü İsmail Pasha Kiosk (Redrawn from Sürmeli 2019, Fig 12). Below: Zülüflü İsmail Pasha Kiosk, front and octagonal rooms on the rear façade (Author).*

7. Facade features

In this period, besides summerhouse layouts, facades also exhibit some visible differences. The movement in layout design is echoed and can be read as well in the mass of the structures.

The feature that catches the eye on the main facade of the building is the central axis. Entrances are sometimes on a symmetrical axis but they also shift to the side or to the corner. The *sofa* arrangement in traditional Ottoman residential architecture has been replaced in some examples by a parlor sitting on the central axis. The most dynamic element in the facade arrangement is the parlor, situated on the central axis and projecting toward the front of the building. In the traditional Ottoman house, the customary design is to have the *sofa* project out toward the front in the "interior *sofa*" plan type. In this era, however, a new massive feature can be seen in summerhouses, where in some structures, the parlor sits on the central axis and also projects outward. Major examples of this can be seen in the kiosks of Ali Şefik Pasha and Arif Hikmet Pasha.

Another distinctive feature of the summerhouses of the period is the asymmetrical facade arrangement. This feature, which was never an element in traditional Turkish houses, can be seen very clearly in Arif Hikmet Pasha Kiosk, Mihran Efendi Kiosk and Cemil Topuzlu Kiosk. The asymmetry in the plan of Arif Hikmet Pasha Kiosk is apparent in the chamfered entrance in the corner and its parlor projecting outwards. In Mihran Efendi Kiosk, the main facade consists of a wooden-columned veranda on the ground floor and on one side of the *sofa,* a room projecting to the front with a wide eave and triangular roof covering on top. Cemil Topuzlu Kiosk displays another example of the asymmetrical facade arrangement. Here, it is the staircase tower that stands at the corner higher than the structure, with its wide double eaves and pyramidal, conical roof, that provides the asymmetrical touch.

One of the most striking features of the Ottoman summerhouse facades can be seen in the way a wood-posted porch is situated in front of the sofa or parlor, whereas on the first floor and attic story, there are Maghrib-Moorish-Orientalist-Mudejar decorative balconies with arches settled on wooden columns with banisters of wood

Figure 9. *Above: The widely popular type of festoon used on eaves and balcony balustrades (Author). Below Right: The "chalet" type of houses of the era and their layouts, as described by the author Mehmed İzzet in his book (İzzet 1904, Fig 2). Below Left: Kinds of steep gabled roofs. Balconies with Magribi-Moorish-Orientalist-Mudejar arches and woodworking trim (Author).*

that are fashioned along the lines of the ornate arches seen in the region of Andalusia (Figure 9). The ornamentation on the banisters of these balconies is of wood on which the technique of decoupage has been applied. The decorative workmanship here is a product of the art of woodcarving and it is particularly visible in the rake moldings. The festoon motifs, so widely popular at this time, on the underside of the steep gabled roof and the balcony balustrade make use of S and C curves, a design resembling the Ottoman palmette (Figure 9).

The decorative woodcarvings can also be seen along the window frames. The facades are similarly decorated with lace-like wooden decoupage work. The festoons sometimes wrap around the pediment of the gabled roof.

The steep gabled roof is the most characteristic feature of these houses . The steep gabled roof on top of the attic story balcony has a wide eave with a crest; there are many versions of this balcony. Inside the steep gabled roof are Maghrib-Moorish-Orientalist-Mudejar arches made in the wood decoupage technique (Figure 9).

These roofs sometimes have acroterion and antefix details. The complementary element of the steep gable roof is the arrow that rises from the center of the roof and has vegetative woodwork motifs on two sides, forming the crest. This roof element standing over the projecting entry mass is the most striking part of the front of the building. There are decorative wooden consoles and mutules beneath the wide eaves of the crested steep gabled roofs, a characteristic that makes a visual contribution to the street silhouette of the house, giving the kiosk the aura of both summerhouse and chalet. The roof pediments have a framework of wooden slats (the tympanon), inside of which are various forms and designs made from transversely arranged slats or latticework.

A new architectural feature that appears in the summerhouses of this era is an element that helps to form the facade of the building–attic story windows. The attic was not a place that is commonly used in the traditional Turkish house but in this period, it

began to be used as a living space. The attic window seems to have been designed as a stylistic part of the exterior of the building, and as a characteristic of the period, this element was covered with a steep gabled roof. Another novelty in attic stories was a polygonal or cylindrical cihannüma that jutted outwards from the structure. This archetype, new to summerhouses, takes the form of a tower-like structure with wide eaves.

Another set of elements unique to summerhouses, designed to be viewed from the exterior of the building, were chimneys, kept at a substantial height and adding to the structure a plastic effect. The chimneys are evidence that the houses were also used in the wintertime.

The summerhouses were painted white and in light and bright colors and all woodworking was carried out by local carpenters. The exteriors of the houses were built of pitch pine due to its durability in the face of climate conditions and the elements (Ciner, 1982). Other timber that was used besides pitch pine were oak, chestnut, alder, beech, elm and linden trees. The harder trees were used for the exterior while less durable trees that were challenged by climatic conditions such as linden were mostly used for the interiors of buildings.

8. Discussion and conclusion

This article presents the wooden summerhouses that constitute a unique group of structures in 19th-century residential architecture, all of which were products of the era in which Ottoman culture turned its face to the west. Their plan designs, the new elements of their layout, and the formation of their facades are discussed. Built by foreign architects in the 19th century and reflecting the western influence on Ottoman residential architecture, Ottoman summer residences are a unique example of 19th century Ottoman residential architecture. Especially in Istanbul, the architectural styles reflected in these mansions located in the settlements of the foreign and Levantine bourgeoisie entered the country through foreign architects, embassies, and newspapers (Batur, 1983). The houses are referenced in one of the important periodicals of the day, *Servet-i Fünun*. The July 1894 edition features an exhibition in London of residential wooden houses and advertises that potential buyers could purchase these structures or have similar versions built wherever they chose. In fact, the magazine offers sketches of the houses along with their prices (Kalafatoğlu, 2009). The houses introduced to readers are of the Victorian *Cottage style*.

Built amid expansive gardens, vineyards and woods facing the sea, these detached summerhouses have a foundation basement of raised masonry that forms the base for a ground floor, a first floor and an attic floor. The picturesque appearance of these buildings is due in some structures to their timber frames painted white or in light and bright colors and in others, to the wood-covered bricks fitted into a timber frame. The basement contains a kitchen, storage rooms, a pantry, laundry room, servants' quarters and other service units such as baths and toilets. The kitchen can also appear on the main floor or at the back of the house. The ground floor plan displays a trio of specialized public rooms–a parlor, a library or office, and a dining room. These three rooms are sometimes accessed through a central hall (*sofa*) and sometimes through a corridor. Also on this floor is a toilet/bathroom, as well as back entrances and service stairs for servants. The first floor contains the bedrooms. All of the rooms have high ceilings and ornate lighting (Ekdal, 2000). While there is no functional difference between rooms in the traditional Ottoman house and all rooms serve as spaces for sleeping, dining, cooking or receiving guests, the architectural approach of differentiating rooms according to function became a novel addition to Ottoman architecture and culture. Above the first floor is another element foreign to the traditional Ottoman house–the attic.

These mansions (kiosks) also have another new spatial element–long and narrow corridors (halls). The corridor or hall is an element foreign to the Ottoman house, serving as an area of

circulation and around which all other spaces are arranged. In fact, even service areas had their own internal halls/corridors. The element of the "corridor" or "hall" originated in Europe but has a marked similarity to the "sofa." The hall/corridor so commonly used in the 19th century as an element of houses especially in England and the United States is in fact the equivalent of the sofa in the Ottoman house (Barillari, 2010).

When the hall (*sofa*) is situated on the central axis of the structure, sometimes it can have two sections. In this two-section sofa/hall application, the front of the sofa/hall is the entrance hall on the ground floor and the stairs or the parlor is in the back. On the first floor, the front of the sofa/hall entrance hall functions as a parlor. In front of the sofa/hall is a new element– a wooden-banistered porch. Above the porch, on the first floor, there is a new decorative element in front of the sofa (hall) in the form of a steep gabled roof and balconies that have wooden posts, decorative banisters, ornate arches, triangular pediments and a wide and ornamental cornice (Saner 2008). These balconies are the most important elements of the configuration of the facade. Another new feature in these structures is that the entrances are sometimes placed at the side of the building. In such cases, there is a stained glass entrance hall after the entrance, an element again foreign to the Ottoman residence.

Still another new feature that can be seen in the plan arrangement of Ottoman summerhouses is asymmetry. While the traditional Ottoman houses exhibit a decided symmetry in the arrangement of rooms on two sides of the sofa, the rooms on the sides of the sofa/hall in these summer mansions are arranged asymmetrically. The rooms display the additional imported novelty of sometimes being triangular, pentagonal or polygonal. Triangular, pentagonal and polygonal projections are also a new addition to the Ottoman house and can be seen on balconies and bay windows. The asymmetry of the facade is yet another new element. The asymmetry is created by entrances pulled over to the side of the building, verandas adjacent to the entrance, and towers to the side.

Another space that is new to these mansions is the straight or L-shaped veranda and terrace, which were never a part of the Ottoman house. The verandas on the side of the entrance and the terraces at the back of the house have wooden banisters and decorative arches, also displaying balconies above, again with banistered and arched balconies.

Another striking element that catches the eye in these kiosks is the tower-like structure of a polygonal or square-shaped *cihannüma* that rises above the house to capture a glimpse of the view outside. The cihannüma is sometimes situated on the attic floor and sometimes appears on one side of the building at the top of the stairs. These structures have wide cornices and are topped with a crested cone, giving the building a distinctly characteristic appearance. Similarly, the attic floor and the wide.

The facades of these buildings are highly decorated and the new elements that can be observed from the front of the building are the wide-eaved steep gabled roof and tall chimneys, the banisters of the balconies and the intense wood-carved decorations and decoupage on the cornices, the trim woodworking design, the ornamental wooden mutules beneath the cornices, the wide-eaved steep gabled roof over the balconies on the ends of the sofa/hall, and the arrow- or spear-shaped crests on top of the roofs. The Maghrib-Moorish-Orientalist and Mudejar styles of wooden arches used on the balconies, verandas as well as on the terraces and porches are important new elements that shape the facades of the buildings. The festoon motifs, so widely popular at this time, on the underside of the steep gabled roof and the balcony balustrade make use of S and C curves, a design resembling the Ottoman palmette (Fig. 9). All of the wooden surfaces are abundantly full of ornamentation (Saner, 2008). Similarly, the clay roofing tiles are imported and were first used exclusively in these buildings (Saner, 2008).

Differing from houses in the city, the picturesque appearance of Istanbul's wooden summerhouses exhib-

Table 1. *Characteristics of the summerhouses in the Kadıköy district, as described in the article (Author).*

NAME OF THE STRUCTURE	LOCATION	ARCHITECT/DATE	PLAN	NEW PLAN ELEMENTS	FACADE CHARACTERISTICS
Ali Şefik Pasha Kiosk (Esad Toptani)	Kızıltoprak	Unknown/19th century	with corridor	corridor, asymmetrical plan, parlor projecting out from the facade, front entrance hall, back entrance hall, porch, attic floor, attic floor windows, decorative arched balcony in front of the sofa	decorative arched balcony in front of the sofa, steep gabled roof and crown above the sofa, high chimneys, trim woodworking
Arif Hikmet Pasha Kiosk	Göztepe	Unknown/19th century	with corridor	inner halls in front of service units, parlor projecting out from the facade, asymmetrical plan, entrance hall, decorative arched balcony in front of the sofa, attic floor	asymmetrical facade, decorative arched balcony in front of the sofa, steep gabled roof and crown above the sofa, high chimneys, trim woodworking
Cavit Pasha Kiosk	Bostancı	Unknown/end-19th century	plan with sofa and interior stairs	sofa projecting out to the back, entrance hall, decorative arched porch with wooden columns in front of the entrance hall, service hall, decorative arched balcony in front of the sofa, attic floor, three-corner balconies on the top floor	decorative arched balcony in front of the sofa, steep gabled roof above the sofa, high chimneys, trim woodworking
Mihran Efendi Kiosk	Erenköy	Unknown/1900's	plan with sofa and interior stairs	sofa projecting out to the back, ground floor entrance hall, sofa on upper floor functioning as a hall, asymmetrical plan, verandah, balcony above verandah, parlor, wide-eaved room with triangular roof on top floor projecting out from the front facade, cihannüma with conical crest	asymmetrical facade, decoratively arched verandah with wooden columns, balcony above the verandah, wide-eaved triangular attic above a projecting side room, chimneys, cihannüma tower, trim woodworking
Cemil Topuzlu Kiosk	Caddebostan	Alexandre Vallaury/1900	plan with interior sofa	asymmetrical plan, inner halls in front of service units, porch, parlor, rooms with triangular projections, verandah/terrace in L-form at back, balcony above the verandah, cihannüma in the form of a tower	asymmetrical facade, decorative arched balcony at the end of the sofa, double-eaved cihannüma in the form of a tower, wide eaves, trim woodworking
Zülüfü Ismail Pasha Kiosk	Göztepe	Unknown/19th century	plan with interior sofa	porch, entrance hall, parlor, inner halls in front of service units, octagonal back rooms, cihannüma	cwooden columned porch, decorative arched balcony above porch, wide eaves, cihannüma, trim woodworking

it the features of an Istanbul-specific Cottage style, as well as the characteristics of the Carpenter's Gothic, Victorian, Chalet, Colonial, Art Nouveau, Orientalist and Neo-Gothic styles (Saner, 2008). On the other hand, the design features of the Late Victorian style are more in abundance in these houses. Some of these Late Victorian designs can be seen in such features as the decorative arched pediments, the crested steep gabled or hipped roofs, the mansard roof, wooden banisters, decorative cornices and Magribi-Moresque-Orientalist arched balconies, attic windows, tall chimneys, polygonal or square towers, asymmetrical facades and plans, inverted flowers with leaves and festoons of vegetative decoration, and Victorian trim woodworking (Figure 10) (Comstock, 2010; Osband, 2002). In the same way, the layout of the houses, their parlors, corridors/halls, entrance halls, polygonal rooms, polygonal balconies, polygonal bay windows, triangular, pentagonal or polygonal projecting rooms, asymmetrical plans and facades, porches, verandas and columned balconies, outward-projecting parlors, and the way the entrances were situated to one side, all reflect the features of the Victorian layout (Figure 10) (Woodward, 1996; Lawrence, 2020).

On the other hand, despite the impact of all of these foreign elements, the classic tradition of the Ottoman house is still distinctly apparent. A common scheme used in the kiosks of the times was the most popular traditional "plan with interior sofa" and a prominent variant of this, the "plan with sofa and interior stairs" that was used in the 19th century. Similarly, although the hall was a new element that had been adopted by a culture that had turned its face toward the West, a modernized version of the sofa was still used as a symbol of loyalty to past tradition.

The classification of these structures varies according to different scholars. The well-known Turkish architect Sedad Hakkı Eldem names these houses of the era "Erenköy Type" houses, using this term to define a new style that combines the forms of the Swiss chalets and the English Victorian with the traditional Turkish house (Eldem, 1984). Eldem defines the British Embassy Summerhouse, dated to 1884, as an example of the Victorian style (Eldem, 1984). Uğur Tanyeli however sees this to be an example of the chalet style. Tanyeli interprets the dominant style of the Istanbul summerhouse as being under the influence of the English Victorian style, stating that these buildings entered the residential vocabulary of

the times as chalets (Tanyeli, 1996). In the same way, Doğan Kuban also accepts that these houses were impacted by Swiss chalets and the English Victorian style (Kuban, 2013). Another researcher with the same view is the German architectural historian Martin Bachmann. Bachmann too maintains that these structures were influenced by the English cottage and the architecture of the Victorian Age (Bachmann, 2003). The author Mehmed İzzet declares in his three-volume encyclopedia published over the period 1904-1911, *Rehber-i Umur-u Beytiye,* that these houses were popular among the affluent Ottomans of the era, defining this type of house as a "chalet," as it was frequently referred to at that time (Izzet, 1904; Tanyeli, 1996) (Figure 9). The well-known Turkish architectural historian Afife Batur speaks of the style of these residences as an eclectic form of the Victorian style, pointing out that elements of Art Nouveau and Orientalism were used together in Istanbul (Batur, 1994c). Batur, recognizing that although the structures were manifestations of the principles of Ottoman civil architecture, they also represented a fusion of the Victorian and Art Nouveau styles (Batur, 1983; 1994e). The architect from Stettin, Armin Wegner, who was also the site manager for the construction of the German Consulate Summer Mansion in Tarabya, wrote in his construction log about the style of the building, defining it as having its roots in Victorian Age England and as being an echo of the dominant colonial style of the period. Wegner also says that the structure had elements of the "Swiss house style," so well-liked in German-speaking areas of the world (Bachmann, 2008a).

In particular, these structures formed a unique urban landscape with their facades, standing out as an original group of buildings that were born of the union of foreign influences and local traditions and adaptations. The houses constitute a synthesis of the traditional Ottoman residential typology and the western form, reflecting innovative concepts gathered from the west by the enlightened segments of the population, blended together with an insistence on remaining loyal to tradition. This trend in Ottoman residential architecture is considered to be the expression of the sophisticated tastes of Ottoman society as it moved on in its journey toward modernization. It must be emphasized however that the western influences in these structures, which can be categorized as the "Istanbul Victorian" style, were applied with an eclectic outlook. The wooden decorations as well as the decoupage technique so amply used reveal the influences of a variety of styles–Art Nouveau, Swiss Châlet, English Victorian, Maghrib-Moorish-Orientalist-Mudejar and Ottoman. The new style, or *Tarz-ı cedid*, as it was called, encompassed a local character that defined a new architectural concept that left its stamp on the contemporary vision of the Ottoman capital of Istanbul.

Lost to fires and the corrosive effects of time, with some demolished to be replaced by luxurious apartment buildings, these structures diminished significantly in number over the years. They represent however an important part of the culture of Ottoman wooden residential architecture and as such, their documentation and their transfer to future generations is of great importance. It is for this reason that we hope that the descriptions of the characteristics of this cultural legacy will serve to fill a noticeable gap in the literature.

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Comparative perception analysis in special-qualified heritage landscapes

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Abstract
There is a wide variety of landscapes and there are many different landscape characteristics that constitute them. Rare and unique landscapes exhibit an even more distinctive profile in terms of their characteristics. The aim of this study; is to evaluate the Göreme (Nevşehir) region, which is on the UNESCO heritage list and has an extraordinary landscape with its landforms, natural and cultural history and all its beauties, in terms of landscape perception and to reveal the perceptual effect of cultural heritage values. In the study, the participant assessment was performed with 12 pieces of landscape scenes taken from the area and The Affect Grid (AG) and The Scenic Beauty Estimation (SBE) Methods were implemented. While the results revealed the effectiveness of The Affect Grid Method and the data obtained, they also ensured that the visual values of the district could be analysed. Examples of rock-carved and masonry house combinations that received high scores in the impact analysis were the images exhibiting the typical residential structure of the region. In addition, when looking at the general distribution, related results were obtained from SBE and AG analyses. Furthermore, the scenic beauty, pleasure, and arousal scoring which are the sensational elements based on The Affect Grid Method showed parallelism as M=6,67, M=6,06, M=6,00 on average. There is statistically a very important relationship between the pleasure dimension, arousal dimension and scenic beauty scores($p<0,001$). The findings obtained point out the basic critiques for similar studies to be carried out in the field of perception in similar areas.

Keywords
Visual quality assessment, User perception, Heritage landscapes, Landscape management, Effect grid.

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1. Introduction

The term "landscape" can generally be defined as an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors (European Landscape Convention, 2000). On the other hand, the landscape visual quality assessment, is a research method for the analysis of the landscape in terms of perception, which can also be defined as "the cognition structure that is created by the object that is already observed," which the thing observed creates in the person.

In addition, the European Landscape Convention defines landscape as "a human perceived space, which is the result of action and interaction of natural and/or human factors."

Perception emphasis once again reveals that the field of landscape perception is a concept that is at the center of landscape assessment. As a matter of fact, many preference studies have been carried out regarding perception for many years and efforts have been made to put the results of this interaction on a digital basis.

Perception is a way of experience. Landscape experience is a perceptual experience as expressed in the definition; perceiving is a prerequisite for most experiences (Jacobs, 2006). However, the dimension of pleasure is an important part of the process, since the concept of beauty defines the aesthetic pleasure and the emotions that an object causes in the mind.

Our perspective of the landscape today is different from other cultures as well as from our ancestors. This situation arises from the dynamic structure of the earth and human beings living in interaction with it, which includes constant change and transformation. The importance of researching human perception stems mainly from this. Environmental perceptions trigger approaches and turn them into behaviors. While this process sometimes gains importance in "preferability", sometimes it represents sensitivities that determine environmental attitudes and behaviors.

Scenic beauty assessment is a part of the environmental psychology field that has been studied for more than half a century (Shafer, 1970; Zube, 1974; Daniel & Boster, 1976; Daniel & Vining, 1983; Dearden, 1981; Zube, 1984; Kaplan & Kaplan, 1989). Landscape perception assessments include a sociological, cultural, and historical frameworks with psychology as a significant influence.

When the visual quality assessment studies are examined; it is seen that the focus is especially centered around the concepts of beauty-ugliness (Ulrich, 1986; Lindemann-Matthies et al., 2010; Junge et al., 2015; Wang et al., 2016; Zhao et al., 2017) or the factors affecting the landscape perception (Kaplan & Kaplan, 1989; Tveit et al., 2006) and elements (Arriaza et al., 2004; Hunziker et al., 2008) are sought in the scenic beauty based on the same values. In the assessments carried out, several judgements could be passed on the typical areas such as water-based landscapes, mountain landscapes, rural landscapes, and urban landscapes in terms of perception and choice (Bulut & Yilmaz, 2009; Özhanci et al., 2014; Kalivoda et al., 2014).

While the beauty of the landscape is important both in terms of protection and sustainability, it also reveals the value of nature (Gosal & Ziv, 2020; Fassoulas et al., 2012). Apart from this, it is an important area in terms of tourism value and expectations and feelings of tourists (Williams, 2012; Ruban, 2018). High visual quality contributes greatly to successful destination development and management, as it makes people feel happier and healthier. Experimental studies on natural beauty shed light on and support the management of geological values (Ribe, 1982).

Landscape beauty evaluations are made by two methods as objective and subjective evaluation (Lothian, 1999). Objective assessment is carried out by experts' assessment of landscape characteristics. On the other hand, subjective evaluation is a method based on revealing the preference and perception of the non-expert public (Tveit et al., 2013). In studies conducted for this purpose, photographs that replace landscape are used becauseit has been revealed that these colored photographs cause perceptions and preferences equivalent to real landscapes

(Daniel, 2001). Many researchers have conducted landscape beauty assessment studies using photographic representations of the landscape (Arriaza et al., 2004; Tveit, 2009; Mo et al., 2021; Othman, 2015).

In the studies on the subject, the biophysical properties of the landscape were discussed. Water, naturalness, vegetation, color diversity, contrast, landform size, uniqueness, etc. Biophysical landscape features are the features investigated in the assessments (Arriaza et al., 2004; Migo´n, 2018; Gosal & Ziv, 2020). In some studies, the effects of personal factors such as age, gender, and education on natural beauty ratings were investigated, and it was concluded that these factors make a significant difference (Tveit, 2009; Kalivoda et al., 2014); however, some other studies have shown the opposite (Gruehn, 2010; López-Martínez, 2017; Chen et al., 2015).

The visual quality assessment is a multi-directional method in terms of approach and sampling. When the number and diversity of the ecosystems available in these landscapes are taken into account, the importance of why the quality assessment studies become apparent. It is not possible to say that there is only one typical landscape with which people are familiar. Those landscapes, which come to the fore with those rare characteristics, are protected by international and national institutions through marking while taking the attention of the people from every culture and environment.

In studies that consider the evolutionary landscape, preferences are considered as emotional responses. We can have positive or negative emotional states about landscapes (Jacobs, 2006). Feelings are not only the accompaniments of emotion. The capacity to have feelings is a biological phenomenon, which we are never without, not while we are awake and not while we are asleep and dreaming (Karmanov, 1999).

In this context, The Affect Grid Method is an emotional impact model built on eight emotional concepts. This method, which is an effective method in the field of impact assessment, is a scale designed as a rapid tool in order to assess the impact changing from dormancy to arousal, from non-pleasure to pleasure. The Affect Grid is a potentially suitable method for any study that requires passing judgments on an objective or subjective type of impact. The Affect Grid is a tool that is short, easy to complete, and therefore can be used rapidly and repeatedly since it is a single-item scale (Russell et al., 1989).

The Affect Grid is potentially suitable for any work that requires descriptive or subjective judgments of impact (Garcia-Crespo et al., 2010). The method is used to obtain social and perceptual judgments in many different fields (Heath et al., 2000; Eich et al., 1994; Wong & Domroes, 2005). He et al. (2017) investigated the effects of music on creative thinking using Test for Creative Thinking-Drawing Production and the Affect Grid Methods. Colomo-Palacios et al. (2011) used the impact grid on developers and users in the field of requirements engineering. Heath et al. (2000), in their study on high-rise buildings that affect the urban landscape, aimed to obtain results with 60 psychology student participants by using The Affect Grid Method. Lin et al. (2018) used The Affect Grid Method with 50 participants to evaluate the effects of building height and lake width on preferences for these landscapes, using various visual scenarios.

The European Convention on Landscapes clearly points out the importance of public/userperceptions, which should be an inevitable part of the planning and management of an area. "The identification, description, and assessment of landscapes constitute the preliminary phase of any landscape policy. This involves an analysis of morphological, archaeological, historical, cultural, and natural characteristics and their interrelations, as well as an analysis of changes. The perception of the landscape by the public should also be analyzed from the viewpoint of both its historical development and its recent significance." (European Landscape Convention, 2000).

1.1. Characteristic of the study area

The history of the Cappadocia Region, which means "Land of Beautiful

Horses", dates back to 7000 BC. Hittites, Phrygians, Assyrians, Persians, Romans, Seljuks and Ottomans ruled in the region, respectively. After the 3rd century, Cappadocia became one of the important centers of Christianity. It came under Seljuk rule in the 11th and 12th centuries (Anonymous, 2021).

The Cappadocia region which is known all around the world is included among these outstanding landscapes. Goreme Historical National Park, which has geological, recreational, and landscape values (it was annunciated as National Park in 1986) is a valuable resource that has been on the world cultural and natural heritage list of UNESCO since 1985 and is being visited by many domestic and foreign tourists. According to the official numbers (TÜİK, 2019), the museum and archeological sites of Cappadocia, one of the most important tourism centers of Turkey, were visited by 2.522.378 tourists within the period of January-August of 2019. Within this period, Goreme Outdoor Museum was the most visited place by 933.495 tourists.

The protection, management, and observation of Goreme National Park and Rock Sites of Cappadocia are under the responsibility of the national and local administrations. Cultural and Natural Heritage Preservation Boards of Nevsehir and Kayseri provinces prepare regional assessments and protection plans as well as ensuring legal protection and restoration.

However, in recent days, important legal and administrative arrangements have been made regarding the future of the region. The decision of the Council of Ministers dated October 30, 1986 and numbered as 86/11135 on the proclamation of Goreme as a national park was decided to be repealed due to the existence of many protection statuses in the entire Cappadocia region and the occurrence of confusion of authority. In the previous process, Law No. 7174 dated 23/5/2019 on the Cappadocia Area was enacted. In this Law, issues such as protection, survival, development, presentation, transfer to next generations, planning, management, and control of historical, cultural values, geological/geomorphological texture, and natural resource values of the Cappadocia area are included. Then, the Cappadocia Area Presidency was established for the same purpose and scope in accordance with the Presidential Decree About the Cappadocia Area Presidency (1/6 / 2019-30791).

In the Cappadocia Region, there is a multi-part mentality for management and planning. The prominent problems at this point are the non-completion of the Conservation Purpose Zoning Plans, the non-availability of the tourism management plan, the incompatibility of the lower and upper-scale plans as a result of the fact that the area planning is not made in an integrated manner and the absence of unity of language in the restoration works (Bilgili, 2018).

There are landscapes around the world, which were formed and developed depending on geological and geographical characteristics within historical patterns, lack of green areas due to the mentioned features of the region where they are located, but reveals a distinguishing natural and physical appearance. The most typical examples of such landscapes are located in the Cappadocia region (Central Anatolian/Turkey) which is specified as the underground and rock cities (Karaguler & Korgavus, 2014).

Cappadocia is an extraordinary model of a traditional human settlement that has become defenseless under the combined impacts of natural erosion and, more recently, tourism (UNESCO World Heritage Convention, 2019). This district which attracts tourists from all around the world comes to the fore in terms of the facts/numbers in tourism of Turkey. While the meaning of tourism in the world is now changing into alternative types such as cultural tourism and geo-tourism instead of sea-sand-sun, such a valuable and rich area can't be ignored with its cultural and natural values. A culture and nature-based tourist profile undoubtedly exhibits discrepancies also in terms of the expectations and contributions. Tourism contributes to the sustainability of these valuable landscapes by adding motivation to the residents of the district for the protection of the localness and values as well as many positive or negative socio-eco-

nomic factors accompanying.

Within the badlands' topography, diverse geographical formations occur depending on the severity of the erosion. The most characteristic one of these geographical formations is the fairy chimneys which were formed with the regression of the slopes on the valley slopes between the pediment plains (Öztürk, 2019). In places such as Uchisar, Ortahisar, Goreme, Urgup, and Cemil village settlements which are located in Nevsehir district, carved rock structures are the characteristic architectural feature of the region. The harmony with this character is observed also in the masonry structures associated or not associated with the carved rock spaces. The rocky spaces developed horizontally and vertically inside the fairy chimneys, on the slopes, and under the ground by means of its easily processable tuff structure. In many structures having diverse functions in the region, three types of construction systems reflecting the architectural character of the region were observed. These are defined as the carved rock structures, the masonry structures, and the mixed structures which include the carved rock and masonry structures together (Bilgili, 2018).

In Cappadocia Region, the most characteristic surface features of the world developed depending on volcanism, tectonism and external forces. The most important geological element in the region is the Cappadocia Volcanic Area with the length of approximately 250-300 km and extending in the NE-SW direction, which is one of the Neogene-Quaternary volcanic belts (Dirik, 2009).

The Cappadocia region, which is located within the Central Anatolia Volcanic Province is an interesting area since it includes interesting geomorphological elements arising on the Mio-Pliocene ignimbrites and tuffs depending on the physical and chemical decomposition processes (Öztürk et al., 2019). The settlement also started within the ignimbrite when the people settled in the region and became acquainted with the space. The most important characteristic of the ignimbrite for the region is that it can be easily carved. The natural structure was started to be used as the most beautiful settlement area since the first ages of history, and the cave architecture (underground settlement) has started to appear in the rich and unseen parts of the world. The ignimbrites in the region are easily affected by the water absorption-drying, daily-seasonal heat change, and consequential surface weathering and water and wind erosion due to their lithological characteristics (Gürler, 2007; Karameşe, 2014).

Besides their lithological, petrographical and structural characteristics, the tectonic uplifts that occurred during the Quaternary Era, the climatic oscillations and the oscillations that occurred at the level of Kizilirmak affected the development of the area and accordingly the fairy chimneys and the formation of the present appearance of the region (Öztürk et al., 2019).

1.2. Research hypothesis

When the literature was examined, no visual perception or impact study performed for Cappadocia or a heritage landscape area that is similar in terms of natural and cultural conditions could be found. Based on the fact that the visual assessment should be dealt with diversely in such a different and valuable heritage area, we considered dealing with it especially with its sensational impact dimension as well as the visual value / scenic value. Furthermore, we examined the effectiveness of the method in this kind of visual assessment by using The Affect Grid Method (Russell et al., 1989).

In this study, The Affect Grid and The Scenic Beauty Assessments were jointly applied and the relation, harmonization, and contrasts were revealed. The purpose of this study is to assess Urgup-Goreme (Nevsehir) region having an outstanding landscape characteristic with its landforms, natural and cultural history and all treasures in terms of landscape perception and to reveal the perceptional impact and value of the cultural heritage with the data obtained through the determination of the scenic value-quality. In this way, it is aimed at determining the sustainable area usage of the basic perceptional factors within the area and their role in the planning.

For these purposes, it is possible to list the hypothesis and targets of the research as follows:

1. Since the Goreme region is unique in terms of visual landscape values, it should be evaluated in detail. Evaluation of touristic destinations in terms of visual quality and characteristics is an internationally and locally important field of study. Of course, these evaluations should make it possible to analyze the elements that provide the natural and cultural formation and transformation of the region over time, with different aspects.

2. Analysis of these elements is essential for sustainable area planning and management, which is also included in The European Convention on Landscapes. As stated in this convention, the sustainability of extraordinary landscapes should be prioritized, as stated in the statement that "...the areas defined as ordinary as well as extraordinary beauty in degraded areas as well as high quality are an important part of the quality of life...".

3. The results obtained will give certain clues about the visual areas (typical rock appearance, rock appearance in the street, characteristic streets, rock/masonry combinations, etc.) and elements that are effective in the region.

4. The usability of The Affect Grid Method should be tested to increase the detail of data in the context of emotional impact. Questions such as "What kind of a picture do the visual components of the current landscape character reveal in mood, and what kind of a graphic does such an unusual landscape reveal in the dimension of arousal/enjoyment?" should be answered.

2. Material and method

2.1. Material

Goreme National Park and Cappadocia , together with Derinkuyu and Kaymakli Underground Cities, Karain, Karlik, Yesiloz and Soganli villages constitute a World Heritage Area of UNESCO (Figure 1).

2.2. Method

Due to the unique qualities of the landscape, the analysis was carried out in need of taking different approaches.

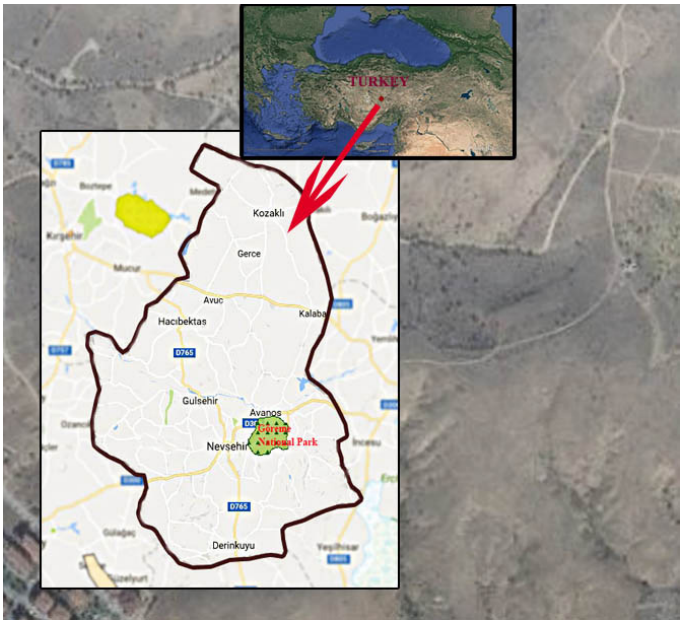

Figure 1. *The location of Goreme National Park in Nevsehir, Turkey.*

The effects of the joy and arousal dimensions on perception were determined by the impact assessment. In this way, the relationship between emotional reactions and preference was determined.

In the study, the Impact Assessment (The Affect Grid Method-Russell et al., 1989) was applied principally and then the Scenic Beauty Estimation (SBE-Daniel & Boster, 1976) was performed.

Photographing process (Stimuli)

First of all, the elements determining the main character of Goreme Historical National Park were examined and the prominent landscape elements were determined in order to ensure the effectiveness of representation in this context. Within the photography process, the photographs were taken by targeting these factors. Examples representing the district landscape such as the following were selected;

1. The general appearance of the rock formations: The volcanic formations representing the most typical and known panoramic structure of the area and the image of the natural and cultural landscape located together.

2. The singular appearance of the rock formations within the street integrity: Singular and plural images of volcanic formations from a close perspective and the image of the purely symbolic landscape.

3. Characteristic street views representing the culture: The appearance of masonry architecture and accompanying natural and cultural elements in harmony with the rock spaces, in which the influence of rock formations is largely eliminated.

4. Carved rock and masonry house combinations: The focus is on the combination of rock-carved and masonry houses that have been developed and integrated from the past to the present, including various cultural elements in their surroundings.

No aesthetic concern was taken into consideration while photographing; care was taken not to include any human, animal, or other activities in the photographs and in the photographs it was intended to represent only typical elements to the extent possible. A digital camera was used for taking the pictures. Photographs were taken during the hours from 12: 00 until 15: 00 when daylight could be sufficient during the August-September 2018 period. Among the many images taken, a total of 12 photographs that could be sufficient for representation were selected and subjected to assessment (Figure 2).

2.2.1. Impact assessment

The method is an impact model in which the eight emotional concepts are evenly distributed over a rectangular coordinate system. In the model; there are 9 points of squares on the 9 x 9 grid, which changes from sleep to arousal on the vertical axis and from unpleasure to pleasure on the horizontal axis. When the axis is rotated 45°, four more concepts are added in two extra dimensions. These are excitement-depression and relaxation-stress pairs. Each frame represents two points corresponding to the dimension of pleasure and the dimension of arousal; this means that participants answer two questions about emotions at the same time as they mark a square of the network (Figure 3).

2.2.2. Scenic beauty assessment

The visual value of the scene was estimated through the assessment of participants. The method is fundamentally based on the Scenic Beauty Assessment method of Daniel & Boster (1976). The images chosen in line with the purpose of the study were scored depending on the preference and additionally, it was ensured that they are characterized with 9 adjectives determined.

2.2.3. Participants and assessment

Considering that there is a suitable sampling group at the point of evaluation of the images, it was preferred that the participants were students of the Landscape Architecture Department. The evaluation process

Figure 2. *The images used in the evaluation.*

was carried out with 90 students from different cities (30 different cities) of the country studying at Nevşehir Hacı Bektaş Veli University. All the students were between 18-24 years old, 47 were male and 43 were female.

Participants were asked to read the explanatory part of The Affect Grid, which is included in the entry of the form, after filling in the section of personal information. Participants first read the instructions given to them to understand the issue. Then, they were asked to mark the place where they deemed appropriate on the 9-point scale to answer: "Please rate how you feel right now."

They were also asked to evaluate the images on a 10-point scale (1-the lowest, 10-the highest) to determine the landscape value. Finally, the participants were asked to characterize the landscapes in the image with one or more of the expressions they deemed appropriate as "artistic, aesthetic, ancient, extraordinary, harmonious, peaceful, interesting, natural, stunning, complicating".

2.2.4. Statistical analysis

IBM SPSS Statistics Version 19 was used for the statistical analyses. Since the data related to the scenic beauty, pleasure, and arousal shows normal distribution (Tabachnick & Fidell, 2013), the Pearson Correlation test was applied for the relations between the scores taken by the images.

3. Results and discussions

3.1.Impact assessment

According to the results obtained, image J has high scores at the arousal dimension (M=6,99) and image L has high scores at the pleasure dimension (M=7,02). Table 1 includes pleasure and arousal score averages.

Figure 4 shows the excitement-depression and relaxation-stress preference congestions of the images. Whereas congestion at the excitement dimension is observed in the images receiving a high score (>=6) in the pleasure dimension, congestion in the depression dimension is observed in the images taking low scores (<=6).

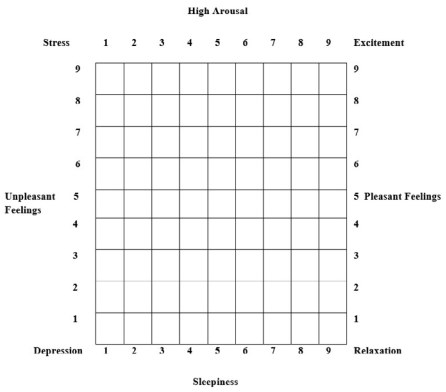

Figure 3. *The Affect Grid (Russel, 1989).*

Table 1. *Average scores and standard deviations in the dimension of pleasure and arousal of images.*

	Pleasure dimension		Arousal dimension		
	Mean	Std. Deviation	Mean	Std. Deviation	N
Scene A	6.56	1.980	6.59	2.012	90
Scene B	6.40	1.970	6.37	1.900	90
Scene C	5.93	2.135	5.69	2.016	90
Scene D	6.61	1.971	6.65	1.093	90
Scene E	4.74	1.998	5.11	2.115	90
Scene F	6.05	2.247	6.04	1.912	90
Scene G	6.69	1.719	5.95	1.719	90
Scene H	5.57	1.785	5.52	1.998	90
Scene I	4.81	2.019	4.73	2.116	90
Scene J	6.80	1.977	6.99	1.941	90
Scene K	5.50	2.017	5.48	1.914	90
Scene L	7.02	1.927	6.56	2.082	90

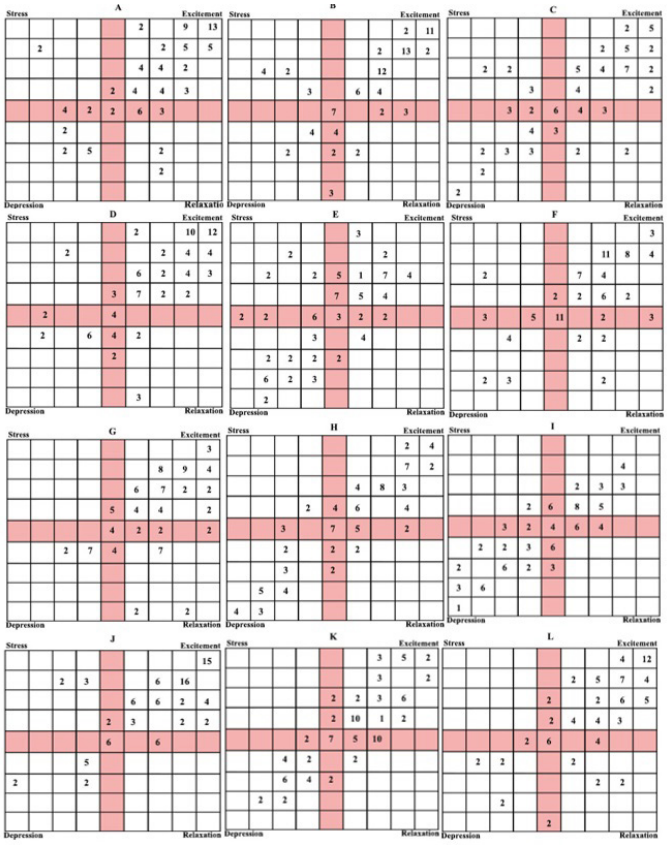

Figure 4. *The excitement-depression and relaxation-stress preference congestions of the images.*

3.2. The Affect Grid and scenic beauty relations

When the scenic beauty scores of the images were examined (Table 2), the highest score average was M=8,12 (image J) and the lowest score average was M=5,24 (image E).

Similar results were obtained in The Affect Grid Method scoring. In other words, both assessment methods show parallelism in terms of scenic perception. Furthermore, the scenic beauty, pleasure, and arousal scores which are the sensational elements based on The Affect Grid Method showed parallelism as M=6,67, M=6,06, M=6,00 on average.

As a matter of fact, according to the One Way Variance Analysis (ANOVA), which is applied for the relations between the scores taken from the dimensions concerning the scenic beauty, pleasure and arousal; there is statistically a very important relationship between the pleasure dimension, arousal dimension and scenic beauty scores($p<0,001$) (Table 3 and Table 4).

The percentages arising in the section of characterization of the images used in the analysis are given in Table 5.

The proportional distribution of the adjectives chosen by the participants for each image subjected to the assessment is given in Table 6.

In most of the images, harmony (5 images) and naturalness (4 images) came to the fore, and for images D and J, the adjective of artistic was preferred more. In these two images, the combination of rock carving and masonry house stands out more.

Emotional studies focus on four different dimensions: emotional stimuli, emotional physical response, emotional experience, and interactions between emotion and cognition (Jacobs, 2006). What we focused on were the emotional and cognitive relationships that emerged as a result of the landscape experience.

Images J and L, which are examples of rock carving and masonry house combinations, show the typical residential structure of the region. The living spaces opened by carving the natural rocks were expanded with new structures from the appropriate building spaces with further human intervention. These new units are complemented by color, texture, and masses. In the landscape dominated by vertical cliffs, the perception of space by masses in the horizontal axis is supported. In addition, when the fragmentary structure in the image is examined, the abundance of detail is noteworthy. This is both an important factor in the

Table 2. *Average scores and standard deviations of images in the evaluation of landscape beauty.*

	Scene A	Scene B	Scene C	Scene D	Scene E	Scene F	Scene G	Scene H	Scene I	Scene J	Scene K	Scene L
Mean	7.24	6.88	6.07	7.40	5.24	7.14	6.65	5.84	5.40	8.12	6.57	7.51
Std. Deviation	2.208	1.872	1.893	2.113	2.032	1.801	1.787	2.001	1.714	1.770	1.826	2.001
N	90	90	90	90	90	90	90	90	90	90	90	90

Table 3. *ANOVA test of images as the result of analysis between groups and within groups (pleasure).*

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1647,751	8	205,969	79,799	,000
Within Groups	2578,518	999	2,581		
Total	4226,270	1007			

Table 4. *ANOVA test of images as the result of analysis between groups and within groups (arousal).*

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1185,341	8	148,168	48,676	,000
Within Groups	3040,929	999	3,044		
Total	4226,270	1007			

Table 5. *Adjective scores attributed to images.*

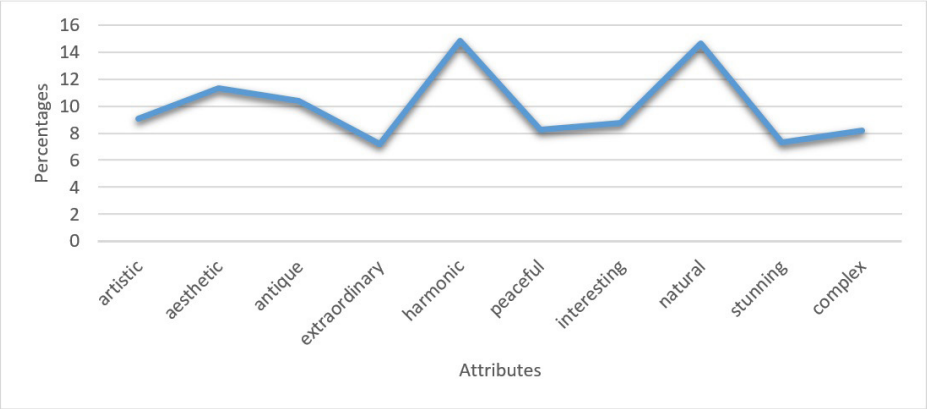

Table 6. *Distribution of adjective scores attributed to images per each image.*

	Scene A Responses		Scene B Responses		Scene C Responses		Scene D Responses		Scene E Responses		Scene F Responses	
	N	Percent (%)	N	Percent (%)	N	Percent (%)	N	Percent (%)	N	Percent (%)	N	Percent (%)
artistic	21	9,10	15	6,61	16	7,31	34	14,98	8	3,88	20	8,85
aesthetic	17	7,40	16	7,05	30	13,70	29	12,78	3	1,46	35	15,49
antique	30	13,0	27	11,89	34	15,53	22	9,69	22	10,68	10	4,42
extraordinary	15	6,50	20	8,81	13	5,94	24	10,57	19	9,22	15	6,64
harmonic	19	8,30	33	14,54	20	9,13	16	7,05	40	19,42	25	11,06
peaceful	30	13,0	24	10,57	5	2,28	12	5,29	12	5,83	33	14,60
interesting	13	5,70	19	8,37	19	8,68	28	12,33	34	16,50	16	7,08
natural	48	20,90	42	18,50	43	19,63	28	12,33	25	12,14	40	17,70
stunning	26	11,30	19	8,37	24	10,96	21	9,25	11	5,34	9	3,98
complex	11	4,80	12	5,29	15	6,85	13	5,73	32	15,53	23	10,18
Total	230	100,0	227	100,0	219	100,0	227	100,0	206	100,0	226	100,0
	Scene G Responses		**Scene H Responses**		**Scene I Responses**		**Scene J Responses**		**Scene K Responses**		**Scene L Responses**	
	N	Percent (%)	N	Percent (%)	N	Percent (%)	N	Percent (%)	N	Percent (%)	N	Percent (%)
artistic	23	10,09	21	10,24	12	5,33	36	15,58	24	10,39	23	10,27
aesthetic	28	12,28	32	15,61	16	7,11	33	14,29	30	12,99	32	14,29
antique	22	9,65	22	10,73	25	11,11	21	9,09	22	9,52	21	9,38
extraordinary	19	8,33	16	7,80	23	10,22	12	5,19	18	7,79	9	4,02
harmonic	39	17,11	32	15,61	41	18,22	23	9,96	40	17,32	43	19,20
peaceful	23	10,09	12	5,85	16	7,11	22	9,52	10	4,33	24	10,71
interesting	16	7,02	18	8,78	19	8,44	21	9,09	14	6,06	22	9,82
natural	26	11,40	23	11,22	31	13,78	31	13,42	33	14,29	16	7,14
stunning	14	6,14	9	4,39	14	6,22	22	9,52	10	4,33	22	9,82
complex	18	7,89	20	9,76	28	12,44	10	4,33	30	12,99	12	5,36
Total	228	100,0	205	100,0	225	100,0	231	100,0	231	100,0	224	100,0

arousal dimension but also has a high value in terms of observation.

While the emotional framework created by the images in the mind combines pleasure and excitement in the positive dimension, it brings together negative enjoyment and depressive emotions in the negative dimension. Famous gardens built throughout the history (gardens belonging to rulers, bureaucrats, rich people, etc.) have always been associated with pleasure and entertainment and equipped for these purposes.

In addition, the prospect-refuge theory by Appleton suggests that people experience pleasure and satisfaction with landscapes that meet their biological needs (Kaymaz, 2012). So this is actually a result of a biological need process.

Images with low scores in the evaluations were irregular and complex units where human intervention could be felt. As a matter of fact, studies have shown that man-made negative elements affect preference negatively. It should not be overlooked that the interventions felt in such a landscape intertwined with such people, human life, and human activities should be proportionate and oriented towards a style.

In both evaluations (SBE-The Affect Grid), the mean scores, the highest and the lowest scores were close, and this was statistically determined. When the sensation dimension is assessed, the heart-warming landscapes also have high scenic value. According to Gregory (1998); it is not the outside world that is experienced, but the mental

structure we build on stimuli organized by concepts that are processed by the senses and stored in the mind.

The perceived naturalness of the landscape increased the value of the landscape as a prominent factor in many studies (Gobster et al., 2007; Kaplan et al., 2006). According to the results; harmony and naturalness were the most preferred adjectives.

Contrary to what was expected, adjectives such as "extraordinary" and "stunning" have not been expressed many times. These landscapes, which are rare in terms of natural and cultural aspects, have not been perceived as unusual in the eyes of the viewer. On the contrary, it was perceived as natural and harmonious. Therefore, the perception of naturalness for landscapes should not be considered together with the usual, typical, or common concepts. This landscape, whose focus is on the rocks and shaped by human intervention in detail, is perceived primarily as harmonious and natural. It is seen that landscape characteristics such as water and vegetation are a sign of harmony and naturalness (Gobster et al., 2007; Kaplan et al., 2006), while rock formations and typical structuring of the local area have the same effect.

As a matter of fact, the studies showed that positive man-made elements increase the attractiveness of the landscape (Bulut & Yılmaz, 2009; Yao et al., 2012) and contributed positively to the perception of landscape beauty.

It should not be denied that the artistic feature that stands out in some images should be evaluated from a separate window. In this special landscape, which is a work of art with its formation and existence process, using the support of arts and works, which is one of the basic elements of the existence of societies, will be a clue for an important cultural benefit and sustainability. According to Karmanov's (1999) definition of the excerpt from the dictionary: "Beauty is the quality that delights the mind or the senses, and the harmony of form or color is associated with features such as the perfection of art, accuracy, and originality."

Since the existence of humanity, individuals have developed common behavior and practice methods within the smallest geographical units in which they live. They take and process water, soil, plants, animals and other cultural components on this plane of life. One of the best examples of this type of life development is undoubtedly the Cappadocia region. The region has been shaped by all natural physical processes and has created different open and closed landscapes. The people of the region have lived in these areas both in natural spaces and in artificial but harmonious spaces they have added. Various combinations have emerged in this landscape, which people sustain by living in and around it.

The density of the rock-cut cells, churches, cave villages and underground cities of the Cappadocia region, which has a settlement type carved from extinct volcanic rocks, has made the region one of the most striking and largest cave-dwelling complexes in the world. In particular, geological formations and cave-house constructions are the main protection and attraction elements. Reaching the judgment of harmony, naturalness and partly artistic in the images, and the typical construction images of the region in terms of landscape quality, are also indicators of the correct formation of the human/space association with thousands of years of history.

4. Conclusions

Undoubtedly, the legal and administrative situation in the region will affect Goreme's present as well as its future. As far as its status is concerned, for more than 30 years the area has had the legal status of a National Park, and the problems related to the general legal framework are a reality. From time to time, uncontrolled and illegal structuring in the region both damages the natural and cultural structure and causes public reactions and disputes.
In terms of the content of the institution and the concept, Cappadocia Area Presidency is a necessary management approach for the region. It can be expected that a proper and specific control mechanism will produce more efficient results. The short and long-term implications of the new arrangements performed will be seen in the future.

Within the framework of the findings and data obtained, the results and suggestions can be listed as follows;

Emotional dimensions and criteria are directly related to landscape preference. Landscape preference measurement based on emotions contains harmonious results. Especially the pleasure and accompanying excitement are effective parameters. It should be handled with different studies.

The rock carving and masonry house combinations existing in the region are the prominent values of the region due to their partial richness. These values should be preserved with their existing structures and specificities.

The value of positive elements of human origin in the region is an important point to be emphasized. The source of human-made positive elements has been influential architectural elements and their environment. Masonry structures created with architectural techniques compatible with rock-carved structures that exist for centuries in the region are unique values. Therefore, these cultural elements, which will inevitably continue to exist for the future generations, should be protected with their sustainable qualities within the framework of the requirements of the concept of conservation.

The existence and effectiveness of human-made negative elements (sometimes a trash bin, sometimes an indiscriminate element with no color and proportion matching) should be prevented, and integrity should be preserved in terms of perceptual influence.

Due to its aesthetic features and nature with artistic forms, it is inevitable for the region to be the focus of artistic activities and traditional elements. It is known that the manufacturing and sales units of many small-scale enterprises still carry on producing local arts. However, it will be beneficial to make art and artistic perception effective with visually compatible mass approaches.

Of course, it is not easy to maintain and protect such a multi-component area with many stakeholders. Undoubtedly, as it is understood from the fact that it is a mixed protection area, it is an area that is affected by human beings and to a certain extent protected by human beings. The process should continue as it has always been and lived with its dynamics, rather than isolating and dehumanizing the region. Abandoned spaces are disappearing faster. However, due to the high tourism potential, many new and uncontrolled structuring initiatives that have emerged in recent years are being stopped by the boards and administrations with penalties and interventions.

Within the framework of perception and preference studies, concepts such as natural landscape, naturalness, and naturalness of landscape have been included with water and vegetation elements at the most, while a different approach is needed for the heritage area which is the subject of the study. Natural formations and their complementary man-made elements integrated into those formations have a positive effect on the perception of the landscape.

The rare values found in Goreme show parallelism with the arousal and pleasure dimensions, and the experience of these remarkable landscapes has brought joyful sensations. Besides, landscape beauty scores and pleasure and arousal scores showed parallelism. Efficient results were obtained with The Affect Grid Method.

Undoubtedly, the region is a unique resource with its values, and with the complementary studies in the field of perception, the current position of the landscape and its future position within the changing and transforming landscapes tomorrow should be analyzed.

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Architecture education before ITU Faculty of Architecture: Actors shaping the architecture education in *Yüksek Mühendis Mektebi Mimari/İnşaat Şubesi* and their impact (1928-1941)

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Abstract
Istanbul Technical University (ITU) Faculty of Architecture has been one of the pioneering architecture schools for architecture education in Turkey since the 1940s. Learning about the period leading to the establishment of the faculty is essential in understanding the institutionalization of architecture education in Turkey. Having transformed into ITU in 1944, *Yüksek Mühendis Mektebi* (YMM) Mimari Şubesi (Architecture Branch) became the ITU Faculty of Architecture. Having functioned as ITU Faculty of Architecture's core, YMM *Mimari Şubesi* is still very little-known today. The usually told tale has been about the *İnşaat Şubesi* (Building Branch) being under Monsieur Dèbes' directorship that it was transformed into the *Mimari Şubesi* thanks to Emin Onat's efforts and struggle against Monsieur Dèbes. Mostly comprised of engineering classes, *İnşaat Şubesi* was considered to be reshaped through Onat's perspective on architecture and education as an actor regarded as the faculty's founder. Positioning Onat in the center, this establishment narrative conceals the other actors shaping architecture education in YMM, their objectives and reflections in the education. In this study, the history of YMM *Mimari/İnşaat Şubesi* is being built through archived documents and narratives of individuals who bore witness to the period. This endeavor not only helps correct the information considered as known facts regarding the renowned actors like Dèbes and Onat but also unveils those other fundamental actors of architecture education and their influence. Discussing the period behind ITU Faculty of Architecture's establishment with all of its actors provides new ways to understand the institutionalization of Turkey's architecture education.

Keywords
Architecture education, Emin Onat, ITU Faculty of Architecture, Monsieur Debés, Yüksek Mühendis Mektebi.

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1. Introduction

The institutionalization of architecture education in Turkey had unfolded in two dimensions from the 19th century to the 1950s. The first one involves the educational institution founded under the name *Mekteb-i Sanayi-i Nefise-i Şahane* in 1882, then transformed into *Güzel Sanatlar Akademisi* (GSA, Fine Arts Academy) in 1928. The other features the institution that was founded under the name *Hendese-i Mülkiye Mektebi* in 1883, evolved into Mühendis Mektebi (Engineering School) in 1909, into *Yüksek Mühendis Mektebi* (YMM, Higher Engineering School) in 1928, then into *Yüksek Mühendis Okulu* (YMO, Higher Engineering School) in 1941, finally to become Istanbul Technical University (ITU) in 1944. Architecture education had been formed by these two institutions until the foundation of Middle East Technical University in 1956.[1] This fact makes the history of both architecture branches/faculties significant in understanding how architecture education in Turkey has been shaped.

The phase leading to the establishment of ITU Faculty of Architecture, a key player in the institutionalization of architecture education in Turkey, is represented in the architecture history studies, narratives, and memoirs about the faculty as below: The governmental efforts to renew the architecture education in accordance with the modernism and public development activities in the early 1930s influenced YMM. According to various studies, this change manifested itself either in the curriculum or in learning content and output from lessons. However, the real transformation had taken place when Emin Onat, who was sent to ETH Zürich (Eidgenössische Technische Hochschule) to be educated and trained as an architect, returned to the school. Upon his return to school, Onat took an opposing stance towards Monsieur Dèbes, who was in charge of *YMM İnşaat Şubesi* (Building Branch) and took over the charge of the branch in 1938. The branch curriculum was renewed, with the addition of figures like Clemens Holzmeister and Gustav Oelsner, making the old *İnşaat Şubesi* become the *Mimari Şubesi* (Architecture Branch). Onat's *Mimari Şubesi* would become the Faculty of Architecture with ITU's foundation in 1944 (Batur, 2010; Baydar, 2012; Bozdoğan 2002; Kafesçioğlu, 2010, Sey &Tapan, 1983; Tekeli, 2011).

ITU Faculty of Architecture's foundation history that can be found in different studies embodies two main problems. The first one is that in different studies there are different information regarding people, events, and dates. For instance, there are conflicting information about Monsieur Dèbes, who was mentioned in YMM records without his forename, such as when he is referred to as an architect from École des Beaux-Arts in Paris in some resources (e.g., Uluçay & Karatekin, 1953), while in some others he is presumed as highway and bridge engineer Georges Debés (e.g., Cengizkan, 2002). There are distinctions in the establishment history of *Mimari Şubesi* which is accepted to be founded by Onat. Whether the branch was newbuilt or the transformed version of the existing *İnşaat Şubesi*, and the transformation it went through, are all vague. Secondly yet, more importantly, the process' being reduced to solely Onat's efforts causes other influencing actors and their impact on the architecture education go unnoticed. Although Onat's presence had been crucial for the *Mimari Şubesi* and ITU Faculty of Architecture, the period's archived documents point to a greater structure beyond Onat himself. Apparently, the actors shaping this structure had as many determining roles and impacts as Onat had, and even occasionally more.

This article focuses on the history of the *YMM Mimari/İnşaat Şubesi*, the core of ITU Faculty of Architecture, between 1928 and 1941 where it was attached to *Nafıa Vekaleti* (Ministry of Public Works). The documents belonging to this usually misinterpreted and often not completely known period suggest that another history for *YMM Mimari/İnşaat Şubesi* is possible. Documents used as this article's sources mainly comprise of *YMM Tedris Meclisi*'s (*Tedris Kurulu* after 1936; Teaching Council) meeting minutes, educational guides published by YMM, laws and

constitutions regulating the YMM, student records of L'École des Beaux-Arts de Paris in Institut National d'Histoire de l'Art', and the testimonies of individuals who used to be students of *YMM Mimari Şubesi*. Telling the history of *YMM Mimari/İnşaat Şubesi* with a micro-historical perspective and regarding the actors highlighted in these documents will bring about a new viewpoint for how architecture education evolved both in the ITU Faculty of Architecture and in the country.

2. The foundation of *YMM Mimari/İnşaat Şubesi* and changes of its name

As predecessors of ITU before 1928, engineering schools had a system capable of educating qualified engineers to serve in any desired field within the country through a single curriculum. A meeting took place in Ankara in February 1928 for the transformation of *Mühendis Mektebi* into a "polytechnic" where specialized departments for engineering education would be involved. In addition to school members, officials from *Nafıa Vekaleti*, engineers from State Railways, engineer members of the parliament, engineer contractors, building company representatives, and representative of *Maarif Vekaleti* (Ministry of Education) attended the meeting. It was decided in the meeting that three branches would be established within the school to meet the increasing need for qualified manpower, considering the importance assigned to the idea of building the country. One of these branches would be *Mimari ve İnşaat Şubesi* (Okay, 2007; Mühendis Mektebi, 1928).

On May 24th, 1928, the transformation to YMM and the establishment of branches officially took place. In the YMM Constitution admitted on June 12th, 1929 (8138 Sayılı Kararname, 1929), the branch was referred to as *"Mimarî ve İnşaat Şubesi (Mebani ve Şehircilik)"* (Architecture and Building Branch (Building and City Planning)). In the year 1928-1929 educational guide was published by YMM it was called *Mimari Şubesi* (Yüksek Mühendis Mektebi, 2001). In the syllabus proposal in July 1930 the school was named as *İnşaat Şubesi* (YMM İdare Meclisi, 1930, July 19), and continued to be called as such during the 1930s. In the reconstruction process of YMM in the 1939-1940 academic year, the name of the branch was changed to *"Yapı İşleri ve Şehircilik Şubesi"* (Building Construction and City Planning Branch) (T.C Başvekalet Kararlar Dairesi Müdürlüğü, 1940; YMM Tedris Kurulu, 1939, December 7), however, it was again changed to *Mimari Şubesi* by the start of 1940-1941 academic year (YMM Tedris Kurulu, 1940, September 24).

As mentioned above, *YMM Mimari/İnşaat Şubesi* changed names five times, starting from its establishment in 1928 until 1941. The multiplicity of branch names, in a way, highlights the vague boundaries defining the area of expertise of the branch. The broad field of the branch's education seems compatible with the old custom associated with the school, that is educating specialists for all sorts of construction activities. However, the process shows the name changes are not necessarily linked to the multifaceted education, but more to the complexity brought by the influential actors' different aims and approaches towards the branch in shaping the education.

3. Actors shaping the *YMM Mimari/İnşaat Şubesi*

The actors influencing the formation of *YMM Mimari/İnşaat Şubesi* are, in fact, associated with the management structure of YMM. YMM was a *Nafıa Vekaleti* affiliate, built upon the objective of increasing qualified manpower for construction activities by the ministry, just like the engineering schools before it. However, unlike its antecedents, it was demanded that YMM grew beyond an engineering school and became a place producing knowledge, therefore it needed to become a legal entity with financial and administrative autonomy like "its peers in Europe" (1/148 Sayılı Kanun Layihası, 1928). With the 1929 Constitution (8138 Sayılı Kararname, 1929) YMM gained rights to become a legal entity and own a separate income in addition to the sources coming from the ministry. *Tedris Meclisi* (Teaching Council) and

İdare Meclisi (Administrative Council) were assigned so that the school would have autonomy in their decisions regarding education and management. The school would be directed by the decisions taken in these councils, yet these decisions were to be confirmed by *Nafıa Vekaleti.* The staff and the curriculum of the school branches were determined by *Tedris Meclisi* which consisted of *"müderris"*es and *"muallim"*s of the school. Every branch had a *"Şube Reisi"* (Branch Chief) appointed by again *Tedris Meclisi*. Branches were under the *Şube Reisi*'s responsibility. This structure of YMM demonstrates that *Mimari/İnşaat Şubesi* was managed by the *Nafıa Vekaleti, Tedris Meclisi* and *Şube Reisi*, in the hierarchical order (Figure 1). These emerge as the main actors to shape the *YMM Mimari/İnşaat Şubesi* between 1928 and 1941.

As can be seen below, the main actors shaping *Mimari/İnşaat Şubesi* had different levels of power. Their vision for the branch was occasionally contradictory and conflicting with each other. From an educational standpoint, the branch staff, a group directly influential in education, are needed to join these actors, however an influential permanent staff could not be formed from the establishment to 1940. The only exception was Emin Onat. Though, Onat's position until 1940 had mostly been about being an actor capable of opposition against decisions and decision-makers, rather than being involved in the decision-making.

4. *Nafıa Vekaleti* and its relationship with the branch

Although YMM was founded as a semi-autonomous body, the large part of its budget being provided by *Nafıa Vekaleti* made the ministry have power over the school from the beginning. Decisions taken in school councils could only be executed after *Nafıa Vekaleti*'s confirmation, which led to conflicts at times between the school administration and the ministry. While the ministry wanted to interfere in various school subjects from curriculum design to the determination of student numbers to be assigned to certain branches based on governmental needs[2], the school administration objected to some of these interventions. With the ministry becoming discontent about this matter, first, it was decided in 1935 that the school would be managed by a director appointed by the ministry (2/2642 Sayılı Kararname, 1935), then in 1936 was made entirely dependent on the ministry by the cancellation of its legal entity and budget rights (2984 Sayılı Kanun, 1936).

The formation of *Mimari/İnşaat Şubesi* during YMM's foundation was regarded as highly important by the ministry. The branch was supposed to fulfill the public construction needs, educating engineers as responsible specialists for all fields except specialization areas of *Yol Şubesi* (Highway Branch) and *Su Şubesi* (Water Branches) (1/148 Sayılı Kanun Layihası, 1928). *Mimari/İnşaat Şubesi*, however, started to be considered a burden about a year and a half after the school opening. The ministry proposed that the branch be discontinued and merged with the *GSA Mimari Şubesi* with an official letter in January 1930. After meetings with the ministry officials in Ankara, it is understood that the proposal partially focused on savings. It was mainly based on the idea that there would not be enough available spots for the architecture graduates' compulsory services. The Ministry has considered that the number of engineering graduates was insufficient and opted for the sparing of funds to education of engineers instead of architects they regarded as not useful (YMM Tedris Meclisi, 1930, February 12).

Probably owing to the fact that the branch had been referred to as *Mimari*

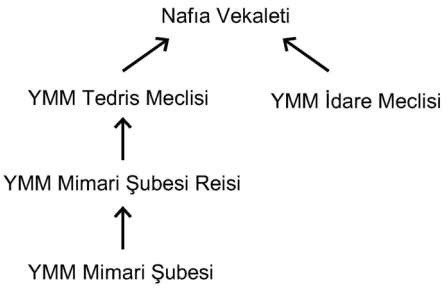


Figure 1. *The management of YMM Mimari/İnşaat Şubesi.*

Şubesi in the 1928-1929 guide and a Beaux-Arts graduate architect had been appointed as its director, *Nafıa Vekaleti* must have thought the branch is far from educating the engineers they envisioned in the beginning. YMM members objected to the GSA joining decision, claiming the branch, unlike its equivalent in GSA, addressed the public construction works of the country as an "architectural engineering" branch (YMM Tedris Meclisi, 1930, February 12). In June 1930, after some contacts with the ministry undersecretary and Monsieur (Ernst) Egli, the chief architect of *Maarif Vekaleti Tatbikat Bürosu* (Ministry of Education Practice Office), the proposal for merger was canceled (YMM Tedris Meclisi, 1930, June 7). It is worth looking at the fact that the branch began to be called *İnşaat Şubesi* following this incident (it is addressed as such in the syllabus proposal; YMM İdare Meclisi, 1930, July 19). This could have been a deliberate decision to get in the way of joining attempts as well as highlighting its difference with the *GSA*.

However, in 1932, due to financial difficulties and its limited budget, *Nafıa Vekaleti* proposed once again to merge GSA and YMM branches (1/357 Sayılı Kanun Lâyihası, 1932). An objection letter explaining the differences between the two branches was again prepared to prevent the joining (YMM Tedris Meclisi, 1933, February 1). Since the cost-saving proposal also included the joining of common classes of YMM with the current classes of *Darülfünun*, this second attempt also did not bring any results when *Darülfünun* was closed in 1933.

Mimari/İnşaat Şubesi which was regarded as crucial by *Nafıa Vekaleti* in the beginning had lost importance in time for it started to be seen as a branch training only "architects". During its time as a *Nafıa Vekaleti* affiliate, among other branches, the lowest number of students (62 out of 364 who graduated between 1931 and 1939 were *Mimari/İnşaat Şubesi* graduates; see list of graduates, Uluçay & Karatekin, 1958) and teaching staff (in the 1936-1937 academic year there were two *muallims*, one *muallim muavini* and an assistant; YMM Tedris Kurulu, 1936, October 3) were allocated for the branch. As *Tedris Meclisi* substantially agreed with *Nafıa Vekaleti* on the importance of engineers training, the branch curriculum was either designed accordingly, or no sufficient funds were provided to educate a qualified branch staff.

Mimari/İnşaat Şubesi managed to survive despite the reluctance of *Nafıa Vekaleti*. When the ministry went through a management change in 1939, the new management provided support for the renewal and development of YMM (Okay 2007; Taylan, 2010). This renewal process covered *Mimari/İnşaat Şubesi* just like the other branches.

5. *Tedris Meclisi* and its opinion on the branch

Tedris Meclisi was one of the councils formed to enable self-government of the school and made decisions about curriculums and staff. Although the council could act autonomously in its decision-making, it was not independent of *Nafıa Vekaleti*'s power, had to submit own decisions to the ministry for approval, and was also assigned the task to design the curriculum based on country needs - this also meant the needs of the ministry (2984 Sayılı Kanun, 1936).

Almost all members of the school were engineers, therefore the council was also a community of engineer *muallims* or *müderrises*. Monsieur Dèbes, the architect in charge of the *Mimari/İnşaat Şubesi* since 1930, attended the council meetings for the first time in 1938, while Emin Onat did for the first time in 1939. This means *YMM Mimari/İnşaat Şubesi* had been shaped by engineers for years.

Once *Tedris Meclisi* was established in 1929, it made two important decisions regarding *Mimari/İnşaat Şubesi*. The first was sending three students who completed their first three education years in the school's common branch to Europe, two to train as mechanical engineers, the other as an architect, to provide *muallim muavini* (teaching assistant) on the school budget. Feyzi "*Efendi*" and Emin (Onat) "*Efendi*"s nominations on behalf of *Mimari Şubesi* were submitted to *Maarif Vekaleti* for their decision (YMM Encümeni Tedris, 1929, June 26). Elect-

ed to study in Zürich, Onat would complete his studies and return to the school in 1935. The second important decision was to bring a *muallim* from Europe who was professionally capable of framing and managing the branch (YMM Encümeni Tedris, 1929, June 3). Fikri (Santur) *Bey* was to be the substitute manager of the branch until this "foreign professor" was found (YMM Tedris Meclisi, 1929, July 25). As Santur started to look for a European candidate and Monsieur Dèbes would be appointed as the branch head following the period which will be elaborated in the next chapter.

It is possible to find *Tedris Meclisi*'s opinion on *Mimari/İnşaat Şubesi* in their objections against the 1930 and 1932 attempts of joining it with *GSA*. It was stated that the branch taught not only architecture but "architecture engineering". Furthermore, that architecture was then acknowledged as a technical profession rather than fine arts and architecture branches in Europe operate within engineering schools. The education given in the branch adopted a more technical approach, shifting from aesthetical objectives towards engineering (YMM Tedris Meclisi, 1930, February 12). "The function of the branch" was elaborated further to provide an opposing stance to the attempt in 1932. As this elaboration suggested, the branch was training architect engineers to be qualified for subjects like construction of roads, sewers, and sanitary systems in the cities and towns, related building construction works and static calculations, heating, and lighting (YMM Tedris Meclisi, 1933, February 1).

It is hard to tell how much these opinions of *Tedris Meclisi* reflected on the curriculum before 1937. The earliest complete syllabus found dated back to the 1937-1938 academic year. This syllabus had classes that could be regarded equivalent to the above needs as "applied electricity", "public works construction", "lifting equipment", "topography", in addition to "architecture" and "city planning". Yet, the debate during the syllabus preparation meetings (YMM Tedris Kurulu, 1937, June 23) demonstrates the uncertainty and disagreements about the expectations on the branch's education. According to some engineer members of the council the "topography" class hours had to be increased, considering branch graduates would work as "civil engineers" in municipalities. This raised objections that branch graduates would work as "architects". According to another belief branch, graduates would not only be architects but also "urban engineers". Fikri Santur expressed his opinion as follows:

> "This branch is an architecture branch. In case this is acknowledged as a fact then the topography classes in the syllabus are adequate. In case this is not an architecture branch, then it is a whole different topic to talk about. Then we should close the branch."

Tevfik Taylan opposed to these as follows:

> "Some classes within our *İnşaat Şubesi* are more than any architecture school would require. For instance, the reinforced concrete class ... is probably far more hours than what GSA has. In fact, we call our branch an architecture-engineering branch and accept architect engineers as different than architects. For topography (class) it is indeed necessary to acknowledge this difference. Especially for the public construction works in our country the need for topography is obvious."

In consequence of these arguments, it is observed in the curriculum of 1938-1939 that the practice parts of the topography and reinforced concrete classes were increased while architecture class hours were decreased (YMM Tedris Kurulu, 1938, April 5).

In accordance with *Nafıa Vekaleti*, *Tedris Meclisi*, despite their inner arguments, set objectives to educate architect engineers for city-building, intending to preserve the education's outweighing engineering aspect.

6. Monsieur Dèbes and his impact on the branch

When it was decided to bring a European *muallim* to manage the branch (YMM Encümeni Tedris, 1929 June 3), the branch substitute chief Fikri Santur consulted Monsieur (Albert-Louis) Gabriel, *muallim* of *Darülfünun* of that time, to find the foreign *Muallim*. Gabriel wrote in his letter in August 1929 that he found several candidates but did not make any

decisions(!) yet (YMM Tedris Meclisi, 1929, August 1). In his September letter, he recommended "the Beaux-Arts graduate" Monsieur Dèbes, stating he would accept a contract that would start in December and end in June. The appointment of Dèbes (Figure 2) was decided by a unanimous vote in *Tedris Meclisi* (YMM Tedris Meclisi, 1929, September 17).

What was known about Monsieur Dèbes as he started to work at *YMM Mimari/İnşaat Şubesi* was nothing more than Gabriel's statements in his letter. The fact that even his forename was not known, made it harder to identify who Dèbes was. Called by various names like Deb, Debs, Deps in various news of his era, he was mistaken for the *Ponts et Chaussées* (Bridges and Roads) Chief Engineer Georges Debès[3] who was the author of "*Kagir, Beton ve Betonarme*" published by ITU. Based on the information that Dèbes was an École des Beaux-Arts graduate, individuals with the surname Dèbes were traced in published lists of Beaux-Arts graduates and various archives as part of my doctoral study. Comparison of a signature on a handwritten note in the École des Beaux-Arts register book (Dèbes, 1928) with Monsieur Dèbes' signature in his note in the *Tedris Meclisi* meeting records (YMM Tedris Meclisi, 1932, October 30) made it clear that those two were the same persons (Figure 3).

Figure 2. *Albert Joseph René Dèbes (Uluçay & Karatekin, 1958).*

Born in 1895, Albert Joseph René Dèbes attended the workshops of Gustave Umbdenstock and Paul Tournon in École des Beaux-Arts in 1917 and 1918. He took the school entrance exams in 1920, attended second-year classes in 1920, and first-year classes in 1921. He won first medal and first prize in the Rougevin competition in 1924 (Figure 4), and the second medal and first prize in the Rougevin 1928 competition. He graduated in November 1929 (Dèbes, 1917-1929) and a month later started his duty in YMM.

Albert Dèbes had been regarded as the head of *Mimari/İnşaat Şubesi* from December 1929 to April 1940 (his contract would be annually renewed by the majority of votes among *Tedris Meclisi* members until April 1940), however, was never been acclaimed as *Şube Reisi* officially. He did not own the titles of *müderris* or *muallim* as the school constitution required him to become the chief. According to the council members, someone who recently came to Turkey would have language barriers, probably not wish to accept the responsibilities of *Şube Reisi* which mainly entailed administrative duties, therefore it would not be suitable to give such a person the responsibility (YMM Tedris Meclisi, 1929, December 19). This way, Dèbes did not took part in *Tedris Meclisi* and stayed out of branch matters.

Dèbes was consulted for matters like identifying the aim and content of the education of the branch, establishing the curriculum and staff, etc. Following the attempt to merge the branch with the *GSA* in 1930, Dèbes was sent the current curriculum, asked to prepare a new one (YMM Tedris Meclisi, 1930, June 7). There are no written documents showing Dèbes' detailed plans for the branch. However, it is observed that he demanded more architecture classes in the branch which had numerous engineering classes as part of its curriculum. He proposed to give supplementary classes to *Mimari Şubesi* students in *Ortak Şube*[4] (Common Branch) and let architecture students move to their branch classes earlier. *Tedris Meclisi* decided an early diversion was not possible, however, Architecture students were to be given painting classes in *Or-*

tak Şube as preparatory classes (YMM Tedris Meclisi, November 1930, 22).

As mentioned before, *Tedris Meclisi* played a greater part in determining the class hierarchy in the branch's 1937 curriculum than Dèbes. It can be considered that Dèbes, as the chief as well as the instructor, participated in the formation of content of classes like architecture and city planning (Yüksek Mühendis Mektebi, 1937). Yet, at this point, it is necessary to point out that YMM modeled similar polytechnics and high technical schools in Europe in the shaping of its education. In the 1937 curriculum meetings, both *Nafıa Vekaleti* and *Tedris Meclisi* members had curriculum proposals similar to that of Berlin Technische Hochschule (TH) (YMM Tedris Kurulu, 1937, May 18). However, the proposals discussed in the council did not include *Mimari/ İnşaat Şubesi* curriculum. It would be hard to claim that this curriculum was designed based on the Berlin TH model (see TH Berlin, 1936). It was different from TH curriculums in Europe (Berlin, Zürich, and Stuttgart) for not covering architecture theory, architecture history, art history, variety of drawing/ painting/pattern classes, despite having common building equipment classes like building construction, statics, heating, and ventilation. On the other hand, architecture classes had a structure involving information about building typologies (Figure 5) as in ETH Zurich (see ETH, 1936). It is hard to tell if this class structure, which continued to be used after the transformation to ITU Faculty of Architecture, was formed with Dèbes' individual preferences or not. It could also be suggested that Dèbes could be asked to prepare architecture classes similar to TH's, considering *Tedris Meclisi*'s influence. Onat's contribution to this content is a low chance since he joined the army at the beginning of 1937 (YMM Tedris Kurulu, 1937, January 19).

It is also hard to claim that Albert Dèbes played a significant role in the formation of branch staff. Before the appointment of Dèbes, it was decided that the assistant to be selected as interpreter to the foreign professor be a fresh graduate of the school who was "into architecture" and "capable of growth by learning from the prospective professor" (YMM İdare Meclisi, 1929, November 25). When looking at the practices, the demands of the Dèbes' assistant candidates to become prospective educators of the school were ignored, as their only role of assisting Dèbes as interpreters continued. Upon Dèbes' demand for an assistant for painting classes in 1930, YMM fresh graduate engineer Feridun Arısan was hired, at *Tedris Meclisi* member Fikri Santur's suggestion. In 1935, the GSA graduate architect Orhan Safa, during his visit to Zeki Sayar in his office, heard about Feridun Arısan's search for an assistant who knew French well, applied for the position at the school, and was accepted "without any formalities required" (Safa, 1995). YMM graduate

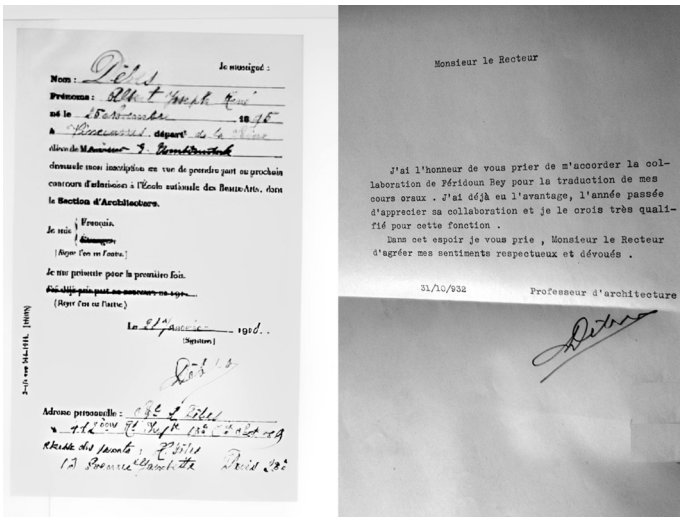
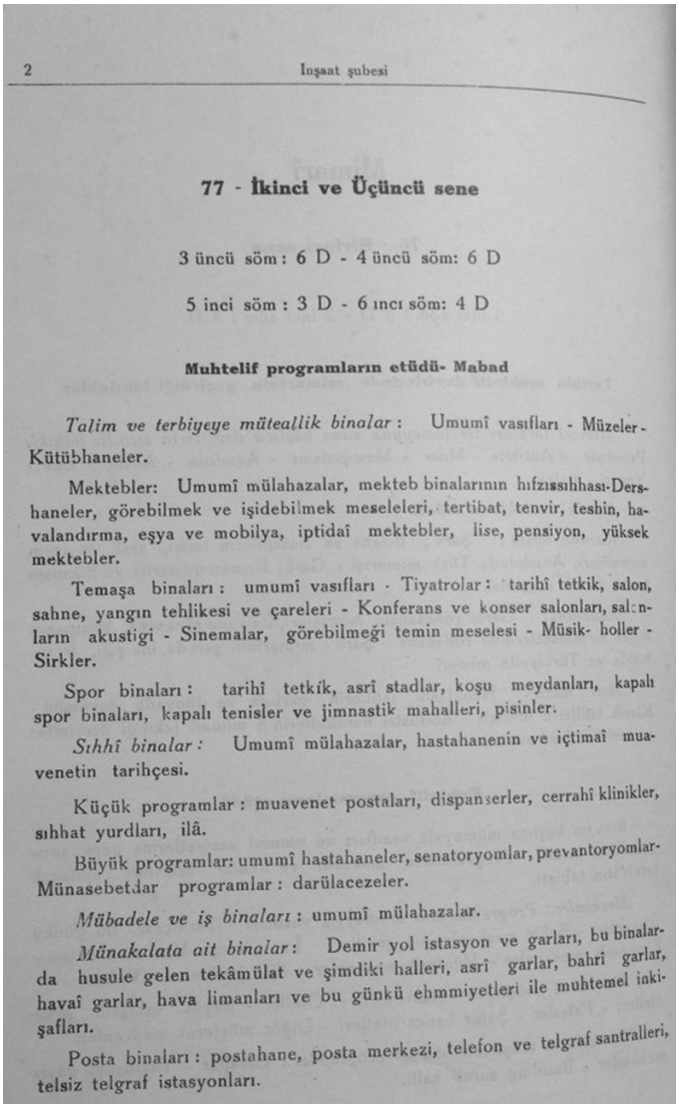


Figure 3. *Student record, on the right; Dèbes' signature in the Tedris Meclisi record, on the left.*

Figure 4. *Dèbes' 1st prize and 1st medal winning project in Rougevin competition in 1924 (École Nationale Supérieure des Beaux-arts (Paris), 1924).*

engineer İhsan Bingüler "was reached by chance and hired in 1936 because it was necessary to find someone as Dèbes' interpreter" after the branch assistants joined the army (YMM Tedris Kurulu, 1937, January 19). With the task of assistant selections being left to personal relationships and coincidences, there was also no declared intention in training a persistent staff for the branch. Dèbes' two recorded attempts to send a assistant for training in Europe were both prevented by *Tedris Meclisi*. Proposals to send his assistant İhsan Bingüler for training in a building branch in Europe (YMM Tedris Kurulu, 1938, May 3) or for an internship in France were put off by the council showing the restrictions with the budget as an excuse, with the arguments that Bingüler was a *Yol Şubesi* graduate, appointed as Dèbes' assistant due to his good French knowledge, and whether he wanted to become an architect through that internship (YMM Tedris Kurulu, 1938, May 17). Instead, engineering assistants from other branches were sent to Europe.

Though he instructed the core courses as architecture and city planning, Dèbes, the person in charge of *YMM Mimari/İnşaat Şubesi*, did not completely seem to be the person to give the branch a structure. The reasons could be either him being a foreigner without a network, not being empowered to get directly involved in decision-making, or his lack of interest in the future of the branch. It is possible to say Dèbes had been of far less influence than the *Tedris Meclisi* and *Nafıa Vekaleti* on *Mimari/İnşaat Şubesi*, during his time on duty.



2 İnşaat şubesi

77 - İkinci ve Üçüncü sene

3 üncü söm: 6 D - 4 üncü söm: 6 D

5 inci söm: 3 D - 6 ıncı söm: 4 D

Muhtelif programların etüdü- Mabad

Talim ve terbiyeye müteallik binalar: Umumî vasıfları - Müzeler - Kütübhaneler.

Mektebler: Umumî mülahazalar, mekteb binalarının hıfzıssıhhası-Dershaneler, görebilmek ve işidebilmek meseleleri, tertibat, tenvir, teshin, havalandırma, eşya ve mobilya, iptidaî mektebler, lise, pensiyon, yüksek mektebler.

Temaşa binaları: umumî vasıfları - Tiyatrolar: tarihî tetkik, salon, sahne, yangın tehlikesi ve çareleri - Konferans ve konser salonları, salonların akustigi - Sinemalar, görebilmeği temin meselesi - Müsik- holler - Sirkler.

Spor binaları: tarihî tetkik, asrî stadlar, koşu meydanları, kapalı spor binaları, kapalı tenisler ve jimnastik mahalleri, pisinler.

Sıhhî binalar: Umumî mülahazalar, hastahanenin ve içtimaî muavenetin tarihçesi.

Küçük programlar: muavenet postaları, dispanserler, cerrahî klinikler, sıhhat yurdları, ilâ.

Büyük programlar: umumî hastahaneler, senatoryomlar, prevantoryomlar- Münasebetdar programlar: darülacezeler.

Mübadele ve iş binaları: umumî mülahazalar.

Münakalata ait binalar: Demir yol istasyon ve garları, bu binalarda husule gelen tekâmülat ve şimdiki halleri, asrî garlar, bahrî garlar, havaî garlar, hava limanları ve bu günkü ehmmiyetleri ile muhtemel inkişafları.

Posta binaları: postahane, posta merkezi, telefon ve telgraf santralleri, telsiz telgraf istasyonları.

Figure 5. *YMM Mimari/İnşaat Şubesi architecture class content.*

7. Emin Onat against Monsieur Dèbes

Emin Onat was one of the three people who were sent to Europe for *muallim muavini* training during the school's establishment in 1929. Sent to Zürich ETH for architecture education, Onat completed his studies in 1934. Although the idea of having Onat and the two others do internships or doctorates was brought to the agenda (YMM Tedris Meclisi, 1934, April 17), the doctorate idea was postponed because the school immensely needed these students as *muavins* (YMM Tedris Meclisi, 1934, November 27). Onat (Figure 6) became part of the branch in 1935 with the title *muallim muavini*.

Emin Onat did not have a say in the branch management as *muavin*. Still, upon his return complaints against Dèbes and his teaching style emerged. As the extension of foreign teacher contracts had been discussed in *Tedris Meclisi* in 1936, Mukbil Gökdoğan presented a report to the council. According to the report, Dèbes did not attend 79 classes out of his total 147 classes, and this situation improved a bit when reported to the school management. However, he did not attend any architecture studio hours for his eight design classes, causing the students under his responsibility to spend the year without any academic "benefits". If the total amount is calculated by the 13.5

Liras he earned per class, it means the country had 1094.5 Liras go to waste.[5] As for Dèbes, he explained his reasons that no students attended the classes, they did not finish the sketch or design homework on time, there were insufficient sources of books and magazines, and the school did not provide a second drawing workshop which had been necessary for the last six years. In response to the assistants' expressing positive opinions about Dèbes, Gökdoğan demanded information about Dèbes' "professional skills and works" that were investigated during his hire, yet no one could answer (YMM Tedris Kurulu, 1936, May 5). It was decided that the official reports back when Dèbes started working at the school be read. Monsieur Gabriel's letter was the only document, and it has no other information about Dèbes than that "he studied in the Beaux-Arts and he successfully worked in the (Picadelli?) theater newly built in Paris", regarding his background and professional skills. According to Gökdoğan, Dèbes could be replaced with some other professors "for the sake of the country". He stated Martin Elsaesser would happily accept this job. According to Gökdoğan, Mies van der Rohe, (André) Lurçat, (Auguste) Perret, and even Le Corbusier could be considered. Dèbes' contract could not be renewed due to a lack of majority votes during the meeting, but it was decided that he stayed until a more qualified person would be found to fill his place with a lower pay (YMM Tedris Kurulu, 1936, May 8).

Mukbil Gökdoğan shared the same opinion about Dèbes with his close friend Emin Onat and expressed them during *Tedris Meclisi* meeting where Onat was not authorized to attend as a *muallim muavini*. Gökdoğan (1961) explained their struggle against Dèbes as below:

> "Once Emin (Onat) returned all we thought about was to rehabilitate and re-build this premature branch according to the civic mindset, namely the European mindset, in a way to fit our system... On the other hand, the impossibility to integrate this model of the Beaux-Arts system, especially in the way Emin is accustomed to, causing disharmony between them, the lack of productivity caused by this, and therefore the overall incompatibility with our body, all caused us to start working towards the dismissal of this person in the appropriate way ..."

As Gökdoğan also pointed out, Onat's attitude towards Dèbes could also be based on the fact that they had different architectural backgrounds. Arif Tansuğ (1962), whom Onat worked with between 1936 and 1938 in *Yıldız Teknik Okulu* construction, believed Onat was "completely a different character than the branch chief Prof. Dèbes. They had thoroughly contrasting opinions on art". It is an understandable fact that Onat, who had a modernist education in ETH Zurich, objected to Dèbes' Academic Classicism doctrine adopted from the Beaux-Arts Ecole. Although the design classes prepared by Dèbes involved elements from the classical architecture doctrine like ornamentation, proportion, rhythm (Yüksek Mühendis Mektebi, 1937) he had his students design modernist projects fitting with the period's architecture trends that did not carry any elements from the Beaux-Arts Ecole (Figures 7-9).

Negative comments against Dèbes seemed to be caused by more than clashes of "architectural taste". It is told that in addition to neglecting his class duties he also did not fulfill the tasks given by the school. Orhan Safa (1995) mentioned about the time he assisted Dèbes that neither he worked for the urgent duty of building a dormitory building in Gümüşsuyu that he was assigned, nor did he approved the projects done by Onat and Safa. Because of this, the school was put in a difficult position

Figure 6. *Emin Onat (1962).*

against *Nafıa Vekaleti*. He was personally not liked by some assistants and students as well. Having assisted Dèbes in 1940, Kemal Ahmet Arû (2001) described Dèbes as a bizarre, snobbish man. According to him, Dèbes did not communicate with his assistants because he did not value them. Having designed an apartment building project in Dèbes's class between 1939 and 1940, Ziya Payzın (2006) stated Dèbes' clinging to his discourse of "There is no Turkish Architecture, there is Islamic Architecture" had a negative influence among students in a time with high patriotic sentiments as World War II was still going on. Ruhi Kafesçioğlu (2016) also defined Dèbes as an "extremely strict person".

Appointed as *muallim* upon completing his military service at the end of 1937 (YMM Tedris Kurulu, 1937, October 12), Emin Onat became branch chief candidate for the first time at the beginning of 1939. Gaining the most votes, he was recommended to *Nafıa Vekaleti* as the branch chief (YMM Tedris Kurulu, 1939, January 10). Shortly after, in the meetings for the extension of foreign professor contracts Onat opposed the extension of Dèbes' contract with the following statement (YMM Tedris Kurulu, 1939, April 18):

> "In deciding the contract renewal of these colleagues, the most important thing to keep in mind is their technical capabilities. Not all architecture branch graduates, unfortunately, are capable of executing a project. Therefore they are busy doing estimations in the Ministry".

After discussions, Dèbes' contract was renewed again by a majority vote (10 out of 18). Mukbil Gökdoğan (1961) talked about their "struggle" with Emin Onat against Dèbes as below:

> "Despite the (Tedris) Meclis' strict conditions ... this hard-fought battle (against Dèbes) continued and finally, through following the book, instead of tricking him and making him leave, by putting forth actual matters and events, regarding both teaching and practice, ... we were able to dismiss M. Debs from the branch. This way the first seeds of our faculty today started growing there."

Dèbes left the school at the end of YMM's reconstruction period in 1940.[6]

8. *Şube Şefi* Emin Onat and the transformation of the branch

A reconstruction period was started in YMM with the support of the new management taking office in *Nafıa Vekaleti* in 1939. In the 1939-1940 academic year, syllabuses were redesigned, lesson contents were reshaped to meet modern needs of the era, staff was increased, educational tools were completed and the projects aiming the further development of the school were put into effect (Taylan, 2010).

The 1939-1940 academic year, like the rest of the school, had been a year of remarkable changes within *Mimari/İnşaat Şubesi*. One of the most important developments was Emin Onat's becoming the *Şube Şefi*. In the *Tedris Meclisi* meeting about the new *"Yapı İşleri Şubesi"* syllabus and the new teachers to be hired in December 1939, Professor[7] Onat declared (YMM Tedris Kurulu, 1939, December 7):

> "The need for the *"Yapı İşleri Şubesi"*'s rehabilitation because until today the technical aspect of the profession had been overwhelmingly emphasized in it, and the artistic aspect needed consolidation so that the education of fully qualified architect engineers could be ensured…"

To reinforce the artistic side of the branch's education, interior design, art history, Turkish architecture history, model making and free-hand drawing classes were included in the curriculum (YMM Tedris Kurulu, 1939, December 7). Despite these new classes and the architecture class hours increasing, it could not be completely restructured. Onat could not bring such a reform to the branch on his initiative because the school was still attached to *Nafıa Vekleti* and managed by *Tedris Meclisi*. A new curriculum from scratch would happen only after the school's transformation to university and the establishment of the faculty.

Emin Onat's greatest contribution to the *Mimari Şubesi* was the formation of a relatively large staff including important names (Figure 10). Clemens Holzmeister, who back then had important duties in Turkey, joined the staff as a professor of architecture, while Gustav Oelsner joined as a professor of city planning.

The impact of *Mimari Şubesi*, which took shape in 1940, on the YMM's architecture education was rooted more in its teaching rather than its curriculum. The fact that the two acclaimed architects Onat and Holzmeister instructed the architectural design, which are regarded as the core of architecture education, and their communication with students brought a significant change (Payzın, 2006; Kafesçioğlu, 2010). The branch's physical environment was also renewed. The old drawing workshop was transformed into "an architectural workshop" with new drawing tables (Payzın, 2006). Having borne witness to this period, Payzın and Kafesçioğlu expressed their shared sentiment as in Kafesçioğlu's (2010) statement "We were now enthusiastic *Mimari Şubesi* students in a whole new environment, not İnşaat Şubesi anymore".

Figure 7. *YMM İnşaat Şubesi year 1933 graduate Emrullah Vehbi's student project designed in Dèbes' architecture studio (Emrullah Vehbi, n.d.).*

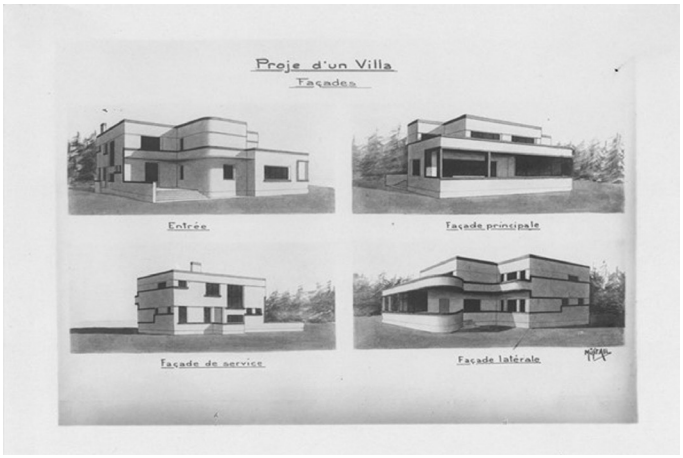


Figure 8. *YMM İnşaat Şubesi year 1935 graduate Müfit Ali's student project designed in Dèbes' architecture studio (Müfit Ali, n.d.).*

Figure 9. *YMM İnşaat Şubesi year 1935 graduate Müfit Ali's student project designed in Dèbes' architecture studio (Müfit Ali, n.d.).*

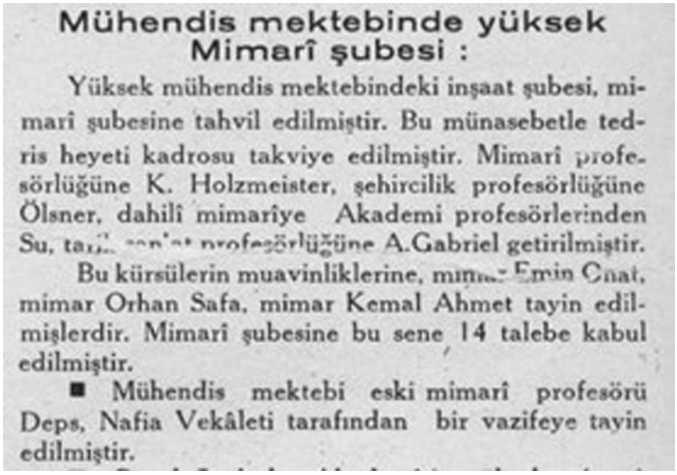
9. Evaluation

Gülsüm Baydar (2012) explains how the history of architecture education from Ottoman times to the Republic era can be read through personal efforts:

> "...the history of architecture education can even be reduced to a few reformists' personal histories. From Abdüllahim Effendi, who wrote the first proposal for the establishment of an architecture school, to Emin Onat, who established the architecture faculty within the (Istanbul) Technical University, individuals played key roles in framing the scope of architecture education."

This approach had been repeated many times in the narratives regarding the establishment of the ITU Faculty of Architecture through Emin Onat's founder role. Taking a closer look at the events that had taken place in *YMM Mimari/İnşaat Şubesi* between 1928 and 1941 shows us a structure consisting of various actors taking part in the formation of the branch. Within this structure, Onat had been a pivotal actor with his vision, determination, and efforts for architecture education. However, Onat's influence had been limited by other actors' objectives and deeds, while the architecture education was molded through the conflicts and/or reconciliation acts between all actors.

In the period from YMM's establishment in 1928 to its passing to *Maarif Vekaleti* in 1941, *Mimari/İnşaat Şubesi* shaped by the deeds of *Nafıa Vekaleti* which it was attached to, *Tedris Meclisi* which took branch-related decisions,



Mühendis mektebinde yüksek Mimarî şubesi :

Yüksek mühendis mektebindeki inşaat şubesi, mimarî şubesine tahvil edilmiştir. Bu münasebetle tedris heyeti kadrosu takviye edilmiştir. Mimarî profesörlüğüne K. Holzmeister, şehircilik profesörlüğüne Ölsner, dahilî mimarîye Akademi profesörlerinden Su, ta... sanat profesörlüğüne A.Gabriel getirilmiştir.

Bu kürsülerin muavinliklerine, mim... Emin Onat, mimar Orhan Safa, mimar Kemal Ahmet tayin edilmişlerdir. Mimarî şubesine bu sene 14 talebe kabul edilmiştir.

■ Mühendis mektebi eski mimarî profesörü Deps, Nafia Vekâleti tarafından bir vazifeye tayin edilmiştir.

Figure 10. *News about Mimari Şubesi published in the Arkitekt Magazine (Haberler, 1940).*

the branch head Albert Dèbes and branch staff Emin Onat. *Nafıa Vekaleti* as the state representative had been an actor to provide the resources necessary to maintain YMM's presence and identify its educational objectives in return. The task of shaping education following the ministry's objectives was assigned to *Tedris Meclisi*. Although the ministry and the council fell into disagreements at times, most council members had the same objectives as the Ministry. The branch was expected to train "architect engineers" fully knowledgeable about city-building. However, their qualification with a broad area of expertise had always been vague and controversial for both the ministry and the council. This notion coupled with the lack of vision and determination necessary to construct the branch curriculum and staff caused the shift from architecture towards the field of engineering, which was regarded as a greater need for the country.

Albert Dèbes and Emin Onat, although being part of the branch staff, had limited impacts on the decisions that developed the branch. Dèbes, who was brought to the branch with a reference letter that had almost no information about himself, did not, or could not, demonstrate any efforts to shape the branch. Emin Onat criticized the education under Dèbes' instruction for poor quality, but Dèbes managed to stay as the branch chief by *Tedris Meclisi*'s approval until 1940. Upon becoming the *Mimari Şubesi Şefi* in 1940, Onat gained the necessary power to realize the transformation he desired. At this point, it is important to keep in mind that Onat's role as chief could happen thanks to the voting in the *Tedris Meclisi* and the approval of the *Nafıa Vekaleti*, and Onat-led transformation of *Mimari Şubesi* was again enabled by the new management of the ministry. Onat played a pioneering role by putting forward a solid will and perspective for the branch's educational objectives, content, and future. However, Onat's becoming the branch chief in 1940 can only mean an improvement in architecture education rather than a revolution because the school structure stayed the same, in other words, the *Tedris Meclisi*'s authority continued. The branch staff was fortified by bringing important names, the quality of architecture classes was improved thanks to their contribution, however, it was not possible to create a fresh new curriculum that positioned architecture education in its center.

YMM's separation from the *Nafıa Vekaleti* and attachment to *Maarif Vekleti* in 1941, YMO's transformation to ITU in 1944, and finally, after the 1946 *Üniversiteler Kanunu* (Law on Higher Education), Faculty of Architecture's turning into an autonomous body caused architecture education to become increasingly independent of the above-mentioned actors. The separation from *Nafıa Vekaleti* took away the pressure of training future ministry employees from the branch's shoulders, while the foundation of the university eliminated *Tedris Meclisi* member engineers' influence on the syllabus. *Üniversiteler Kanunu* rendering faculties relatively independent and enabling the formation of decision mechanisms from faculty members allowed more and insider actors to form ITU Faculty of Architecture and its education.

Endnotes

[1] *Yıldız Teknik Okulu* (Technical School) and *ITU Teknik Okulu* were among the institutions. However, these were not considered to be schools that train *Yüksek Mimar* (master architect) due to their shorter education period. Also, the majority of the teaching staff of these schools were members of ITU and GSA.

[2] The education expenses of most

of the students were covered by *Nafıa Vekaleti*, and these students had to work there after their graduation.

[3] He lived from 1876 to 1950 and worked as engineer at Ministry of Public Works (France) until 1935 (URL.1, URL.2).

[4] Specialization branches with a three-year program started after the three-year *Ortak Şube*, where basic education was given.

[5] Dèbes was the highest paid foreigner at YMM. In 1936, his salary was 1200 TL, on the other hand, other foreigners received a salary of 850 Liras or 700 Liras (T.C Başvekalet Kararlar Dairesi Müdürlüğü, 1936).

[6] According to the news published in the Arkitekt magazine, Dèbes was appointed to another duty by *Nafıa Vekaleti* (Haberler, 1940). No information could be found in the state archives about the post he held after 1940 or when he left Turkey. Dèbes died in Paris in 1976 (URL.3)

[7] During the restructuring process in the school, the title of *muallim* was changed to *profesör* (professor) and *muallim muavini* to *doçent* (associate professor).

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Evaluation of functional flexibility in contemporary Japanese housing layouts: Integration of user perspective

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Abstract
In recent decades, given the indefinite identity of residents to house designers and builders, along with changes in families' lifestyles, flexibility has regained its importance in housing design. The present study aimed to develop the concept of functional flexibility, which accommodates potential responses to non-physical changes by users. Since the responsiveness and efficacy of flexible solutions in housing units largely depend on the residents' reactions to these solutions, this study integrated the user perspective to evaluate and improve functional flexibility in contemporary Japanese housing. To evaluate functional flexibility as a framework, first, its related components and indicators were identified. Next, a questionnaire survey was conducted to investigate these components in contemporary Japanese housing layouts and to evaluate the gap between the current and expected conditions based on the users' needs. Finally, some suggestions were presented to bridge this gap and optimize the housing layouts. The findings revealed that functional flexibility consists of two components of multifunctionality and convertibility. Multifunctionality was analyzed using one indicator, that is, type of combined functions. Convertibility was also evaluated using four indicators, that is, multipurpose rooms, movable partitions, movable shells, and transformable furniture. The evaluation of indicators showed that Japanese housing layouts had multifunctional spaces, multipurpose rooms, and changeable elements, leading to functional flexibility. Besides, several solutions, including the type of layouts and architectural elements, were suggested to optimize functional flexibility.

Keywords
Japanese housing, Functional flexibility, Multifunctionality, Convertibility, User participation.

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1. Introduction

1.1. Changes in housing design

Due to changes in the families' needs over time (e.g., family expansion and advancing age), a residential unit should be able to respond to the new unique lifestyles and living habits of its residents and accommodate a wide range of households over its life span (Friedman, 2002). If an architectural space cannot accommodate its users' expected functions, user dissatisfaction is inevitable. Therefore, it is important to propose appropriate design solutions to bridge the gap between expected functions (e.g., users' expectations of their living space) and current functions (e.g., a set of design strategies available in the existing housing layout). Rather than incorporating functionally predetermined spaces, flexibility allows housing units to fulfil the users' dynamic needs over time by increasing their space options (Schneider and Till, 2005); this strategy has gained increasing importance in house planning and design.

1.2. A review of flexibility

With rapid social, economic, and technological changes in today's life, flexibility has become a significant feature of contemporary house planning and design to accommodate to the transformations of human life. Flexible buildings are intended to respond to evolving conditions in form and function (Kronenburg, 2007); accordingly, in the life cycle of a building, it can maximize its production efficiency (Schmidt III and Austin, 2016). Overall, flexibility can ensure the long-term use of buildings by changing their living spaces and functions (De Paris and Lopes, 2018). Moreover, it can accommodate both temporary (e.g., combining two rooms by the use of a movable partition) and permanent (e.g., moving an external wall to expand the size of a room) changes (Schneider and Till, 2007). It can be concluded that flexibility enables buildings to meet multiple needs of users through time.

1.2.1. Typology of flexibility

Considering the potential changes in housing design, researchers have categorized the concept of flexibility (Lans and Hofland, 2005; Groak, 1992; Schneider and Till, 2005; Gilani and Türker, 2020). Dittert (1982 cited in Lans and Hofland, 2005) classified flexibility into two categories: functional flexibility (i.e., ability to change the interior space based on the residents' changing needs without structural alterations) and structural flexibility (i.e., physical and structural changes in the interior space). Moreover, Groak (1992) described two distinct aspects of flexibility, including the capacity of different physical arrangements (i.e., ability to respond to physical changes) and the capacity of different social applications (i.e., ability to respond to non-physical changes), which bear resemblances to the notions of functional and structural flexibility, respectively. Additionally, Till and Schneider (2005) classified flexibility strategies into two broad categories of use (flexibility in the spatial layout through house planning and design) and technology (flexibility through construction techniques and structural and servicing strategies).

There is a clear similarity between the abovementioned classifications. In this study, the change-based approach to flexibility was applied to classify flexibility into two categories, that is, structural-spatial flexibility and functional flexibility. Structural-spatial flexibility refers to the potential of a building to respond to physical changes by modifying the physical form of the building via joining, splitting, extending, and merging spaces. On the other hand, functional flexibility signifies the potential of a building to respond to functional changes or use of a space in different ways without making physical changes. Functional flexibility is completely dependent on the active participation of users, as well as interactions between humans and architectural space. Therefore, the present study focused on functional flexibility and evaluated it from the users' perspectives.

1.3. Japanese housing as a case study

Traditional Japanese housing, which is regarded as a valuable case study in many studies on flexibility, employs a

combination of flexible strategies, such as a wooden post-and-beam structure system (Engel, 1985), sliding doors as internal partitions and external skin, and multipurpose rooms with some furniture (Yagi, 1992). With the standardization of housing designs, the contemporary Japanese housing layout is based on a central multifunctional space and several private rooms (Daniels, 2010). The present study aimed to assess the adaptability of contemporary Japanese housing to users' expectations and to determine the criteria for improving the current condition.

1.4. Objectives and methodology

This study mainly aimed to develop the concept of functional flexibility. Besides, this explorative study aimed to identify different dimensions of functional flexibility, to investigate these dimensions in contemporary housing layouts in Japan, and to make suggestions to optimize these layouts. The research scope was limited to design strategies associated with housing layouts and did not address technical or structural strategies. Overall, the results of this study can be useful for architects, interior architects, and designers to create flexible residential spaces.

To evaluate flexibility in architecture, researchers have used various methods, including assessment based on layers and indicators (Geraedts, 2016; Kelly et al., 2011), assessment based on users' opinions (Beisi, 1995; Altaş and Özsoy, 1998), study of plan transformation over a long period (Minami, 2016), "space syntax" concerning the concept of polyvalence, and physical factors of floor plans (Femenias and Geromel, 2020; Leopen, 2006). As a common method in these studies, flexibility is divided into several sub-dimensions to appraise flexibility in buildings or to determine design strategies for achieving flexibility (Geraedts, 2016; Kelly et al., 2011; Ghafourian, 2018; Till and Schneider, 2005; Einifar, 2003; Leopen, 2006; Femenias and Geromel, 2020); however, the users' perspectives are largely ignored in the process of flexibility assessment. Therefore, user perspective is a focal point of this survey. The questionnaire survey method was employed to integrate the users' opinions for evaluating functional flexibility in contemporary Japanese housing units.

To specify the framework of this study, first, the components of functional flexibility and its related indicators were separately identified and then used as criteria to statistically evaluate the adaptability of Japanese housing layouts to the users' expectations. Next, the characteristics of contemporary Japanese housing units were discussed to collect the required data for designing the questionnaire. To understand the contemporary Japanese housing layouts, some projects designed by Japanese architectural offices, as well as a number of model houses built by major Japanese homebuilders (e.g., Misawa, Sekisui, Daiwa, and Panasonic), were visited by the authors. The questionnaire survey was conducted in 2019, and data were analyzed using SPSS Version 23.0. The collected data were used to appraise the current solutions in contemporary Japanese residential units to meet the users' changing needs over time.

2. Dimensions of functional flexibility

In this study, the concept of functional flexibility was considered as an inclusive term, covering several components related to a dimension of flexibility, without which functional flexibility could not be analyzed. Also, each component was divided into multiple sub-dimensions (i.e., indicators), which were used as the evaluation criteria for functional flexibility in housing design. In this manner, the design solutions related to these components created functional flexibility in the spatial layout. By reviewing the designers' perspectives on the concept of flexibility, the components and related indicators were extracted.

2.1. Components of functional flexibility

Designers have used several keywords for the definition of flexibility. Table 1 presents the users' perspectives of functional flexibility.

Table 1. *Keywords related to functional flexibility.*

Designers	**Keywords**
Grütter (1987)	Multi-functionality: accommodating several functions in a space
Beisi,(1995)	Multipurpose room: room function can be changed without changes to the room dimension Change in room relationships: connections between rooms of a unit Change in room quantity and size: room divisions can be changed by moveable walls Change in accessories: apartment accessories can be chosen by tenants or replaced easily
Pena & Parshall (2001)	Multi-functionality: accommodating multiple functions at the same place Convertibility: ability to respond to interior changes
Einifar (2003)	Multi-functionality: accommodating multiple functions in a space Adaptability: occurrence of various behaviors in the same place at different times
Leopen (2006)	Polyvalence: interchangeability of activities between different rooms
Ghafourian (2018)	Multi-functional: accommodating different functions at the same time in space Segregation: ability to divide a room into two separate spaces Different furniture arrangement: possibility of different arrangements of furniture, using movable and foldable furniture
Gilani & Türker (2020)	Versatility: spatial multi-use with minor structural modification Convertibility: conversion from one function to another; exchange of functions Multi-functionality: accommodating different functions at the same time, at the same place Ability to separate & re-join the rooms Flexible arrangement of furniture: ability to rearrange furniture Freedom of main space as generic space

Based on the keywords related to functional flexibility presented in Table 1, certain factors affect the flexibility of buildings. In this study, these factors, referred to as components, were as follows:

Multifunctionality (M): Multifunctionality refers to the principle of spatial integration of smaller rooms and functions into a larger room. Multifunctional spaces are open-plan spaces that can be simultaneously dedicated to multiple functions. The open-plan concept in housing architecture was more widely applied in the 1960's when the kitchen was integrated into a whole with the living room and dining room (Alfirevic and Simonović Alfirević, 2016). It seems that elimination of barriers, such as walls and doors between adjacent rooms, can save the living space owing to the reduction of circulation areas, besides enhanced accessibility due to visual and physical permeability.

Convertibility (C): Functional flexibility can be achieved through conversion of spaces (Pena and Parshall, 2001). Convertible spaces can accommodate different functions at different times according to the users' needs. Overall, places that can be used for various purposes offer their users more options than places limited to a single fixed use (Bently et al., 1985); therefore, the concept of convertibility conflicts with fixed functionalism. Also, convertibility overlaps with the concept of polyvalence, which refers to the characteristics of a fixed form that can be used in different ways without structural interventions (Leopen, 2006).

Flexibility through a polyvalent

Table 2. *Extraction of CIs based on designers' perspectives.*

Designers	**Characteristics of convertibility**	**Extracted indicator**
Schneider & Till (2007)	1.Functionally neutral rooms	Multipurpose room
	2.Connection between rooms	Movable partition
	3.Movable and sliding walls	Movable partitions, Movable shell
	4.Foldable furniture	Transformable furniture
Gilani & Türker (2020)	1.Conversion from one function to another, exchange of functions	Multipurpose room
	2.Ability to separate and rejoin rooms	Movable partition
	3.Ability to rearrange furniture	Multipurpose room
Ghafourian (2018)	1.Ability to divide a room into two separate spaces	Movable partition
	2.Various possibilities for arrangements of furniture	Multipurpose room
	3.Using movable and foldable furniture	Transformable furniture
Beisi (1995)	1.Multipurpose rooms	Multipurpose room
	2.Several possibilities for connecting rooms	Movable partition
	3.Flexible or moveable walls	Movable partition

form relies on the vague anticipation of users' various interpretations of space and possible functions. Therefore, a space with different functional capacities is considered a convertible space, which can meet the users' various functional needs (functional flexibility). Convertibility applies to both temporary and permanent changes. For example, foldable furniture can easily convert a living room into a bedroom temporarily without any structural modifications (Schneider and Till, 2007). Permanent conversion of a bedroom into a study room through different spatial arrangements is another example. Such changes can create spaces adaptable to the users' changing needs and demands.

2.2. Indicators

Multifunctionality and convertibility are the qualitative characteristics of architectural space. Therefore, to provide a simple and reliable means to measure changes in these components, it is necessary to determine related variables, namely, indicators. Each indicator provides a tool to evaluate the flexibility of housing design. In this study, indicators were extracted by reviewing the designers' perspectives of flexibility, leading to multifunctionality and convertibility in architectural space.

2.2.1. Multifunctionality indicators (MIs)

Designers have introduced specific characteristics for multifunctionality, which have been widely used to facilitate functional flexibility in architectural spaces. Gilani and Türker (2020) considered "combining different activities at the same time, at the same place" as an indicator to analyze multifunctionality. Some designers also described that multifunctionality is characterized by different integrations of housing functions (Grütter, 1987; Ghafourian, 2018; Alfirevic and Simonović Alfirević, 2016). The extracted indicator is as follows:

Type of combined activities (MI1): This indicator represents a number of activities simultaneously occurring in a single room without any fixed barriers. In practice, the type of combined activities in a multifunctional space can accommodate various layouts of a residential unit. Integration of a living room, dining room, and kitchen into one space (LDK) and integration of the dining room and kitchen into one space (DK) (Alfirevic and Simonović Alfirević, 2016) are two significant examples of housing layout.

2.2.2. Convertibility indicators (CIs)

Designers have been frequently proposing housing design solutions

to improve the characteristics of convertibility; these characteristics can be applied to determine CIs (Table 2).

Considering the characteristics of convertibility in architectural space described by the designers (Table 2), the extracted indicators were as follows:

Multipurpose room (CI1): A multipurpose room is regarded as a functionally neutral room, which can be used for various purposes at different times. The spatial plan consists of equal-sized rooms with indeterminate uses (Schneider and Till, 2007). This spatial arrangement accommodates various furniture layouts for the rooms, allowing for different modes of occupation depending on the users' demands.

Movable partition (CI2): The adjacent rooms can be connected by movable partitions and doors. For example, light sliding doors are used to join or divide the rooms in traditional Japanese housing (Schneider and Till, 2007). Different room relationships allow the users to interpret the rooms for different uses (Kim, 2013). On the other hand, the use of movable partitions, besides the ability to change the size and function of space, enables users to change the space function according to their needs.

Movable shell (CI3): A movable external shell establishes a variable relationship between indoor and outdoor spaces. It can influence the functional potential of a room by converting the indoor closed space into a semi-open space, using movable enclosure in the external walls.

Transformable furniture (CI4): Transformable or space-saving furniture can periodically change the function of space. A folding bed, for instance, can transform a living room during the day into a bedroom at night (Schneider and Till, 2007). The use of foldable furniture may be the best way to change functions in a small space.

3. An overview of contemporary Japanese housing layouts

This section includes the evolution of contemporary housing design in Japan, its layout typology, and common features.

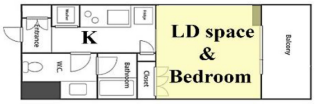
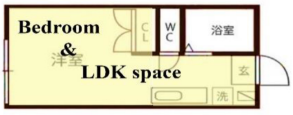
Considering the substantial war damage and housing shortage following the Second World War, the Japanese government faced a housing crisis in different cities (Ronald, 2009). In an attempt to resolve the severe housing shortage in the late 1950's and 1960's, large-scale housing complexes, called "Danchi" in Japanese, were built by the government. Generally, each unit in Danchi consists of a central dining-kitchen area, separate bedrooms, a bathroom, and a toilet (Daniels, 2012). It should be noted that in contemporary Japanese housing history, the Danchi apartment layout plays a key role in separating the dining and sleep spaces (Daniels, 2010).

Additionally, rapid urbanization, rapid population growth, and economic constraints led to the emergence of limited spatial dimensions and multifunctional spaces (e.g., dining room/kitchen). In the 1970's, the total number of housing units in Japan exceeded the number of households, leading to the greater importance of quality than quantity in housing design (Minami, 2016). This phenomenon resulted in the development of longer-lived houses by applying flexibility strategies. Movable partitioning systems in the Kodan Experimental Housing Project in 1982 (Minami, 2007), besides changeable façade systems in the Next 21 Project built in 1994 (Kendall and Teicher, 2000), are well-known case studies of flexible housing.

Post-war housing layouts, such as Danchi units, were standardized based on the "n-DK" model, where n denotes the number of rooms, except for the combined dining-kitchen (DK) area (Ronald, 2009). Later on, the "n-LDK" housing style was proposed by adding a living room (L) to the n-DK model, leading to an enlarged house size (Hinokidani, 2007). Besides, the DK and LDK styles could become an LD style, that is, a combined living room/dining room space with an adjacent kitchen. Generally, the n-DK and n-LDK styles are widely used in contemporary Japanese housing layouts.

Despite differences in construction techniques, standardization of

Table 3. *Layout typologies in Japanese contemporary house (Adapted from Real Estate Japan, 2020).*

Layout	Rooms	Example
nLDK	- A multifunctional space for Living/ Dining / Kitchen - "n" denotes the number of rooms separate from LDK (basically the number of bedrooms) - Toilet/bathroom	
nDK	- A multifunctional space for Dining / Kitchen - "n" denotes the number of rooms separate from DK - 1 room is used as a living room according to the user's perspective - Toilet/bathroom	
nSLDK	- A multifunctional space for Living / Dining / Kitchen - "n" denotes the number of rooms separate from LDK (basically the number of bedrooms) - Service room - Toilet/bathroom	
1k	- A multipurpose room as a multifunctional space for Living and Dining during the day and bedroom at night - Kitchen - Toilet/bathroom	
1R	- A multipurpose room as a multifunctional space for Living / Dining / Kitchen during the day and bedroom at night - Toilet/bathroom	

housing layouts and industrialization of construction techniques have led large construction companies in Japan to build residences with similar layouts, based on a combined space (DK or LDK style) and some private rooms (Daniels, 2010). Today, housing units in all types of Japanese styles, whether detached houses or apartment units, are classified based on a model, which determines how many rooms the housing unit has in total, excluding the bathroom and/or toilet (Real Estate Japan, 2020). These contemporary housing layouts are summarized in Table 3.

Based on the authors' observations of Japanese houses and literature review, common features related to functional flexibility were extracted:

Multifunctional space: The standardization of housing layouts after World War II (Daniels, 2010) and limited living space led to the emergence of multifunctionality in Japanese housing layouts. As mentioned earlier, multifunctional spaces are open-plan spaces that can have multiple functions at the same time. According to the housing layouts in contemporary Japan (Table 3), there are three types of multifunctional spaces based on the type of combined activities. The combination of activities, such as cooking and eating, forms a DK space in the n-DK layout. Similarly, combining activities, such as cooking, eating, and gathering together in the n-LDK, n-SLDK, and 1R layouts, as well as eating and gathering together in the n-K layout, create LDK and LD, respectively.

a b

Figure 1. *(a) Japanese-style room. (b) Western-style room (Authors, 2019).*

Multipurpose rooms: Japanese housing layouts usually consist of a multifunctional space and a number of private rooms designed in two styles, including Japanese and Western (Ronald, 2009) (Figure 1). A Japanese-style room or a tatami room is floored by tatami mats and characterized by the minimal use of furniture. On the other hand, Western-style rooms use wooden floors, and their functions are determined by the available furniture. The main distinguishing feature of these two design styles is the different lifestyles they can offer. The Japanese-style room implies floor-based living, whereas the Western-style room implies furniture-based living.

Generally, a tatami room is a multipurpose or functionally neutral room. Tatami is a traditional Japanese mat that has been used as a flooring material for sitting, sleeping, walking on, or a novel activity, such as refreshing the covers of tables, benches, and even beds (Yagi, 1992). Overall, the use of uniform-sized tatami mats as flooring enhances the functional potential of a room. The multifunctionality of tatami rooms, as well as the minimal use of furniture, provides sufficient space for various activities.

Movable partitions and shells: The analysis of housing layouts designed by major Japanese homebuilders (e.g., Misawa, Sekisui, Daiwa, and Panasonic) and architectural offices showed that two adjacent rooms may be connected by movable partitions, such as sliding doors or a door as a dividing element (Figure 2a). For example, a tatami room can be connected to its adjoining room by the means of sliding doors (Ronald, 2009), making it possible to change its size and function. By joining two small rooms, a larger architectural space can be created to adapt to the users' varying needs. Moreover, by using movable shells that provide semi-open spaces (e.g., balcony and terrace), the interior space can be converted to a semi-open space, and functional flexibility is achieved in the housing layout (Figure 2b).

Figure 2. *(a) Movable partition. (b) Movable shell in Kairo-no-iye (Cloister House) by Tezuka Architects (Authors, 2019).*

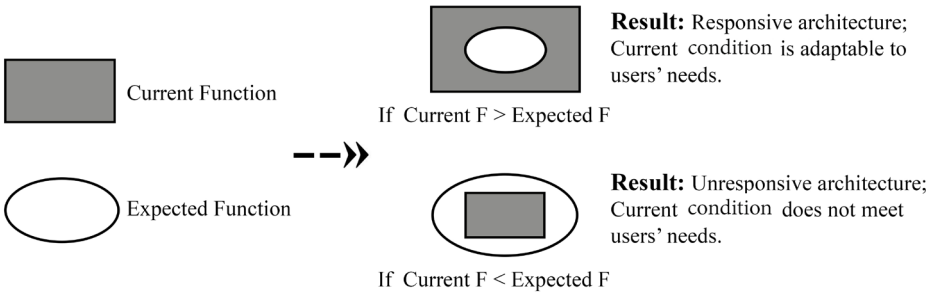


Figure 3. *Conceptual model for assessing functional flexibility (Diagram by Authors).*

4. Data collection

A questionnaire survey was conducted, targeting contemporary residents to collect the required data for this study. The users were asked if their households were responsive to their various needs. The results of the questionnaire survey were used as criteria to evaluate functional flexibility in contemporary living spaces in Japan.

4.1. Sampling technique

A survey was conducted in 2019 to collect the required primary data from the contemporary users of Japanese detached houses and apartment units. The samples were selected through simple random sampling method, which is a reliable method for collecting information when every single member of the population is chosen randomly (Rao, 2000). In this method, every population unit is given an equal chance to appear in the sample. It is worth mentioning that standardization of housing layouts in Japan (Daniels, 2010) reduced data scattering and facilitated the generalization of findings to the entire community. To collect information using this method of sampling, the questionnaires were sent to the residents' mailboxes (300 housing units including 134 detached houses and 166 apartment units) in Tokyo. Responses were received from 138 homes (51 detached houses and 87 apartment units), registering a response rate of 46%. The sample was logically assumed to represent the entire population of contemporary housing users in Japan.

4.2. Questionnaire structure

A questionnaire was used to assess the perceived gap between the users' needs and the current residential status from the users' perspectives. The current functions include a set of housing design strategies to meet the users' needs, while the expected functions comprise a set of users' expectations from their living space. If a space cannot meet these expectations, it can lead to user dissatisfaction. The conceptual analysis model of functional flexibility is therefore based on the analysis of the gap between the current and expected functions of the housing design (Figure 3).

To determine the demographic characteristics of the participants in the questionnaire, they were first asked about their sex, ownership status, and level of participation in the design and construction phases. Next, the rest of the questionnaire was structured in two parts containing 11 close-ended questions, three of which evaluated MI1, while the remaining eight evaluated CI1, CI2, CI3, and CI4 under current and expected conditions.

5. Statistical analysis

The questionnaire findings were analyzed using SPSS for Windows Version 23.0 (IBM Corp., Armonk, NY, USA). A two-sided P-value less than 0.05 indicated a significant difference. Chi-square and binomial tests were used as two valuable statistical tools to test the significance of data. Chi-square distribution test is a non-parametric test to compare the observed frequencies with the expected frequencies. Also, binomial test is a non-parametric test to determine whether the frequency distribution of nominal, dichotomous variables corresponds to the assumed distribution (Agresti, 2007).

Table 4. *Assessment results of the current and expected conditions of MI1.*

Layout type	Current condition		Expected condition				Difference (gap) between current and expected conditions (percentage)
	Descriptive statistics		Descriptive statistics		Statistical test		
	Frequency	Percentage frequency	Observed frequency	Percentage frequency	Chi-square statistic	Asymptotic Sig.	[current - expected]
Without multifunctional room	6	4.34%	18	13.04%	39.971	0.000	-8.70%
DK room	20	14.49%	52	37.68%			-23.19%
LD room	44	31.88%	14	10.14%			21.74%
LDK room	68	49.29%	54	39.14%			10.15%
With multifunctional room (DK, LD, LDK)	132	95.66%	120	86.96%	-	-	-
Sum	138	100%	138	100%	-	-	-

5.1. Description of sociodemographic characteristics

As mentioned earlier, 138 users participated in this study. The studied sample with no missing data (n=138) consisted of 53.6% males and 46.4% females. The respondents were aged between 24 and 67 years (M=37.81; SD=9.493). Moreover, 37.7% of the respondents owned their place of residence and were asked if they had participated in the design and construction of their house with designers or homemaker companies. A large majority of owners completing the questionnaire (n=46, 88.47%) had not participated in the design or construction phases.

5.2. Assessment of multifunctionality indicators (MI)

To assess the functional flexibility of housing layouts, the current and expected conditions of the multifunctionality indicator (MI1) were studied using two different categories of questions. The first category determined the frequency of multifunctional rooms and types of multifunctional spaces (LDK, DK, and LD) according to the type of combined activities under the current condition, and the second category specified the frequency of multifunctional spaces (LDK, DK, and LD) based on the respondents' preferences. Next, Chi-square test was conducted. The total scores of the questionnaires are presented in Table 4, where a P-value less than 0.05 was considered significant.

Table 4 consists of two parts. The first part presents the current conditions, and the second part depicts the respondents' expected conditions. According to the table, under the current conditions, 95.66% of dwellings had a multifunctional space (DK=14.49%, LD=31.88%, and LDK=49.29%) in their housing layouts. The second part shows the respondents' preferences for the spatial organization of living room, kitchen, and dining room ([L, D, K], [L, DK], [LD, K], and [LDK]). The results revealed that 86.96% of the respondents favored housing layouts, including a multifunctional space (DK=37.68%, LD=10.14%, and LDK=39.14%). The majority of the respondents (76.82%) chose housing layouts, including DK or LDK (DK=37.68% and LDK=39.14%) under the expected condition, while 10.14% considered LD to be consistent with their needs.

Depending on the users' preferences, data related to the expected layouts were examined by Chi-square

Table 5. *Assessment results of the current and expected conditions of CI1, CI2, CI3, and CI4.*

CI	Current condition				Expected condition				Difference (gap) between current and expected conditions (percentage)
	Descriptive statistics		Statistical test		Descriptive statistics		Statistical test		
	Frequency (Affirmative response)	Percent (Affirmative response)	Test prop.	P-value	Frequency (Affirmative response)	Percent (Affirmative response)	Test prop.	P-value	[current - expected]
CI_1	108	78.3	0.50	0.000	82	59.4	0.50	0.033	18.9
CI_2	93	67.4	0.50	0.000	33	23.9	0.50	0.000	43.5
CI_3	113	81.9	0.50	0.000	124	89.9	0.50	0.000	-8
CI_4	38	27.5	0.50	0.000	84	60.9	0.50	0.013	-33.4
Sum	138	100%	-	-	138	100%	-	-	-

test ($\chi 2$). This statistical test was used to identify whether the relationships between variables were significant. Table 7 indicates a significant relationship between different expected layouts based on the users' preferences ($\chi 2$=39.971, asymptotic Sig.=0.000, P-value<0.05). The percentage of individuals who selected spatial organizations, including multifunctional spaces (LDK, DK, and LD) (86.96%), was significantly higher than that of individuals choosing spatial layouts without a multifunctional space (13.04%).

Table 4 indicates differences (gaps) between two sets of values to compare the frequency percentage distribution of various combinations of activities in the current and expected conditions. As shown in Table 4, in the current conditions, the frequency (percentage) of housing layouts, including DK and those without multifunctional rooms, was lower compared to the expected condition. Besides, the frequency (percentage) of housing layouts, including LD (31.88%), was higher in the current condition compared to the expected condition (10.14%). Similarly, the frequency (percentage) of housing layouts including LDK (49.29%) was higher in the current condition compared to the expected condition (39.14%).

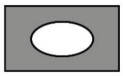
5.3. Assessment of convertibility indicators (CIs)

To assess the functional flexibility of housing layouts, the current and expected conditions of CIs were measured using two categories of questions. The first category determined whether these indicators existed in the housing units, and the second category specified whether the respondents needed these indicators. The total score of the questionnaires was a measure of functional flexibility in convertible spaces. Next, a nonparametric binomial test was conducted (as presented in Table 5). A P-value less than 0.05 was considered significant.

Table 5 consists of two parts. The first part represents the current conditions, and the second part depicts the respondents' expectations. The table shows that in the current condition, 78.3% of the respondents' residences had multipurpose rooms (CI1), and 67.4% of the respondents had either a movable partition or a door between at least two rooms in their residence (CI2). Moreover, 81.9% of the respondents' residences had movable shells in the external walls (CI3), and 27.5% of the respondents used foldable furniture at home (CI4). To examine whether the frequency distribution of CI1, CI2, CI3, and CI4 is significant under the current condition, a binomial test was applied. The results showed that the P-value was less than 0.05 (P-value=0.000 for CI1, CI2, CI3, and CI4); in other words, the result was significant, and the frequency (percentage) of affirmative responses differed significantly from the test proportion (0.50).

Under expected conditions, 59.4%,

Table 6. *Conceptual model for assessing MI in contemporary Japanese housing.*

Indicators		Conceptual assessment model		
		Comparison of current and expected functions	Current function / Expected function	Result
MI_1	Types of combined activities	Expected condition < current condition (responsive architecture)		Current condition is adaptable to users' needs

23.9%, 89.9%, and 60.9% of the respondents evaluated CI1, CI2, CI3, and CI4 to be consistent with their needs, respectively. To determine whether the frequency distribution of CI1, CI2, CI3, and CI4 was significant under the expected conditions, a binomial test was performed. The results showed that the P-value was less than 0.05 (P-value for CI1=0.033; P-value for CI2 and CI3=0.000; and P-value for CI4=0.013), meaning that the result was significant, and the observed frequency (percentage) of affirmative responses differed significantly from the test proportion (0.50).

For comparison of the frequency percentage distribution of CIs under the current and expected conditions, Table 5 presents the difference (gap) between the two sets of values. As shown in Table 5, under the current condition, the frequency (percentage) of CI1 and CI2 was higher than expected. However, the frequency (percentage) of CI3 and CI4 was lower than expected under the current condition.

6. Discussion

Identification of the components of functional flexibility (i.e., multifunctionality and convertibility) and their indicators makes the concept of functional flexibility comprehensible and provides a tool to evaluate it in housing layouts. Also, since the residents' reaction to the available flexible solutions has been investigated insufficiently, this study used a questionnaire survey to integrate the users' perspective for evaluating functional flexibility. For this purpose, users involved in this questionnaire survey were asked about the current and expected conditions of the indicators (Tables 4 and 5).

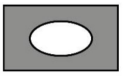
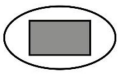
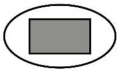
For each indicator, the frequencies related to the current and expected conditions were compared to determine whether the available solutions could be responsive to the users' expectations. The current condition can be helpful in functional flexibility if it covers the users' expectations; otherwise, it requires changes for adaptation to their needs. In the following section, functional flexibility in Japanese housing layouts was evaluated in two sections, that is, multifunctionality and convertibility, and then, some suggestions were made to optimize these spatial layouts.

6.1. Evaluation of multifunctionality indicator (MI) in Japanese housing layouts

In this study, multifunctionality was evaluated in Japanese housing layouts, using the indicator of "type of combined activities". This study investigated the users' perspectives of spatial organizations, including multifunctional spaces (DK, LD, and LDK), and organizations without multifunctional space under the current and expected conditions (Table 4). Overall, 95.66% of users involved in this survey had a multifunctional space in their housing unit, and only 4.34% used separate rooms for the kitchen, dining room, and living room. Also, 86.96% of the users considered a multifunctional space to be suitable to their needs. According to the conceptual analysis model described earlier, the current condition could meet the expectations (Table 6). Consequently, Japanese housing units can be considered flexible in terms of multifunctionality.

As previously mentioned, in the contemporary Japanese housing layouts (Table 4), there are three types of

Table 7. *Conceptual model for assessing CIs in contemporary Japanese housing.*

Indicators		Conceptual assessment model		
		Comparison of current and expected functions	Current conditions / Expected conditions	Result
CI_1	Multipurpose room	Expected condition < current condition (responsive architecture)		Current condition is adaptable to users' needs
CI_2	Movable partition	Expected condition < current condition (responsive architecture)		Current condition is adaptable to users' needs
CI_3	Movable shell	Expected condition > current condition (unresponsive architecture)		Current condition does not meet users' needs
CI_4	Transformable furniture	Expected condition > current condition (unresponsive architecture)		Current condition does not meet users' needs

multifunctional spaces based on the type of combined activities: DK, LD, and LDK. The present study also explored the users' points of view about these spaces under the current and expected conditions and then measured differences in their frequencies (Table 4). The frequency distribution of layouts under the expected conditions revealed that the users preferred layouts, including DK and LDK to those with LD or without multifunctional rooms. In the current condition, the frequency of LDK layouts exceeded the users' expectations, while the frequency of housing layouts including DK did not match the users' expected conditions. Therefore, more attention should be paid to layouts involving a DK space; moreover, a movable partition (such as a sliding door) can be installed in LDK between DK and living spaces so that LDK can be converted to DK and a separate living room when needed. Moreover, since the frequency of Japanese housing layouts including an LD room was higher than the users' expectation, it can be suitable to use a movable partition between the LD room and kitchen, which makes the alteration of LD to LDK possible when needed.

Generally, it is suggested to design the living room, dining room, and kitchen adjacent to each other. Also, it is recommended to anticipate requirements for movable partitions (e.g., installing frames on the ceiling and floor) between these three spaces in the design stage. In this manner, users can choose which activities to combine to form LDK, DK, and LD or three separate rooms according to their needs at any time.

6.2. Evaluation of convertibility indicators (CIs) in Japanese housing layouts

Convertibility was evaluated in Japanese housing layouts using the indicators of "multipurpose room", "movable partition", "movable shell", and "transformable furniture". To this end, this study explored the frequency distribution of CIs in Japanese housing layouts under the current conditions. Also, it indicated the users' views about the adaptability of these indicators to their needs under the expected condition and then measured the differences between their frequencies (Table 5).

In this study, a conceptual analysis model was applied to determine whether the frequency distribution of CIs responded to the users' expectations under the current condition. Table 7 presents the conceptual models related to CI1, CI2, CI3, and CI4 for evaluating the gap between the current and expected conditions in the contemporary Japanese housing.

The results showed that in the case of multipurpose room (CI1) and movable partitions (CI2), the current condition of Japanese housing layouts had a greater potential than the expected condition to meet the users' needs. In case of movable shells (CI3) and transformable furniture (CI4), the ex-

isting condition did not match the users' expectations. Therefore, it can be recommended to add external movable and sliding skins to increase the functional flexibility of interior space. Moreover, it is suggested that industrial designers, interior designers, and architects pay more attention to this indicator.

7. Conclusion

This study evaluated functional flexibility in the contemporary Japanese housing layouts with the integration of users' perspectives. Although the functional flexibility of housing units depends on their ability to accommodate non-structural changes by users, the users' perspectives have been rarely considered in the assessment of flexibility. To evaluate the functional flexibility of contemporary Japanese housing, the present study compared the users' opinions about the current and expected conditions of functional flexibility. The results first identified the components and indicators of functional flexibility to provide assessment criteria. The findings showed that functional flexibility comprised two components of multifunctionality and convertibility. Multifunctionality was evaluated using the indicator of type of combined functions. Convertibility was assessed by indicators, including a multipurpose room, movable partition, movable shell, and transformable furniture. Next, a questionnaire survey was conducted to assess the gap between the current and expected conditions based on the users' perspectives.

The results revealed that the spatial layouts of contemporary Japanese houses have some characteristics associated with functional flexibility: 1) multifunctional spaces (LDK, DK, or LD) with various combinations of living, dining, and kitchen areas; 2) multipurpose rooms which accommodate various activities at different times; 3) movable partitions (sliding doors) between rooms which enable users to change the size and function of rooms. Regarding the mentioned indicators, the current conditions were adaptable to the users' needs, while the current conditions of indicators, including the movable shell and transformable furniture, did not entirely meet the users' expectations. Moreover, this study presented some suggestions to fill the gap between the current and expected conditions to optimize the adaptability of Japanese housing layouts to the users' changing needs. These suggestions are as follows:

Creating housing layouts with LDK or DK.

Designing the living room, dining room, and kitchen adjacent to each other and installing frames on the ceiling and floor between them to facilitate adding movable partitions in the future.

Creating a movable shell between the interior and exterior spaces.

Using transformable furniture (e.g., foldable furniture) for altering the function of a room.

Overall, this study focused on the development of functional flexibility from the users' perspectives by identifying its dimensions. It is suggested to conduct a study targeting the development of structural-spatial flexibility and to evaluate it based on the opinions of home builders and designers in Japan.

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Evaluation of sustainable schoolyards: "Design your schoolyard" workshops with a practice-based process in Muratpaşa, Antalya

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Abstract
Design of the learning spaces is not only the field of the design discipline. Alternative learning processes such as outdoor environmental learning underline an emerging field that needs to be discussed with interdisciplinary lenses. This study stands in between design, environmental learning, and sustainability. Environmental learning brings the concepts of learning outside and in daily life by sharing and experiencing the knowledge. Educational spaces cannot be handled with traditional design principles anymore. Designers should start approaching the learning spaces not only with aesthetical or spatial values; and start to include curriculum design, sustainable design, and alternative learning processes into this multifaceted process. Designers and education managers should also interpret this "in-between" field with practice-based studies. Therefore, this study is critical because it creates a practice-based process for creating a sustainable design-based curriculum that empowers students to design their schoolyards. The pilot study combines curriculum design, spatial design, and learning about sustainability themes, under "Design Your Schoolyard" online workshops and it includes multi-stakeholders to the process. On the other hand, field research evaluates the schoolyards of the pilot study area, Muratpaşa, Antalya, which aims to expose the condition of schoolyards for outdoor learning. The research first; aims to open a new discussion on schoolyard design in the education and design field. This issue should be handled on a national level by blending various disciplines. Second, it aims to put forward an experience-based process between alternative learning, learning about sustainability, and schoolyard design -for future studies.

Keywords
Curriculum and spatial design, Environmental learning, Learning about sustainability, Sustainable schoolyards, Outdoor learning spaces.

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1. Introduction

The learning process and the environment in which learning takes place are strongly linked. The spatial constructs can reshape human behaviors by transforming inhabitants' social consciousness about sustainable living practices and strengthening their connections with nature.

Modern people have lost their ties with nature as a result of the industrialization period, which can be considered a crucial threshold after which anthropo-centric living practices started to dominate the nature and the environment. Industrialization brought along massive urbanization movements, which negatively influenced people's perceptions of the nature. The results of that influence can be seen not only in the physical constructs of the spatial environment but also in the behaviors of the inhabitants. Therefore, raising the ecological awareness of individuals is of utmost significance. With that in mind, the present study is concerned with the cultivation of sustainable practices of individuals, strengthening their connection with the environment, and raising their ecological awareness.

The aim of the present study is two-fold: Firstly, depending on the fact that one's connection with nature and awareness of sustainable practices should be instilled in childhood, the study focuses on the schoolyards as learning spaces that have the potential to cultivate sustainable practices. Considering that, it looks into the informal learning processes and everyday life experiences that can be embedded in schoolyards as learning landscapes, which may cultivate sustainable practices by blending the learning process and the schoolyard design.

Secondly, the study aims to take an interdisciplinary approach to interpret spatial design and associate it with pedagogy and sustainability. Design practices can potentially interpret the spatial constructs as pedagogical sites, blend the design phase with learning processes and pass this ecological-centered social transformation into human behaviors. Socio-ecological transformation starts at the individual level, and schools are crucial places to activate that transformation.

The theoretical part of this research is associated with a practice-based process. The literature review part focuses on environmental learning and its relationship with learning about sustainability and discusses the potential of schoolyards for informal outdoor learning. Finally, the field study has evaluated Antalya Muratpaşa district middle school gardens, their potential, and their shortcomings as learning landscapes.

The practice-based part of this study highlights the importance of learning about sustainability in schoolyards, introduces the 6th and 7th-grade students to sustainability through online meetings during the Covid period, and later opens them a space to design their sustainable schoolyards where they can learn and share.

Antalya Muratpaşa Dumlupınar Middle School students designed their school garden. They implemented their ideas in a participatory process with the fund/support of ITU Housing UYGAR Research Center and Antalya Bilim University, Architecture department students.

From the field research, the results put forth a poor condition; schoolyards do not contain any spatial feature that can be connected to the informal learning process about sustainability. In addition, within the practice-based process, students discuss and design their sustainable schoolyards. During the design and implementation part, they learn how to apply sustainable practices in their daily lives. Also, we notice that when they learn from each other and the environment, it is the most valuable form of learning. The results expose that majority of the schoolyards need an urgent and operational new vision line that discusses and relocates them as pedagogical sites and blends curriculum, sustainability, and spatial design issues under the learning landscapes.

2. Environmental learning and sustainability

As is suggested by EPA (Environmental Protection Agency), "environmental education is a process that allows individuals to explore environmental

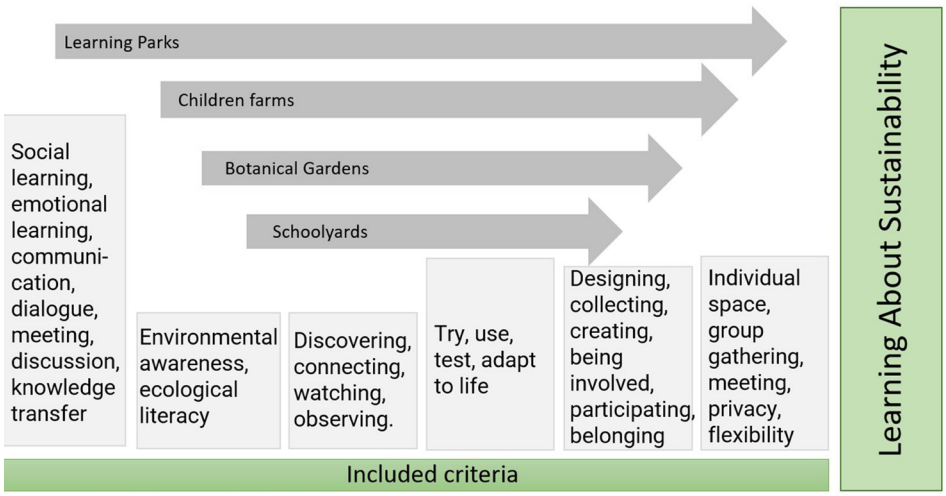

Figure 1. *Learning pyramid. Edited and developed by the author from the works of Edgar Dale (1969).*

issues, engage in problem-solving, and take action to improve the environment" (EPA, n.d.). It will only be possible through environmental education that individuals make a better sense of environmental issues and challenges and, through such education, they will be equipped with the necessary skills and understanding before they make decisions regarding environmental issues.

Through environmental education, which can be formal and informal, people are supported to learn how they are connected to their natural environment. Observations in ecological areas, birdwatching, visiting a science museum, observing the rehabilitation of a wetland, or cleanup of a river can be given as examples of what constitutes environmental education.

Sauvé (2002) notes that environmental education is connects human to the environment; and "which is known by various names, is at least a century-old idea" (Louv, 2010:243). It integrates the principles of ecology, biology, economics, and various other disciplines under an interdisciplinary framework. Children gain awareness through environmental education being part of processes and activities; they gain knowledge about environmental problems and skills and attitudes about how to act on those problems. Also, by participation, they become involved in environmental problems. As Sauvé declares, the connections that can be built by environmental education can encourage people to learn about their surroundings and this knowledge can foster a sense of belonging and environmental responsibility, which can lead us to "become guardians, responsible users, and builders of Oikos, our common "home of life" (Sauvé, 2002: 2).

Learning about sustainability is under this broad umbrella of environmental education. "Since sustainability is a cultural process, it depends on the everyday actions of ordinary people" (Van der Ryn & Cowan, 2007:82).

Everyday actions and activities hold a crucial value in the learning process. Therefore, environmental learning is an important learning style that combines Place-Based and informal methods. Environmental learning can be categorized under environmental education and the umbrella of informal learning. In this learning style, knowledge is gained by daily life experiences which can take place at home, while traveling, in everyday life, or be gained through books, radio, and museums. Hence, the "place/environment" where the learning happens holds a significant value. Formal learning is a planned and systematic process under a specific educational structure or institution. On the other hand, informal learning involves random and spontaneous processes that permeate life. The knowledge is not organized, not systematically poured; instead, a person gains knowledge in life through experiences (Coombs & Ahmed, 1974:8). Therefore, as a lifelong experience, environmental learning has strong ties

with informal and Place-Based learning styles.

The figure above describes the various places where learning about sustainability can happen as part of an environmental learning process. The criteria express and declare the activities that hold importance to this informal learning process. Schoolyards are crucial nodes where everyday life passes in schools and where environmental learning can occur.

In this study, environmental learning and learning about sustainability are highlighted, and sustainable schoolyards are focused on as the places of the socio-ecological transformation and where informal and Place-Based learning processes can happen in the everyday life of students.

2.1. Sustainable schoolyards and learning about sustainability

The learning processes take place in and out of school environments with informal as well as formal processes. Cities are becoming increasingly urbanized; and the green spaces -where we connect with nature- are decreasing, and the chances of encountering nature, connecting, and exploring in cities are falling. In this sense, school gardens as a laboratory space can be a base for learning in daily life and experiential learning about sustainability. On the other hand, the potential of the place to teach through experience is excellent. Therefore, schoolyards should be treated as three-dimensional and experiential maps or books, and hidden curricula should be embedded in them by the design practices.

The spatial design dimension of the pedagogical-based program studies is lacking. In this sense, the present study discusses pedagogy-design-ecology disciplines inter-relationally under the title of "learning landscapes" with an interdisciplinary and holistic approach following the systems view.

"An effective environmental education requires students to leave the classrooms" (Sobel, 2014:11). Learning is a process that requires application, interaction, and sharing. As has been explained in the previous section, we can benefit from informal learning processes to provide such experiences. "Studies show that children become desensitized when urban children on different continents are told about the Amazon jungle or similar global ecological issues" (Sobel, 2014:15). If children cannot create bondage with their environment and nature, they can grow up as future individuals who ignore environmental problems, cannot act in an eco-conscious way, and cannot apply sustainable living practices.

With Place-Based education and informal learning processes embedded into places (schoolyards) where students' everyday life passes/happens, explaining environmental problems with examples from the immediate environment and developing practices that allow them to establish bonds by experimenting are essential. In this regard, schoolyards are essential. These areas are places where students meet, interact, share, play, and learn from each other.

Figure 2 below explains the learning processes. Learning is strengthened and becomes more efficient through sharing and applying what you have learned rather than merely reading and remembering what you have read. In other words, if students have the chance to experiment and learn by applying and experimenting, the knowledge becomes more stable. If they apply what they have learned to their daily lives, their rate of learning increases.

Therefore, Place-Based learning and environmental learning are essential. Learning sustainable practices by applying and practicing in schoolyards is crucial, and the practical part of the present study also constructs the works on that idea.

There are several approaches to Place-Based learning: One of them is proposed by the Children & Nature Network, under the "Green Schools" movement. The organization defines outdoor learning spaces as "multi-functional spaces for play, learning, discovery, and development" (Children Nature Network, n.d.).

These learning spaces provide space for relations and interactions, encounters, and sharing, and establish a relationship between the interior and exterior environments of the school

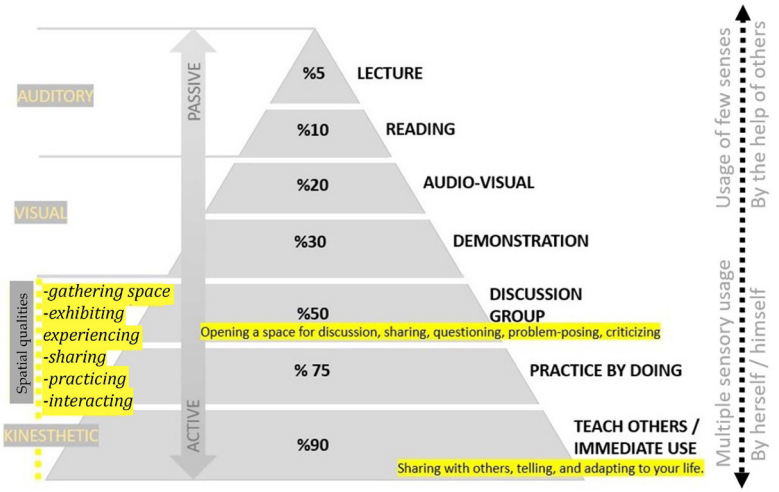

Figure 2. *Spaces and necessities of Learning about Sustainability. Developed by the author.*

building, not only with spatial relationships but also with community engagement. As for the organization, green school gardens should include outdoor classrooms, local and pollinated gardens, rainwater harvesting, traditional playground equipment, nature playgrounds, edible gardens, paths and walkways, trees, shrubs, and other planting elements.

Harvesting rainwater from the roof against the danger of water scarcity, learning about the carbon footprint by recycling, and practicing planting in schoolyards connect students directly with sustainable practices and can have a significant potential to change their habits and cultivate eco-friendly thoughts and practices. In this sense, learning in life by experimenting, observing, and discovering is an issue that needs to be underlined, and learning spaces should be designed considering such processes. Below, some good practices from Bali Green school are explained and exposed.

In Green School Bali, schoolyards carry an essential role in learning and

Figure 3. *Green school in Bali. Example of a good practice, a schoolyard design that support environmental learning about sustainability.*

practicing sustainable lifestyles. They include rainwater harvesting, permaculture gardens, alternative energy applications, and solar panels that produce the school's energy. Figure 3a exposes the alternative energy use of the school. Students familiarize themselves with these applications during their daily lives in the schoolyard (ITT Technology Arts Sciences TH Köln, n.d.). Figure 3b shows the time that students spend in the outdoor environment, connecting with nature and agriculture, sharing, and learning by practicing (Green School, n.d.) Figure 3c shows the permaculture gardens where students practice and learn (Meinhold, 2014). Figure 3d shows the hydroelectric turbine of the school where students learn sustainable energy and water usage systems (Green School, n.d.).

The schoolyard has a hidden curriculum behind the schoolyard applications and design. Students have the chance to meet with sustainable practices, analyze and learn; hence, this opens a space for them to use and apply this knowledge in their daily lives. These outdoor learning spaces cultivate eco conscious individuals of the future.

The environment is a "silent curriculum" that can provide positive (or negative) learning experiences. The answer lies in seeing the physical environment and the quality of the environment as active and indispensable parts of the learning process (Taylor, 2008:25). In approaching schoolyards as learning landscapes and designing them for learning about sustainability, informal learning methods play a vital role and establish a link between the place and the curriculum. The practice-based part of this study uses those informal learning processes and attempts to apply them to space design. In the following sections, the practice-based part of this study will refer to the informal learning processes and how to include them with space design.

"Education for Sustainability develops the knowledge, skills, values, and world-views necessary for people to act in ways that contribute to more sustainable living patterns. Sustainability education is future oriented, focusing on protecting environments and creating a more ecologically and socially just world through informed action. Actions that support more sustainable living patterns require consideration of environmental, social, cultural, and economic systems and their interdependence" (Australian Curriculum, n.d.). Sustainable schoolyards support and cultivate sustainable patterns; therefore, they should be handled holistically and in an interdisciplinary manner.

Sustainable schoolyards as learning landscapes stand at the intersection of education, sustainability, and space design. These areas are like three-dimensional books where knowledge is spread and gained. And, they have a silent curriculum, hold a space connecting students' daily lives, curriculum, and learning as a third teacher. The space where the learning experience takes place has an essential connection with learning. Therefore, curriculum, space design, and stakeholder relations should be engaged and planned together. If the education system or teachers, and school principals do not support the sustainable schoolyard design or perspectives, these ideas cannot develop in the school environment. Alternatively, if the curriculum is not embedded into schoolyard design, the informal learning process cannot work. Therefore, designers should engage with the curriculum and school managers, and the sustainable schoolyards should be handled as a multi-stakeholder process. Environmental education programs that can be embedded into schoolyard designs need to be planned with the cooperation of all stakeholders; that is, school management, students, teachers, and designers.

Throughout the practical-based process of this study, multiple stakeholders are included in the practice-based and participatory process. The methodology and process will be explained with diagrams in more detail in the following sections.

3. Methodology

As is asserted by Takashi (1999), if we adopt learning environments beyond a building, our vision of school and learning will expand. For this reason, schoolyards need to be interpreted

not only as gardens, but also as nodes that cultivate learning and interaction. This interaction opens a space for learning together. One of the fundamental issues to be considered in the design process of a learning environment is to move away from the idea that education takes place only inside the building. The relationship between indoor and outdoor spaces, as well as the relationship between curriculum and schoolyards, should be handled together, with a holistic and interdisciplinary educational perspective.

For learning to take place outside the building and to transform gardens into learning landscapes, various experiential design applications can be applied to schoolyards: Open-space classrooms, islets where different numbers of groups can work, applied areas such as a laboratory where they can observe applications on agriculture, biodiversity, renewable energy, areas such as poultry houses, crop gardens, and rainwater harvesting can be used as learning landscapes.

With that in mind, the present study constructs its fieldwork and a participatory process in these crucial spaces where informal learning may happen. The study has two research phases. The first one is the practice-based workshop and application process; the second one is the fieldwork that scans the schoolyards of the Antalya Muratpaşa district. The two phases of the study complement each other. The field study results expose that the schoolyards need to be interpreted and taken into consideration in an operative way with interdisciplinary approaches where the design creates connections with learning processes and curriculum design. The practice-based pilot study mainly focuses on that issue and aims to create connections between curriculum design, sustainable design, and schoolyard design.

Informal learning, environmental learning, and learning about sustainability are examined in parallel with the literature study, and as the first limitation, the research area is limited to schoolyards. Another limitation has been determined on learning about sustainability, focusing on how learning about sustainability will occur in schoolyards.

The practice-based part aims to support learning about sustainability and create an interactive and sharing environment where students can exchange ideas and think about their schoolyards and sustainable designs together. As explained in the literature review, the efficiency of learning increases when an outdoor learning design is integrated into and intertwined with the curriculum. Therefore, this pilot study supports, strengthens; and encourages students to design, discuss, and make decisions about their schoolyards in sustainable manners.

Moreover, the field research scans the Antalya Muratpaşa District, where the practice-based workshops took place in a school and aims to evaluate the schoolyards regarding whether they are efficient or not for learning about sustainability.

The fieldwork and the practice-based process are intertwined. The fieldwork supports the pilot study and confirms the suggestion that schoolyards are not enough for learning about sustainability. New perspectives and holistic interpretations are emerging in this multi-faceted field between design, pedagogy, and sustainability. The results will be shared in the following section.

This research is part of a Ph.D. thesis project, and one researcher is involved in this process as the research team; the researcher's background is in the urban design area.

3.1. Practice-based pilot study: Design your schoolyard workshops

"Design your schoolyard" online and face-to-face workshops started in January 2021 and ended with a participatory project in July 2021. During the six months, weekly online meetings focused on education about sustainability. The pilot study was held with sixth and seventh-grade students from Antalya Muratpaşa Dumlupınar Middle School.

In the first phase, the researcher designed the curriculum for online workshops and applied it through online workshops with the attendance of the schoolteacher.

These workshops initially started for an Erasmus+ project (This international project focused on the Global Environmental Awareness Raising -GEAR- topic, and the researcher joined this team later; these works evolved, developed, and continued by the researcher as the pilot studies of her Ph.D. thesis.)

The researcher was a voluntary educator at the beginning of the process. However, after the experience of these initial workshops, the researcher developed "Design Your Schoolyard" meetings and their curriculum. Thus, the pilot study has been developed and started after the trial process with an Erasmus+ project.

These online workshops were held during the Covid restrictions and lockdowns; therefore, they remained formal and online. Afterwards, İTÜ UYGAR Research Center supported this study with a fund, and the students' ideas were applied to the schoolyard.

3.1.1. Curriculum design

Sustainable practices become essential in schoolyards in parallel with the approaches such as planting gardens, school orchards, and edible gardens. Learning happens in locations that provide space for practice and trial processes. Also, the learning place should open a space for communication and dialogue. Therefore, outdoor learning spaces should be evaluated following such relations. During the curriculum design of online and face-to-face workshops, literature review and previous good practices are taken into consideration together with each part of this pilot study.

As the first step of the design, the researcher developed a six-month curriculum, for approximately ten to fifteen students; the group gathered online every weekend for three hours. After each subject, students designed posters, models, and drawings to support the ideas and subjects they had learned. Learning by design, built environmental education, and sustainability education concepts have been researched and applied to this process. Arın's (2015) doctoral dissertation about the built environmental education and its workshop structure inspired the design of the curriculum of this pilot study.

Table 1. *Online and face-to face meetings, the curriculum and on-site applications.*

January-March 2021	ONLINE WORKSHOPS	The problems of our cities, neighborhoods, and our solutions.	Model making, sketches, digital works
		What is sustainability? Environment and Ecology. Sustainable cities. Sustainable Transportation.	
		Recycle, Reuse. Our carbon footprint.	
		Compost application examples. Making our own compost at home.	
		Healthy Eating, Agriculture in the City, Food. Community Gardens, Crop gardens. DESIGN YOUR SUSTAINABLE NEIGHBORHOOD.	
		Permaculture principles, sister plants.	
		Energy, Water, Waste, renewable systems.	
		Design your sustainable home.	
		Plant and Animal Diversity, biodiversity. Insect, bee hotels. ecosystems.	
		Basic Design, Eco-art and re-use.	
		Mind maps. Garden maps. Schoolyard discussions.	
April 2021		Design your schoolyard with sustainable principles.	
May 2021 **Decision and Discussion**		Self-criticism, discussion, taking decision as a group. Deciding on the projects to apply to garden. -Design of application process. Decision of materials. Meeting with architecture students.	
June-July 2021	Schoolyard	APPLICATION PROCESS (Sharing the process with online social media page.) -Material selection and procurement. - Organization and orientation of students, distribution of tasks. -Application and design on site as well.	

Also, education for sustainability programs for children helped to develop the curriculum. After each workshop, students developed and designed a project on the week's topic. In other words, the weekly workshops were not merely classes, but project-and-design-based workshops.

The table explains the structure and curriculum of the pilot study. Students were introduced to the topics above and created projects and designs on those issues over the course of six months.

The first topic focused on the discussion of environmental problems around us. The students were encouraged to discuss environmental issues, centralize on the problems of their close environment such as their neighborhood and school, identify the main problems, and think about solutions

to those problems. The study was enhanced using new technological tools. For example, students used the Padlet tool to discuss and interactively share their thoughts on an open board.

During the second topic, students were introduced to the sustainability concept. What is it, and how does it affect us? In what scale? Where do we use this concept? Sustainable cities and transportation were discussed. This week created the base of the pilot study. Students used Canva program to create posters and videos on their imaginary sustainable city perceptions.

Following the sustainability concept, the third topic focused on recycling, re-usage, and our carbon footprints. Students drew their carbon footprints by discussing daily habits; they also learned about re-usage and recycling to apply these principles in their daily lives. They created posters for themselves and their families to hang on their walls at home to remind them to use less and reduce their carbon footprints.

The fourth topic was a continuation of the previous issue; focusing on compost and how they can apply this to their home. After learning about this topic, firstly, they investigated their garbage at home and evaluated the stuff in their garbage. Then, they prepared posters with Canva about how to manage and compost their garbage. Afterwards, a basic DIY composting kit was introduced to the students, and they did a compost experience at their homes for one month.

The fifth topic was permaculture and planting. They have learned the plant siblings and how plants should be cultivated by these principles. They have learned which plants live together and support each other. Then, while designing their schoolyard and planting areas, they used these principles to select the plants they were going to plant in their schoolyard.

The sixth topic covered energy, water, and waste management on the city scale. They were introduced to rainwater harvesting, waste management, and how these applications can heal the cities.

On the seventh topic, they designed a sustainable dream home with all that information and background. Students used the Tinker cad tool, which helped them to design their sustainable homes with a 3D tool.

The eighth topic focused on biodiversity and the systems approach. They discussed the food chain and the interdependence of every animal and system on the earth. Also, bug hotels, bee hotels, and their relationship with aromatic herbs and permaculture gardens were discussed. They created an aromatic garden for their bug hotels. Then, this knowledge was used in the design and application of their schoolyard; they created bug hotels and herb gardens.

The ninth topic focused on basic design principles and eco-art applications that they can use to design their schoolyards. They met with yarn bombing, nature art applications, and eco-art applications that they could use for recycling; they made birdhouses from recycled materials.

After the sustainability workshops (between January-March 2021), students were encouraged to develop ideas and design their schoolyards during April and May 2021.

Finally, the tenth topic focused on discussing the conditions of their schoolyard, evaluation of the outdoor space, how sustainable the garden is, and how it can become more sustainable. In this process, they prepared various drawings, ideas, and models that illustrated how their schoolyard could become more sustainable. The process was supported by the model preparation, poster, and drawings. During this stage, they developed designs and ideas for their schoolyard by using the knowledge they gained from the online workshops. For two months, this process continued. At the end of this session, through a democratic meeting, we discussed the ideas and chose the best ideas that could be applied to the schoolyard by using the Miro open board. At the same time, the schoolteacher joined us in choosing the ideas, and meetings were held with school principals about the design and application of those ideas.

After that process, Covid lockdowns were over; therefore, students could meet in the garden for face-to-face

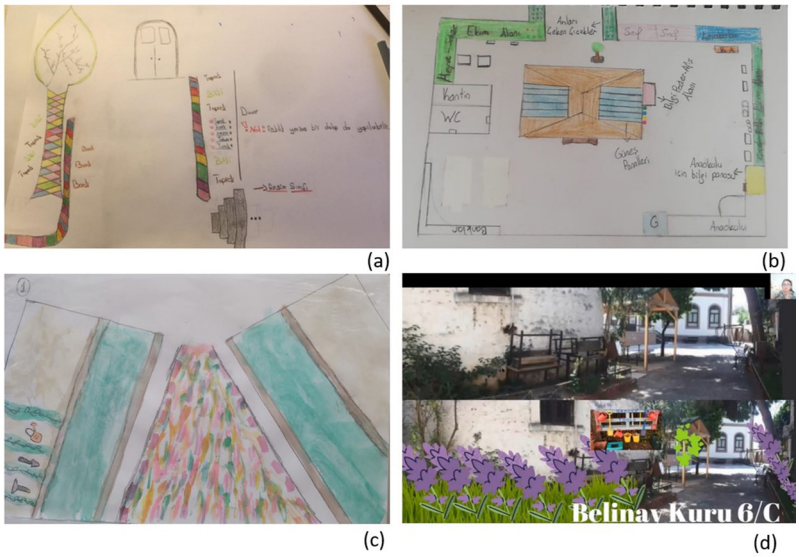

Figure 4. *Drawings and collages of the students from the design process of the schoolyard. (a). Student sketch on eco-art and permaculture design of vegetable garden. (b). Student work for the schoolyard as a plan. (c). Student sketch expresses the planting area, eco-art, sensory path ideas. (d). Student digital work expressing aromatic garden and organization of the backyard during the online workshops.*

applications. The application and the stakeholder processes are explained in the following sections in detail.

The students used the knowledge that they had learned about sustainability and imagined their schoolyards in more sustainable manners. At the end of this phase, online meetings were held, and the students discussed their design and implementation ideas. Together, they selected the ideas that would be implemented.

During June and July 2021, the face-to-face part of the process started as part of the final phase. During that period, Covid lockdowns were not that strict, so the students and the researcher could meet and apply the phase in the schoolyard. The other sample group (architecture students) were also involved in the project in this step. Middle school students, who designed their school garden in parallel with the workshops on sustainability, implemented the selected ideas with the support of the ITU Housing UYGAR research center fund and with the help of Antalya Bilim University, Architecture department students.

Human change is not a sudden process; it happens gradually by experimenting, interacting, learning, and sharing in different and creative ways. Learning about sustainability and outdoor learning space design requires interdisciplinary views and connections. Therefore, curriculum design, informal learning, space design, and sustainability should be interpreted holistically. Thus, the results of this process and projects designed and applied by students might refer to this idea: Space becomes a third teacher and a supportive environment in students' everyday lives.

As it can be noted from the photos of the application process, a recycling station, a permaculture garden, a composting station, vertical gardens, bug hotels, aromatic gardens, and sensory gardens were applied to the site. They developed and relationally located these ideas. As a result, the composting station is located next to the permaculture garden, or bug hotel relates to the aromatic herb garden. There is a hidden curriculum behind these spaces, where students can take responsibility, take care of the garden, spread knowledge, and teach other students. Also, an open classroom was applied to the garden to share the ideas of these sustainable applications.

3.1.2. Sampling

The middle school was selected as the continuation of an ongoing project. The researcher participated in

Figure 5. *Applied ideas and designs on schoolyard.*

Figure 6. *Middle school students and university students working process on site.*

sustainability education programs that the middle school carried on under an Erasmus+ program.

Later this research evolved as a part of the researcher's Ph.D. thesis. Voluntary students from the 6th and 7th grades joined the project. The rationale behind the choice of the participants is based on Piaget's developmental periods. Piaget (2015) states in his cognitive development theory that children's learning process develops in parallel with their developmental phases. For him, between 0 to 7 years of age, the environmental perception is limited. Therefore, sensory-based learning spaces and programs should be designed in this process. He defines the period between 7 to 11 years of age as the concrete operations period, when environmental perception is developed. The period after 11 years of age is defined as the abstract operations period. The sampling of this research is limited to 12-year-old middle school students. This developmental group has an environmental perception and concrete and abstract thinking abilities. Thus, while designing the curriculum, child development research was embedded in the process and workshop program.

Child development, developmental psychology, sustainability education, and spatial design should all be taken into consideration and integrated while developing a curriculum and spatial design. An intensive rainforest lesson could take place in middle or high school, it has no place in elementary school classrooms (Sobel, 2014:25).

In the face-to-face phase of this pilot study, 3rd-year architecture university students joined the application process. After they joined, middle school students were more active and felt more responsible. They developed ideas on site together, and the canopy of the sensory garden was designed and developed on-site together with university and middle school students.

3.1.3. Multi-stakeholders

The researcher and one counselor teacher from school were involved in this process. The counselor teacher was the connection with the school. After the implementation of the ideas,

she will continue the organization of responsibilities among students, and they will take care of the garden. Also, a sustainability club has been created to develop, spread these ideas, and share the knowledge of these spaces. An open-air classroom supports this idea as a spatial quality and through the use of open-air classroom students will share and teach other the responsibilities of schoolyard garden.

This practice-based pilot study gives importance to its multi-stakeholder structure. Each step of this process includes various stakeholders, as explained in the figure below.

As it was noted earlier, multi-stakeholders joined this process from beginning to end. Even though the researcher developed and designed the curriculum of online workshops, she was not alone during online workshops or site applications. One middle school counselor teacher was involved in all these online and face-to-face meetings. She was also a tie between school management and our project.

In the first phases of these online meetings, various meetings were held with the schoolteacher to explain the curriculum. In addition, the teacher joined all classes and supported students in this process.

In the application process, ITU Konut UYGAR Research Center funded the project. After deciding on the projects that would be applied, the researcher created the budget and all the material lists.

Also, in that phase, the meetings were done with the school principal and students, and the researcher explained to them the site designs and requested permission to apply them to the schoolyard.

Antalya Bilim University Architecture Department 3rd grade voluntary students joined in that process, and they interpreted this pilot study as a social architecture process. It was a crucial experience for them. First, they met with the middle school students and discussed the site design and students' ideas.

Also, they had the chance to work together, apply the designs to the schoolyard, and develop new ideas and solutions with the middle school students -as they have designed the canopy at the entrance of the sensory garden and applied the canopy together with the children on site. (The images and video can be reached from the social media accounts of the workshop.)

The workshop's goal was to strengthen the students on sustainable practices and support them in imagining and designing their school environment.

While working in such conditions and trying to interpret education, learning, sustainability, and design areas together to develop a holistic curriculum for the future, including multi-stakeholders in the process is vital. Creating partnerships on those processes with; NGOs, permaculture designers, universities, architecture, planning and landscape students, social architecture clubs, and researchers would strengthen the schools and education systems. These collaborations can be created strongly by the school and public municipalities.

3.2. Field research: Evaluation of schoolyards in Antalya, Muratpaşa

The field research of this study scans and evaluates the schoolyards in Muratpaşa, Antalya, where the pilot study school is located. This field research is intertwined with

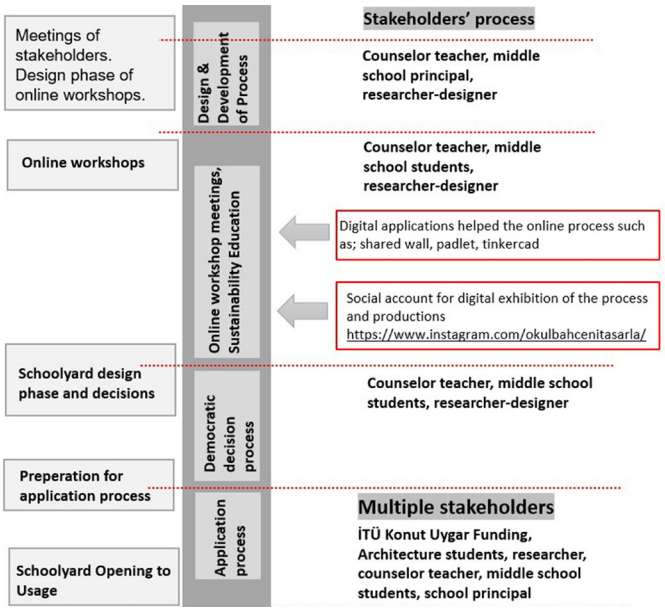

Figure 7. *The pilot study process and its relationship with different stakeholders.*

Table 2. *Muratpaşa district, middle school garden measurements.*

	School name	total parcel (m2)	building floor area	school garden	soft scape	hard scape	resting sitting area	sports area	parking area	play area	student number	teacher number	class number	soft scape per student	hard scape per student
1	Muratpaşa Ahmet Bileydi Orta Okulu	3.181	843	2.338	95	2.079	172	400	298		666	37	27	0,14	3,12
2	Ahmet Ferda Kahraman İlkokul ve Orta okulu	1.876	484	1.392	46	1.346	53	416	109		724	29	18	0,06	1,85
3	Ahmet Yesevi İlkokul ve Orta okulu	4.129	646	3.483	80	3.403	85	1.014	119		501	25	18	0,15	6,79
4	Atatürk Ortaokulu	4.500	1.000	3.500	66	3.434	66	255	0		1377	68	38	0,04	2,49
5	Barbaros Ortaokulu	5.572	1.279	4.293	910	3.383	360	911	189		689	42	20	1,32	4,91
6	Başöğretmen Atatürk Ortaokulu	3.744	1.063	2.681	500	2.181	225	514	0		1377	68	38	0,36	1,58
7	Cumhuriyet Ortaokulu	2.050	622	1.428	37	1.391	25	660	0		332	24	14	0,11	4,18
8	Dr.galip Kahraman Ortaokulu	5.267	600	4.667	175	4.492	50	1.400	567		514	39	11	0,34	8,73
9	Dr.ilhami Tankut Ortaokulu	1.732	673	1.059	40	1.019	78	310	43		279	21	14	0,14	3,65
10	Dumlupınar Ortaokulu	2.141	609	1.532	60	1.472	60	220	100	130	233	14	8	0,25	6,31
11	Emel Sevgi Taner Ortaokulu	5.580	1.160	4.420	245	4.175	245	688	0	748	1256	46	30	0,19	3,32
12	Ermenek Ortaokulu	12.077	2.113	9.964	3.112	6.852	522	869	0	907	182	21	33	17,09	37,6
13	Faruk Tugayoğlu Ortaokulu	2.782	911	1.871	190	1.681	150	721			583	21	33	0,32	2,88
14	Fatih Ortaokulu	10.153	2.345	7.808	280	7.528	280	1.209	450		397	29	15	0,7	18,9
15	Fatmagül Özpınar Ortaokulu	4.375	1.199	3.176	70	3.106	90	781		311	1083	47	33	0,06	2,86
16	Güvenlik Ortaokulu	3.841	982	2.859	180	2.679	180	569			691	35	30	0,26	3,87
17	GüzelobaOrtaokulu	9.548	1.626	7.922	2.072	5.850	110	583			860	52	30	2,4	6,8
18	Hamza Taş İmam Hatip Ortaokulu	4.817	825	3.992	150	3.842	115	853		189	729	46	25	0,2	5,27
19	Hanım-ömer Çağıran Ortaokulu	4.488	784	3.704	320	3.384	280	400	396	128	1279	50	36	0,25	2,64
20	Hasan Kaya Ortaokulu	5.474	761	4.713	245	4.468	125	1.910			355	29	16	0,69	12,5
21	İnönü Ortaokulu	3.882	1.386	2.496	130	2.366	70	784	450		485	44	24	0,26	4,87
22	İrfan İlk Ortaokulu	4.584	876	3.748	180	3.568	130	418		239	629	40	24	0,28	5,67
23	İstiklal Ortaokulu	7.677	1.364	6.313	300	6.013	400	1.835		590	766	48	14	0,39	7,84
24	Kamile Çömlekçioğlu Ortaokulu	5.627	850	4.777	60	4.717	105	1.054		291	597	47	27	0,1	7,9
25	Kazım Şanöz Ortaokulu	4.519	1.012	4.418	80	4.338	60	624		265	712	33	29	0,11	6,09
26	Konuksever Ortaokulu	3.127	696	2.431	80	2.351	240	416		211	970	46	22	0,08	2,42
27	Mecdude Başakıncı Ortaokulu	5.200	1.466	3.734	140	3.594	40	1.245			1.529	69	35	0,09	2,35
28	Mehmet Akif Ersoy İmam Hatip Ortaokulu	2.743	780	1.963	90	1.873	60	484			273	26	13	0,32	6,86
29	Melahat Faraçlar Ortaokulu	3.952	1.075	2.877	100	2.777	300	611			1.049	41	9	0,09	2,64
30	Merkez Ortaokulu	4.544	1.154	3.390	50	3.340	50	849			1.016	67	31	0,04	3,28
31	Meryem Mustafa Ege Ortaokulu	3.456	1.060	2.396	90	2.306	200	616			935	59	30	0,09	2,46
32	Muratpaşa Ortaokulu	4.273	1.084	3.189	150	3.039	170	345		345	572	43	21	0,26	5,31
33	Muratpaşa Yenigöl Ortaokulu	1.608	470	1.138	90	1.048	90	408		60	67	9	4	1,34	15,6
34	Mustafa Asım Cula Ortaokulu	4.539	858	3.681	330	3.351	280	208	230	210	483	29	16	0,68	6,93
35	Naciye Havva Manavuşak Ortaokulu	4.943	801	4.142	900	3.242	180	583		176	409	34	16	2,2	7,92
36	Nadire Konuk Ve Ali Oğuz Konuk Ortaokulu	11.398	1.788	9.610	560	9.050	350	1.844	886	587	717	51	30	0,78	12,6
37	Namık Kemal Ortaokulu	6.692	1.776	4.916	400	4.516	180	200	783		1221	71	40	0,32	3,69
38	Vali Hüsnü Tuğlu Ortaokulu	5.590	1.524	4.066	165	3.901	110	904		423	728	35	24	0,22	5,35
39	Vali Saim Çotur Ortaokulu	5.034	934	4.100	190	3.910	180	590	112	177	873	59	33	0,21	4,47
	Total	190.715	41479	150.187	12958	137.065	6466	28701	4732	5987	28138	1594	929	0,46	4,87

the participatory pilot study. As a supportive phase while scanning the schoolyards, the field research aims to discuss if these spaces are efficient for learning about sustainability and if they include sustainable practices. The results show that an urgent transformation that interprets these spaces together with curriculum, space design and sustainability is needed in schoolyards.

Antalya faced a crucial threshold in terms of urban development in 1980 with tourism development. The city has received a lot of immigrants. Urban space has been affected by these economic changes. Parallel to this urbanization process, natural areas in the city decrease, while the built environment increases.

The population of the city by the end of 2020 is 2.548.308. Considering the 2012 population of Antalya, for 1.073.794 inhabitants, there is 4,2 m^2 of active green space per person (Manavoğlu & Ortaçeşme, 2016); for the Muratpaşa district, this number is 3,2 m^2 of active green space per person (Ortaçeşme et al., 2005).

The field study aims to scan and analyze the current situation of secondary/middle schoolyards in the Muratpaşa district. Several points have been analyzed, measured, and evaluated to discuss if these spaces contain any spatial qualities related to sustainable practices.

The field study measures Muratpaşa district middle/secondary school gardens with Google earth street view, and on-site visiting methods. Thirty-nine middle school gardens in the Muratpaşa district have been analyzed in terms of some spatial qualities such as parcel area, garden square meters, building floor area, area, soft ground, hard ground, play, sports, resting areas, parking areas, also includes student numbers to find some relations in between soft scape and student numbers.

After the field analysis, the following main problems and missing points of the schoolyards have been identified:

Playground areas of the schoolyards are only two-dimensional areas created by the borders drawn on the ground. There is no three-dimensional playscape in schoolyards.

Sports areas and playground areas are disconnected from the whole garden; there is no relation or connection between these functional areas and soft

grounds.

There is no relationship between the indoor and outdoor areas of the schools. Also, outdoor areas are designed without any consideration of learning processes or curriculum.

Many schools and their gardens have the same typology. They have a vast hardscape as a garden, and these hardscape areas are used as parking and sports areas; generally, there is no connection with the landscape or soft grounds.

There are no sustainable practices nor any applications in the schoolyards. There are no activities or spatial designs related to learning in the school gardens, such as open classrooms, coops, or planting gardens.

Soft grounds, which are not efficient, are in passive usage. They are positioned around the school borders with 70 cm to 1-meter width, which does not permit active usage. Therefore, soft grounds cannot work as active green spaces.

Parking areas are not limited by borders in the garden. Therefore, any spot in the garden can become a parking lot; thus, they occupy all the functional areas in schoolyards. There is a car dominancy in the schoolyards.

The benches are generally positioned on the hard grounds; very thin and useless soft ground areas surround the seating areas. They are arranged in a row throughout the garden without any clustering or organization.

Garden furniture and outdoor elements are mostly fixed to the hard ground for safety. Therefore, no garden furniture is moveable, flexible, or changeable in terms of flexibility and openness to change garden elements and designs.

The research results reveal the excess usage of hard ground and inadequacy of soft grounds per usage and student. The amount of soft ground per student is 0.45 m^2. Almost no soft ground or green space usage is available for students. The hard ground per student is 4.87 m^2. These rates are far below the Antalya rates. Hardscapes cover most of the square meters of the garden, and schoolyard functions such as games, sports, and rest are located on hard grounds. The soft ground ratio is insufficient compared to the garden size.

Innovative approaches and interdisciplinary perspectives that interpret design, education, and sustainability together are urgently needed in school gardens.

4. Discussion and results

This practice-based pilot study underlines that learning by doing, Place-Based learning, participation, and taking responsibility has an essential role in the learning process about sustainability. The fieldwork of this research traces the schoolyards to evaluate if they are sufficient for outdoor environmental learning about sustainability. Moreover, it exposes that the schoolyards do not include any outdoor environmental learning potential. As a result, new approaches are emerging to blend the hidden curricula focusing on learning about sustainability with spatial designs that follow and support the qualities of the informal learning processes. Informal learning processes are presented in this research to combine learning about sustainability in everyday life of students as an outdoor environmental learning style and with a practice-based process.

The practice-based pilot study of this research discusses first, how to transform schoolyards into learning spaces by creating a curriculum to apply spatial design and second, to involve students in the process and encourage them to discuss the problems of their environment and find solutions and design ideas for their schoolyard.

This research also aims to be an example for future studies that would like to generate ideas regarding the disciplines of sustainability, informal learning, and spatial design.

This research is an experimental process that aims to open a discussion on the design of the schoolyards, and it aims to underline that it is not all about the design discipline. Instead, the schoolyard and school design should be managed with multi-stakeholders as an " in between area" that has ties with various disciplines such as sustainable design, alternative learning styles, and

education theories.

The field research part of this study scans the middle schools of Antalya, Muratpaşa district, highlighting the poor conditions of schoolyards. Muratpaşa district analysis is a very small-scale sample. Hopefully, this research will inspire future studies, and more detailed research will be done on evaluating schoolyards on the city and national scales.

The field study exposes that the nature-child connection is missing in almost all schools, and soft ground per student level is shallow (0,45m^2). Therefore, there is an urgent need to transform school gardens, looking at them through new lenses. This study aims to give some experience-based solutions and roadmaps for interdisciplinary studies in the design and education field.

The field study achieved its goal, and it proves that the schoolyards need an urgent new approach, and they need to be interpreted with more practice-based and experience-based studies. The pilot study supports these findings and unfolds a practice-based experience with children participation. The curriculum and the stake holders support this process and students are supported to develop new ideas on their own garden.

This practice-based pilot study which is supported with the field study data aims to open a new discussion on schoolyard developments and secondly; aims to be a good practice and example for the future studies on learning landscapes.

Additionally, the research declares that schoolyards are vital spaces for meeting with nature, cultivating sustainable practices in children, and for becoming active citizens. Design methodology of schoolyards as outdoor learning areas is an emerging field -and should be interpreted with multi-faceted approaches to include curriculum, pedagogy, ecology, and environmental education in these learning landscape design disciplines.

The curriculum generated for the practice-based workshops and the ideas developed and applied by the middle school students is important because of its valuable inclusive and multi-stakeholder process. Below some essential points and findings of the practice-based study are explained:

- Design and project-based online workshops helped students to learn about sustainability principles and practices and supported them while designing the schoolyard for learning about sustainability.
- Students discussed and made decisions together at the end of the workshops. This democratic process supported them in listening to, learning from each other, and making decisions together, a step of the participatory process.
- Students develop and design their schoolyards. This valuable process may also support them in place attachment, sense of belonging, owning their schoolyard, and the sustainable values they created together for their own spaces.
- Families were involved during online workshops, and the knowledge was somehow passed from students to the families. While the students were doing design projects for online workshops, they explained and applied what they had learned to the families. (Creating a composting project at home or designing a poster to reduce the carbon footprint of home usage can play an essential role in transforming families into sustainable practices.)

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Through this link more images and videos can be found: https://www.instagram.com/okulbahcenitasarla/

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Evaluation of the changing urban soundscape in Turkey during Covid-19 pandemic through online survey

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Abstract
The disease caused by the virus named Covid-19 and declared as a pandemic has shortly spread worldwide. Measures taken during the pandemic has exceedingly affected the acoustic environment of the cities. Sounds are a part of the human activities in the cities; therefore, they contain information regarding city life. It is possible to understand the positive or negative impacts of the pandemic on social life by analyzing the acoustic life throughout the process. Within the scope of the study, the impacts of the changing social life in Turkey on the city acoustic were studied physically, socially, and psychologically with the soundscape approach. The study conducted accordingly is designed to understand how the Covid-19 process affected the urban soundscape. For this reason, the focus was on the answers given to the participants on their level of pleasantness with the acoustical environment before and during the pandemic, the change in the sound sources they heard, and the sounds they were pleased to hear during the pandemic. Due to Covid-19 restrictions, the study was conducted by using an online Internet survey with 690 participants across Turkey. In addition to the cities with high participation in the study and a general evaluation was made. At the end of the study, it was seen that the change in sound environment pleasantness was more pronounced, especially in the cities of high population density. In general, the audibility of nature-based sounds increased and nature-based sounds were found to be pleasing during the pandemic.

Keywords
Covid-19, Soundscape, Urban acoustic environment, Changing acoustic environment.

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1. Introduction

Covid-19 is an infectious disease caused by the recently discovered type of coronavirus (*World Health Organisation /Q&As on COVID-19, 2020*). The disease, which was detected in Wuhan, China at the end of 2019, has become an unpredicted global pandemic within a short time, and World Health Organization declared it as 'Pandemic' on March 10, 2020. This pandemic with global effects manifested itself in different ways in different cities and countries where public space usages, social relations, and intensities of urban settlements are organized differently.

Turkey is among the countries, which are significantly affected by the pandemic. Turkey is located between Asia and Europe. In Turkey, there are 81 cities, and 30 of them are metropolitans and 23 cities have a population of over 1 million people. The Ministry of Health declared the first positive Covid-19 case in Turkey on March 11, 2020. This condition led to extensive changes in Turkey along with the entire world. During the pandemic, it was attempted to take the progression rate of the pandemic under control through implementations such as discontinuing education, restricting transportation, suspending the activities of cafes, bars, etc., arranging the working hours of state institutions and organizations, restricting production operations, and minimizing the intensity of people circulating within the city.

The decreased use of public spaces in the cities affected many aspects, particularly the factors threatening public health such as air and noise pollution (Nicola et al., 2020), and allowed these negative effects to decrease, albeit partially. The urban acoustic environment is one of the areas where the reflections of these changes are observed. Urban sounds are a part of human activities in cities. Activities affecting social life such as restricted production operations, less or no use of means of transportation, lockdowns, and suspension of activities of entertainment venues directly impact the urban acoustic environment as well. The environment created by the Covid-19 restrictions; It is an important opportunity to explore the urban acoustic environment experience without urban noise and to get the opinions of city users.

The soundscape approach is used in many national and international studies on the urban acoustic environment to determine and evaluate the changes (Çakır Aydın & Yılmaz, 2016; Kang & Schulte-Fortkamp, 2016; Gök Tokgöz et al., 2019). The soundscape was defined as 'the acoustic environment as perceived or experienced and/or understood by a person or people in context' in ISO 12913-1 standard (International Organization for Standardization, 2014). The soundscape changes as a result of the incidents that disrupt social life and change the social dynamics. There are studies on soundscape changing as a consequence of incidents such as wartime, nationwide protests, demonstrations, etc. that lead to dramatic changes in a certain period (Birdsall, 2012; Ceylan, 2017; Kytö & Özgün, 2016). The pandemic is also one of these dramatic changes. Contrary to nationwide or local changes, the pandemic is a global situation that affects all the cities around the world. In this regard, although the pandemic is a global situation that caused social changes, its local reflections on the cities should also be studied. It is seen that the studies on the effects of the pandemic on the urban acoustic environments concentrate on the decrease in noise, noise mapping, or classification based on the differences between the sound pressure levels before and during the pandemic (Aletta et al., 2020; Aletta et al., 2020; Asensio et al., 2020; Manzano et al., 2021; Montano & Gushiken, 2020). There are studies that measure acoustic environment satisfaction and discomfort levels with the participation of the citizens (Andargie et al., 2021; Şentop Dümen & Şaher, 2020; Torresin et al., 2022). According to the studies reviewed, in addition to the studies with an objective dataset and the decreases detected in the sound pressure levels, it is important to determine and evaluate the changing soundscape with the participation of the citizens in order to understand the physical environment simultaneously. Besides, determining the soundmarks of the process is an important part of the impressions of the

citizens in this period. Soundmarks are the sounds that may identify the identity of a space. Soundmarks contain basic information about the place, area, city, society, and culture (Yelmi, 2016). The soundmarks, which have a significant place in understanding the development and transformation of society, in hold qualifications such as identity and belonging. Therefore, it is required to determine, analyze and evaluate the soundmarks to comprehend the impacts of the pandemic on the inhabitants.

With slogans such as "limited social life" and "stay at home" repeated throughout the pandemic, the soundscape has become one of the important factors that enable people to interact with their environment. Although the visual relation with the environment was limited during the restricted social life period, acoustic relation continued. Thus, studying the effects of the pandemic, which led to radical changes in social life, using the soundscape approach is significant to extensively evaluate the effects caused by the pandemic on the acoustic environment perception of the inhabitants. The study aims to determine and evaluate the soundscape changed during the pandemic with the participation of the inhabitants. The relations between the receiver and urban environment are evaluated in terms of physical, social, and psychological aspects using the soundscape approach. According to this, the objectives of the study are;

- To evaluate the effects of Covid-19 and the measures taken in this period in the world and in Turkey,
- To understand how Covid-19 Pandemic affected the urban acoustic environment and urban soundscape in Turkey,
- To determine the acoustic environment pleasantness levels with the data in different cities before the pandemic on an individual scale and to explain how they changed 'during the pandemic,'
- To investigate and determine the urban acoustic and sounds of different cities specific to the pandemic period (soundmarks),
- To detect and evaluate the changes in the sound environment perceived and experienced by the society by comparing the periods before and during the pandemic,
- To determine the sounds defined as pleasing during the pandemic.

Online surveys were preferred rather than face-to-face research as the study method due to the social distancing rules. The online surveys were initiated on May 5, 2020, and ended on May 10, 2020. In order to evaluate the impact of the Covid-19 Pandemic process on sound sources and the sound environment pleasantness, the impact of the Covid-19 process on the world and Turkey was explained first, and then the effects of the process on the urban acoustics were analyzed.

2. Overview of the lockdown period

2.1. World and Turkey during the Covid-19 pandemic

The pandemic affected many aspects such as economic stability, education conditions, and business processes on a global scale. The sectors such as the entertainment sector, etc. where physical interactions are inevitable almost stopped and this affected the economic stability. Less use of goods and services, decreased production operations, reduced use of vehicles, as well as decreased domestic and international passages, allowed global environmental pollution to decrease (Anser et al., 2020). This process increased the use of Internet-based commerce, activities, and Internet-based social interactions. The importance of distance education technologies was understood, and they became widespread due to current conditions.

Because of the social distancing rules brought in by the limited access to public spaces during the pandemic, people were expected to stay at their homes, change their daily indoor routines (e.g., work from home or work on a rotating schedule), and socially interact with their environment from a window/balcony/garden. In the process, curfews and prohibited physical activities have minimized social/physical interaction. In the meantime, ways to face this emergency have been limited to indoor spaces and noise complaints have increased in this places (Tong et

al., 2021). The characteristics of the countries, such as demographic structure, weather conditions, the density of settlement, etc. differentiated the measures and implementations during the pandemic.

Turkey made restriction decisions in many areas such as economical, social, administrative, legal, military, religious, educational, and cultural areas. Basically, these restrictions prevent close contact which is the fundamental route of the spread of the virus. Therefore, immediately after the announcement of the first case, the activities of educational institutions were suspended, and distance education activities were initiated. Following this quick decision, the activities of entertainment venues, cinemas and theaters, religious places, and cultural places that affect the social life and host many people collectively were suspended. After stopping the use of indoor public areas, the activities such as gatherings, picnics, etc. in open or half-open public places were inhibited. It was intended to reduce physical contact by lessening the areas of interaction and to minimize going out as much as possible. The density of people in open spaces was substantially reduced by working on a rotational schedule, lockdowns for people above and under certain ages, and restriction of the use of public spaces. These measures taken in March continued throughout April. In May 2020, the restrictions were partially removed with the normalization process. First, the number of cities with mandatory lockdowns was lowered based on case management processes. The controlled normalization period, which lasted until mid-November, was interrupted by the increase in the number of patients, which was referred to as the second wave. Education was suspended once again, and the lockdowns began.

Apart from the negative impacts of the implementations during the Covid-19 pandemic on people's perceptions and psychologies, these implementations changed the functioning of the city and altered the physical environment elements such as light, sound, the odor that constitute the identity of the city. Sound, which is one of the inevitable outcomes of human activities also got affected by this process, and the character of the soundscape has changed.

2.2. Effects of Covid-19 pandemic on urban acoustic in Turkey

The effects of the pandemic on urban acoustic were evaluated under two principal titles. These are the effect of regulations regarding the restricted use of public spaces and the effect of the new sound sources brought in by the pandemic.

- The effect of the regulations regarding the restricted use of public spaces

The restricted use of public space started with the suspension of education at schools. Due to the young population density in Turkey, this situation has caused a change in the urban acoustics (Steele & Guastavino, 2021) .With the suspension of education in schools, vehicle sounds that take children and teachers to school have decreased. In this process, many employees worked online. It has affected the decreasing vehicle traffic during the Covid-19 period (Asensio et al., 2020; Basu et al., 2021). Suspension of all social and cultural activities and restricting houses of prayer prevented people from conducting activities collectively. This made the human sounds heard less in the cities. Decreased traffic volume allowed the dominant influence of vehicle sounds on the urban acoustic to reduce. Banning or restrictions on open-air markets which produce high-level noise (Meng et al., 2017; Yalılı Kılıç & Adalı, 2020), during the pandemic have reduced human voices in these regions. Cancellation or limitation of domestic and international travel considerably reduced road, air and rail transportation. The vehicle and human sounds have decreased effect on urban acoustic as well as decreased masking effect on natural sounds, and the audibility of natural sounds in cities increased.

- The effect of new sound sources brought in by the pandemic.

There are also new sources of sound that are brought into our social lives by the pandemic. Announcements from municipalities and mosques related to Covid-19 and announcements to re-

Figure 1. *Images of 23 April celebrations in UNESCO Heritage City Safranbolu.*

Figure 2. *Image prepared for the online internet survey.*

mind the legal process and the restrictions are new sources of sound added to the changing urban soundscape. The announcements and the voices of the sellers on the streets to sell bread and various food as a result of the lockdowns continued during this period. Conditions such as numerous sounds in the soundscapes of the cities losing their effectiveness or disappearing or the addition of new sources revealed the need for studying the soundscape of the cities during the pandemic. During the pandemic process, various implementations were carried out in order to ensure social solidarity and give morale to the citizens. Some interactions reinforced social solidarity such as conversations, music recitals, singing, etc. from the interaction areas like balconies, windows, gardens, and streets.

The celebrations for national holidays such as April 23 National Sovereignty and Children's Day and 19 May Commemoration of Atatürk, Youth and Sports Day were canceled due to the pandemic, but to maintain the holiday enthusiasm, the Turkish National Anthem was recited from the windows or balconies of the houses at the given hours. As is seen in Figure 1, such celebrations or similar ones were made across the country. The applauding ceremony to support the healthcare professionals at 9.00 pm is one of the examples indicating that social solidarity was provided through acoustic means.

3. Field study

3.1. Materials and method

Within the framework of the social life that changed during the pandemic and the "Stay at home" policies, the use of the Internet and social media platforms of people recognizably increased for many reasons such as getting information and communicating with relatives and friends (Ahmed et al., 2021; Colley et al., 2020; Király et al., 2020). Therefore, online Internet survey is a practice that is becoming widespread (Puglisi et al., 2021; Şentop Dümen & Şaher, 2020; Torresin et al., 2022). In the scope of the study conducted, an online internet survey was selected as the primary research application in compliance with the current pandemic conditions.

3.1.1. Online internet survey

In the online internet survey, the sound sources specified in the ISO standard and the recommended numerical rating scale were preferred, and the survey was organized within the framework of expert opinion (International Organization for Standardization, 2018, 2021). The survey conducted was announced through social media accounts and individual efforts to increase the number and diversity of participants. While sharing posts on different social media platforms, it was attempted to prepare attractive images for the survey. The image and the online internet survey link as given in Figure 2 were also shared with people

with high numbers of followers. The "swipe up" feature that may be used by such people ensured easy access to the survey by the participants.

The responses to the survey were accepted for 5 days between 5/5/2020 and 5/10/2020 when the restrictions and prohibitions due to the pandemic continued. During the implementation of the survey, in all cities in Turkey; distance education has been applied at all education levels, all theaters, cinemas, concerts, etc. events, restaurants, and cafe services have been closed, curfews are imposed on weekends in metropolitan cities, and intercity and international travel are restricted.

3.1.2. Survey structure

The questions in the survey were prepared and evaluated in four sections. The survey structure, questions, and response scales are given in Table 1.

The first section includes personal information such as age, gender, place of residence, frequency of going out, and sensitivity to noise. The second section is where the pleasure of the users regarding the changing acoustic environment before and during the pandemic was determined, and where they were asked to evaluate the pleasantness level on a scale of 1 to 10. In the third section where the most data regarding acoustic environment sounds were obtained, there are questions about the sound sources and whether they identify a sound environment before and during the pandemic. The fourth and last section includes an open-ended evaluation question asking to write down the sounds identified and found pleasing during the pandemic. A field where the user recommendations and opinions regarding the Internet survey and the current experience may be noted is added to the bottom of the survey.

Table 1. *The survey structured, questions and response scale.*

	Questions	Response Scale
Section 1: **Personal Information**	**Q1**:Gender, **Q2:** Age **Q3:** Which city do you live? **Q4:** How can you describe the building you are living in? **Q5:** When you think about the pandemic process, what is your frequency of leaving the house during this period? **Q6:** Are you sensitive to the sounds around us?	**Q1,Q2:** Selected among the options **Q3:** Open-ended **Q4:** Selected among the options or writing(Flat/Single Family-house/ Flat without balcony/mass housing) **Q5:** Never/ Almost never / Once in Week/ Once in every two/ Almost every day **Q6**: 0–10 numeric scale with verbal labels only at extreme-ends: 0Not at all sensitive, 10 Very sensitive
Section 2: **Questions for Sound Environment Evaluation**	**Q7:** Please indicate your general sound environment pleasantness when you think about the before pandemic process. **Q8:** Please indicate your general sound environment pleasantness when you think about the during pandemic process.	**Q7, Q8:** 0–10 numeric scale with verbal labels only at extreme-ends: 0Not at all sensitive, 10 Very sensitive
Section 3: **Questions for Sound Sources**	**Q9:** Which sounds do you heard before the pandemic? **Q10:** Which sounds are soundmarks before the pandemic process? **Q11:** Which sounds do you heard during the pandemic? **Q12:** Which sounds are soundmarks during the pandemic process?	**Q9,Q10, Q11.Q12:** Selected among the options-The sound sources were grouped under these titles according to the ISO 12913-2 standard.(International Organization for Standardization, 2018)
Section 4: **Pleasing Sound During the Pandemic**	**Q13**: Are there any sounds you find pleasing among the sounds you hear during the pandemic? If so, what are they? **Q14:**Comments	**Q13,Q14:** Open-ended

3.2. Survey result

In the survey, which can reach 58 cities in Turkey, which has 81 cities, data evaluations of a study group of 690 people were made from the cities that include metropolitan cities where effective curfews are also applied during the pandemic process. According to TUIK data; As of the end of 2020, the total population of Turkey is 83 million 614 thousand 362 people (*Turkish Statistical Institute*, 2021). 705 people participated in the online Internet survey. During the survey analysis and evaluation stage, this number decreased to 690 people due to the submission of incomplete forms. It should be considered during the evaluations that the 690 people in the study group were limited in representing the universe. Survey results are given under four headings, taking into account the high participating cities.

3.2.1. Personal information

Examination of the survey results, based on the gender data of the participants, 67% of the participants (463 people) were women and 33% (227 people) were men which indicated that the majority consisted of women. The age data of the participants were evaluated in 6 groups. According to the data, in the groups under the age of 45 (15-24 years, 25-34 years, and 35-44 years) %85 of the participants (587 people) constitute the majority. The general distribution was 15–24: 19% (132 people), 25–34: 45% (308 people), 35–44: 21% (147 people), 45–54: 7% (47 people), 55–64: 6% (42 people), 65+: 2% (14 people). When the use of social media tools and access to online

Table 2. *The frequency of going out of survey participants during the pandemic.*

	Number	Percentage
I go out every day	79	11%
I go out every other day	96	14%
I go out once a week	246	36%
I hardly go out	190	28%
I've never gone out	79	11%

surveys are taken into account, an expected result to has more participants in the given age groups. The low number of participants grouped as 65 years and above may also be explained by the effect of the age factor on the use of the Internet.

Based on the responses of the participants to the question on the frequency of going out during the pandemic (Table 2), it is determined that 75% went out once a week or less. These results indicate that the partial lockdowns and the "stay at home" strategies are adopted and practiced by the majority of the participants across Turkey.

The cities that participated in the survey are shown in Figure 3. It shows 24 cities with 5 or more participants out of 58 cities that participated in the survey. Announcing the survey on social media accounts has been effective in determining the cities with the highest participation, and the cities of Nevşehir and Eskişehir, where the organizers of the survey are located, came to the fore. 65%(449 people) of the survey participants are from Istanbul, Nevşehir, Eskişehir, and Ankara. 35% (241 people) of the survey participants participate from other 54 cities and the participation rate of each city is below 5%. For this reason, cities other than Istanbul, Nevşehir, Eskişehir, and Ankara were not evaluated separately. In addition, information such as population densities, green area ratios, and living spaces of people, which are thought to affect the acoustic environment of these cities, are given.

Comprising 25% (174 people) of the survey participants, Istanbul is the city with the highest participation. It is the most populous city in Turkey with its population exceeding 15 million (*İstanbul Valiliği,* 2020). Also to the question, we asked people to describe where they live, 71% (124 people) out of 174 participants said flats. 10% (18 people) claimed that they lived in flats without balconies and 17% (29 people) lived in mass housing. Only 2% (3 people) lived in a single-family house. According to the data of Istanbul metropolitan municipality, the green area per person is 7% (IBB, 2020). 2751 people per square kilometer live in Istanbul. The city with the highest population density (TUIK, 2021). Istanbul is the leading city in Turkey in terms of noise problems that are getting worse due to rapid population growth (İlgürel et al., 2016). It is known that there is a lot of road, rail, and air traffic in Istanbul. In addition, many studies have been carried out on noise reduction in Istanbul (Demir et al., 2016; İlgürel et al., 2016; Ozkurt et al., 2014).

Nevşehir, which makes up 15% (100 people) of the survey participants, is the second city with the highest participation. Nevşehir, with its 243 thousand population, is the lowest populated settlement compared to the other cities examined (*Nevşehir Nüfusu*, 2021). 53 people per square kilometer live there (TUIK, 2021). According to survey results, 79% (79 people) out of 100 participants described where they live as flats. 14% (14 people) claimed that they lived in a single-family house. 6% (6 people) lived in mass housing and nobody lived

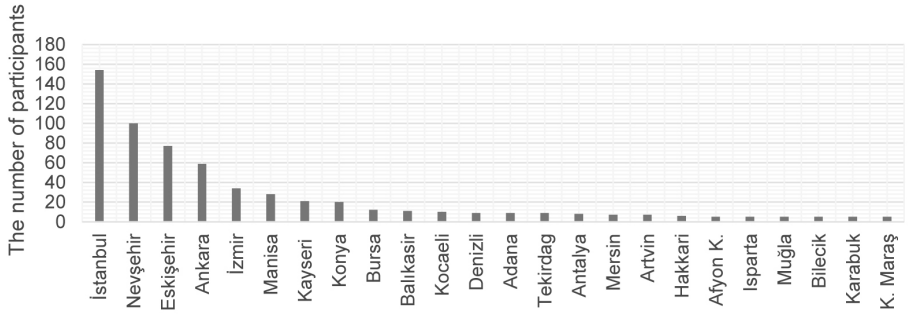

Figure 3. *Cities participating in the survey and the number of participants.*

without a balcony flat. According to the data of Nevşehir municipality, the green area per person is 14% (*Nevşehir 2019 Performans Raporu*, 2020).

14% (96 people) of the survey participants, Eskişehir is the third city with the highest participation. Eskişehir, with a population of 888 thousand, is one of the 30 metropolitan cities in Turkey (*Eskişehir Nufus*, 2021). 62 people per square kilometer live in Eskişehir (TUIK, 2021). According to survey results, 66% (51 people) out of 77 participants described where they live as flats. 16% (12 people) claimed that they lived in flats without balconies and 13% (10 people) lived in mass housing. Only 4% (3 people) lived in a single-family house. According to the data of Eskişehir municipality, the green area per person is 13% (Eskişehir Büyükşehir Belediyesi, 2019).

Ankara, which makes up 11% (79 people) of the survey participants, is the fourth city with the highest participation. Ankara, with a population of 5 million 600 thousand, is the second largest city in Turkey. 212 people per square kilometer live in Ankara (TUIK, 2021). According to survey results, 83% (43 people) out of 59 participants described where they live as flats. 5% (3 people) claimed that they lived in flats without balconies and 19% (11 people) lived in mass housing. Only 2% (1 people) lived in a single-family house. According to the data of Ankara metropolitan municipality, the green area per person is 19% (Ankara Kalkınma Ajansı, 2018).

In the light of these data, it is predicted that the change between the acoustic environment pleasantness and the sounds heard will be more in big cities such as Istanbul and Ankara.

3.2.2. Sound environment pleasantness before and during the pandemic

The survey participants were asked to evaluate their pleasantness from the sound environment they were in before and during the pandemic on a scale of 10 (where 1 is minimum, i.e., "Very unpleasant" and 10 is maximum, i.e., "Very pleasant") In Table 3, averages of pleasantness values in cities with high participation and in all cities are given.

Table 3. *Averages of pleasantness values in cities with high participation and in all cities.*

	Before Pandemic	During Pandemic
Istanbul	5.02	7.07
Nevşehir	5.75	6.67
Eskişehir	5.50	6.89
Ankara	5.10	6.93
Averages of all cities	5.25	7.19

When examining the average values, it is possible to mention an overall increase in the sound environment pleasantness. The difference between the mean values before and during the pandemic is greater in large cities.

3.2.3. Sounds sources and the sound environment before and during the pandemic

In this section of the survey designed to define the sound environment during and before the pandemic and to detect the soundmarks specific to the area, the participants were asked to mark the sound sources heard among 26 different sound sources identified. Four titles were prepared to determine the sounds heard before the pandemic, soundmarks of the sound environment before the pandemic, sounds heard during the pandemic, and the soundmarks of the sound environment during the pandemic. The sound sources were grouped under these titles according to the ISO 12913-2 standard (International Organization for Standardization, 2018).

- Non-human sounds (natural sounds) were grouped as sounds of nature and pets and diversified as bird sounds, dog sounds, the sound of other animals (insects, cats, etc.), wind/leaf/tree sounds, water sounds, and other natural sounds (rain, thunder, etc.)

When Figure 4 is examined, it is seen that the hearing of the sounds of non-humans has increased more clearly in Istanbul and Ankara. In Nevşehir, it was seen that this situation almost did not change before and during the pandemic.

We understand that there is a response to bird sounds, which is found as a sound mark during the pandemic, from the sounds of non-humans, whose hearing status is increasing more.

- Human sounds were grouped as the sounds derived from the actions

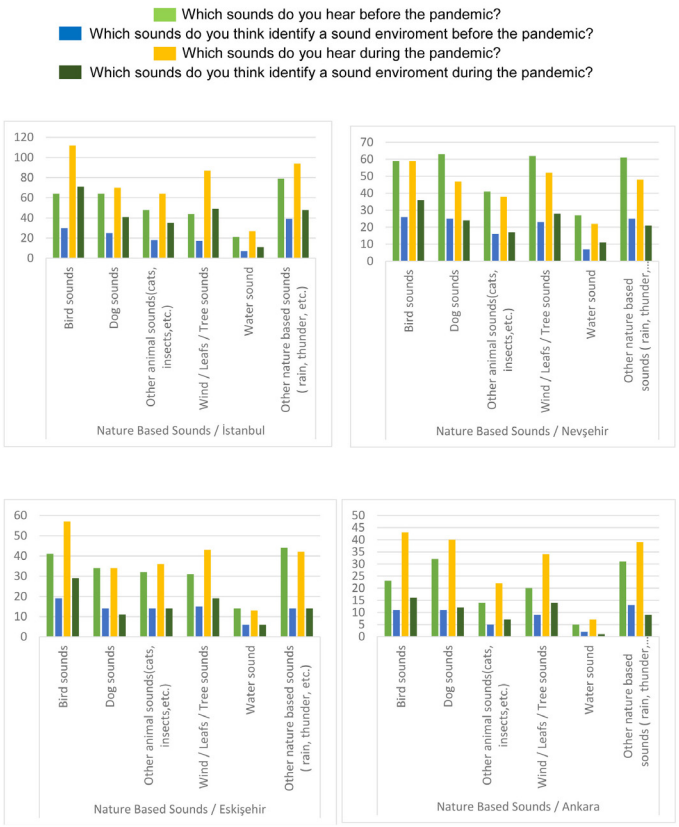

Figure 4. *Sounds of non-human about Istanbul, Nevşehir, Eskişehir and Ankara before and during the pandemic.*

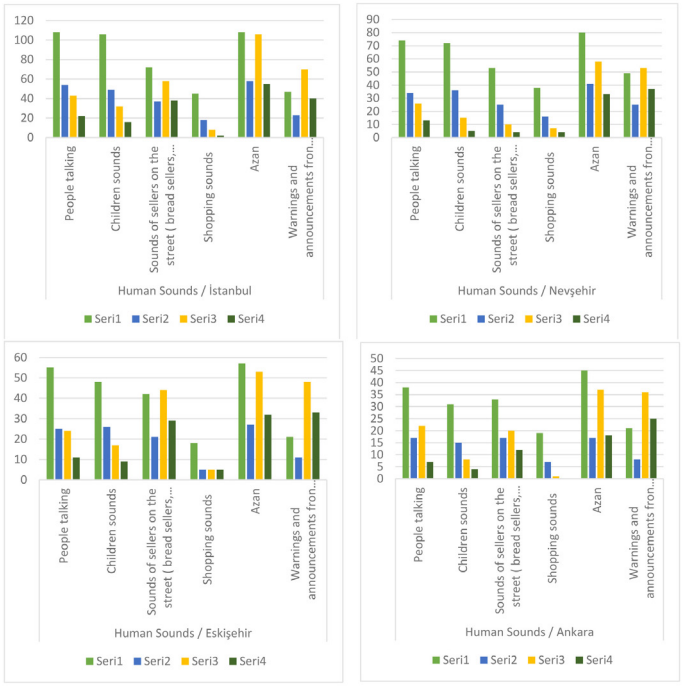

Figure 5. *Human sounds about Istanbul, Nevşehir, Eskişehir and Ankara before and during the pandemic.*

of the people, and social activities/ events. During the pandemic, it is seen in all cities that there is a decrease in the hearing of human voices, except azan and the warnings and announcements from mosques and municipalities.

When Figure 5 is examined, the sounds found as soundmarks during the pandemic; It has been seen that there are azan, warnings and announcements from the mosque and municipality. Azan is also a sound source that is seen as a soundmark before the pandemic.

- Sounds produced by motor vehicles and electromechanical (fixed and mobile) sounds (technological sounds) were diversified as road traffic sounds, vehicle horn sounds, aircraft sounds, mechanical sounds, sounds of ships and boats, mechanical device and equipment sounds, and motor courier sounds.

When Figure 6 is examined, during the pandemic, it is seen in all cities that there is a decrease in the hearing of sounds produced by motor vehicles and electromechanical devices. It is seen that especially the sounds of vehicles from roadway traffic are the most heard sounds in cities. Before the pandemic, vehicle sounds from roadway traffic is shown as a soundmark. During the pandemic, any of these sounds are not seen as a soundmark.

3.2.4. Sounds defined as pleasant during the pandemic

Within the scope of the survey, following the determination of the sounds in the acoustic environment before and during the pandemic, the participants were asked about the natural sounds, human sounds, or technological sounds that they defined as pleasant during the pandemic. 443 participants responded to this question which was designed as open-ended and which may be responded with multiple sources of sound. According to this;

- 52% (230 participants) of the participants reported “bird sounds” or “birds singing;”
- 31% (137 participants) of the participants reported “nature, animal, rain, and wind sounds;”
- 9% (40 participants) of the participants reported “azan sounds and the praying sounds;”
- 3% (13 participants) of the participants reported the sounds produced by the “celebrations from the

balconies," "national holidays," and "celebrations to support the health-care professionals;"
- 2% (10 participants) of the participants reported "the sound of the bakers;"
- 2% (7 participants) of the participants reported the "announcements and declarations;"

as their pleasant sound preferences.

When the responses were analyzed, it was seen that non-humans natural and pet sounds which are "bird sounds, animal sounds, the sound of the rain, the sound of the wind" were preferred more. This indicates that the natural sounds heard during the pandemic ensure and even increase the sound environment pleasantness of the inhabitants. Therefore, it is considered that ensuring the audibility of these sounds may increase the level of sound environment pleasantness of the city. The other sound preferences noted were social activity/event sounds of the human sounds. It was seen that motor vehicle and electromechanical sound sources were not mentioned in any response.

4. Evaluating the acoustic environment and user satisfaction before and during the pandemic

Within the scope of the study, the acoustic environment pleasantness, the sounds heard, the change, and the pleasing sounds during the pandemic were asked. When the relationship between the sounds physically heard and the pleasantness was physically, socially, and psychologically reviewed,

- It was seen that the acoustic environment pleasantness before the pandemic was lower than the acoustic environment pleasantness detected during the pandemic. This differentiation is thought to be associated with the audibility of technological sounds. It may be understood from the responses that the audibility of the technological sounds has decreased during the pandemic.
- The participants reported bird sounds and natural sounds as pleasing during the pandemic, and this indicates that the relevant sounds have positive impacts on human psychology.
- The announcements from the mosques and municipalities during the pandemic are of the sounds in the soundscape, but they are considered a new source of sound due to their changing characteristics.
- Although the urban sounds changed as a result of the urban rhythm slowing down and increasing the quality of urban acoustic, the psychological effect created by the other conditions affecting the social life (restricted interaction, inability to socialize, etc.) reduced their influence on the satisfaction and wellness of the citizens. The positive influences of increased acoustic quality were restricted.

The changes in the soundmarks such as vehicle sounds, human sounds, etc. that symbolize city life have changed the acoustic characteristic of the city

Figure 6. *Human sounds about Istanbul, Nevşehir, Eskişehir and Ankara before and during the pandemic.*

center and made the busy areas similar to any other area within the city by removing their characteristic features.

5. Conclusion

Sound is a dynamic component; it is directly affected by social changes. This study is important as it is a country-wide research based on the personal views of urban residents about the urban acoustic environments. Documentation of subjective data in a perception-based soundscape approach; reflects the urban users' ideas about the changing acoustic environment. In this way, different information such as the detection of new sound sources and satisfaction status can be obtained. The contribution of the study is that the determination made is wide-ranging and at a level that will allow comprehensive studies.

As in many studies focusing on urban acoustic environment change after the Covid-19 process, in this study, while the rate of hearing human sounds, motor vehicles, and electromechanical sounds before the pandemic was high, the prohibitions brought in during the pandemic decreased the rate of hearing these sounds and increased the rate of hearing natural sounds. And a rise in acoustic environment pleasantness level was observed with this increase. Most of the studies have detected these changes with acoustic environment measurements, sound pressure level changes, and conducted their studies on a city sample (Aletta et al., 2020; Asensio et al., 2020; Basu et al., 2021). Unlike this study, these determinations were made through a questionnaire and an evaluation was carried out that included many cities across the country. Thanks to open-ended questions, pleasantness level and pleasing sounds were identified with user opinions. This is an element that enriches the study and makes it a comprehensive assessment. The fact that the study was across the country made inter-provincial evaluations difficult. Different measures taken in different cities in the same period affected people's perception of the acoustic environment. With the strict measures taken for Istanbul, Ankara, and Eskişehir, the hearing of some sounds has decreased. In a small city like Nevşehir; there was no significant reduction in noise such as low-intensity traffic noise. It should be noted that the findings obtained from the answers given by the study group participating in the survey belong only to the study group. In order to generalize the research findings, similar studies should be increased.

In this study, new sound sources such as "celebrations from the balcony", "national holidays" " celebrations to support the healthcare professionals" "sounds of bakers", and "warnings and announcements from institutions such as mosques, municipalities, etc." were detected. But these new sounds are the acoustic results of the solutions for the needs generated during the pandemic and for the problems such as informing people during the process. Even if alternatives are produced when the interaction of people with the city is interrupted by activity restrictions, the urban identity is condemned to get lost. Therefore, the analysis and interpretation of the urban soundscape are important to understand the social dynamics and identity components of this process and a process similar to this. Considering the change in the cities exemplified in the study, in future and ongoing studies, the necessity of conducting city-specific investigations comes to the fore. This situation reveals the importance of the sound identity of cities.

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From actualization to virtuality: Differentiations of becoming in Bryan Cantley's critical architectural representation

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Abstract
The act of knowing the architectural representation which is controlled by the ratio centralism of the classical subject, prevents the representation from exploring the potentials of experiencing the event and creating the concept and difference. This study purposes to offer the issue that transforms architectural representation from knowing to designing may be revealed through the differentiations of becoming in the virtual space and non-human human comprehensions. The study deciphers Bryan Cantley's becoming-representation atmosphere in the context of experiencing the field of possibilities of imagination and critical creativity by remaining in the event. The methodology of this research area experience to dismantle the case study of Cantley's atmosphere with the posthuman critical theory of Rosi Braidotti and the differentiation theory of Gilles Deleuze, as the enablers of imagining, escaping from the historicist linearity and creating conceptual becoming-representations. In line with these methods, the relationalities and probabilities of Cantley's conceptual creations such as mechudzu, post-liminal fuzz, enantiomorphistic inversions and third-space with his representation design atmosphere are deciphered. Contribution of this study for the medium of architecture is thought as attracting attention to the issues which are creating representation lexicons, differentiations by the encounters in virtual space, becoming-grab among all the humans with non-humans and leaving the linearity of prediction for being able to open the field of possibilities about becoming-representation.

Keywords
Architectural representation, Becoming, Differentiation, Posthuman assemblage, Speculative narratives.

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1. Introduction

The critical formations observed in the history of architectural representation become visionary messengers of the intellectual and formal imaginations that future practices will evolve. Representation reveals as the joint that connects architectural practice and theory. "It is precisely in such moments of change where critical thought and new theories are produced and practice is radically restructured. Theory and practice are articulated through representation" (Agrest, 2000). The politics and formations of the medium of architectural representation can be discussed through the concepts of actuality, actualization, and virtuality. When the traditional representation is examined, "a broad range of spatial and formal ideas is formed regarding its basic reasons for creating images in architecture and discovering methods of making them which indicates the dependence of architectural space logic to limitations of 'Architectural Representation'" (Shojaee & Saremi, 2018). In this sense, is the act of creating architectural space subject to the actual limitations of architectural representation? The standardization of architectural representation complicates coming across an architect who drew for the medium of critical architectural representation around the sixteenth century. The reason for this situation can be explained by the actuality of Renaissance perspectivalism, which rationalizes the realism of the seeing eye, through the dominance in drawing, geometry, art, and architecture. In the traditional architectural representation, narratives of translation are usually ignored by the geometry. The origin of geometry "is always present and its ideal objectivity is unaffected by the particularity of utterance or the language of its expression. There is no difference to be put into play" (Allen, 2000). For Pérez-Gómez (1983), "implicit in the geometrization of the epistemological universe was the possibility of transforming architectural theory into an instrument for technological domination". The instrumentalization of architectural representation through the Cartesian geometrization aims to the architectural buildings of the subject's actuality desire. However, the imagination of utopian/futuristic architectural drawings that do not aim to be built, starts to represent the potential of critical architectural space by remaining in the act of drawing. Hans Vredeman de Vries, a Renaissance architect, presenting experimental drawings of abstract object-oriented collisions of perspective drawings in the seventeenth century, is not perceived as compromising with the eye-centered realism of perspectivalism (Burden, 2000). The historicist usage of geometrization for the critical unbuilt architecture may become more apparent when we observe the Carceri and Campo Marzio drawings of Giovanni Battista Piranesi in the eighteenth century. "In the Carceri, the constriction comes not from the absence of space, but an opening toward the infinite… Compared to the Carceri, the Campo Marzio actually appears polemical and self-critical… In the Campo Marzio what is contested is the limitedness, the abstractness, the randomness of the hermetic 'objects' that throng the plates of the Carceri" (Tafuri, 1987). Yet in the eighteenth century, a similar brave self-criticism may not be revealed in the actualized utopian architectural representations of Étienne-Louis Boullée, Claude Nicolas Ledoux, and Jean-Jacques Lequeu. "Of the three, Boullee represents primarily the struggle for new forms; Ledoux, the search for a new order of the constituents; Lequeu the tragic ultimate stage of the revolutionary movement… [These three architects] represent the height of the movement that ended the Baroque and presaged the architecture of the nineteenth and twentieth centuries" (Kaufmann, 1952).

Even in the early twentieth-century avant-gardes that are mostly aforementioned with their nations do not seem to be purified from the actuality desire of subjectivity. German Expressionists Bruno Taut, Wassili Luckhardt, Wenzel Hablik or Hans Poelzig draw the crystallized utopian fantastic landscapes of tapering corners under the Crystal Chain [Die Gläserne Kette] formation (Whyte, 1985). Russian Constructiv-

ists such as Vladimir Tatlin, Alexander Rodchenko, and Gustav Klutsis represent futuristic propaganda for the urban spaces and life dynamics undergoing rapid industrial change. However, other mediums of critical architectural representation such as Dadaists and Surrealists in the early twentieth century, replacing the image's place from inside to the outside of conscious, do not adopt the subjectivist consciousness and the classical instrumentalization of modernity. Dadaists, sprawling in international collectivism of solidarity and rebellion, offer the impossible encounters of photomontage interobjectivity as a critique against the subjective management of consciousness. The polyphonic, polyfocal, and heterogeneous representations of Dadaists appear in the works of Hannah Höch, Raoul Hausmann, Kurt Schwitters, Marianne Brandt, Paul Citroen, László Moholy-Nagy or El Lissitzky (Scolari, 2012). On the other hand, Surrealists such as Max Ernst, Yves Tanguy, and architect Roberto Matta, who exhibit intellectual reconciliation with the Dadaists, reveal unmanageable atmospheres of encounter in which the virtual and the actual spaces, subject, and object are mixed (Spiller, 2016) in the sequences of unconscious and subconscious desire. "Matta's biomorphic shapes appear in convulsive spaces, using free association over constructed rigidity" (Dolin, 2005). Nonetheless, the subject to be montaged or mixed, historically remains.

After the Second World War crisis, critical architectural representations constitute 'anti-city' spatialities with the attempts of postisms to relieve the world environment as a break with modernity. After the destruction of cities, an anti-city utopianism, arising from the criticism of the cities of modernity, is imagined in Guy Debord's psychogeographic mapping of The Naked City, The Plug-in City of Archigram's detachable modules that can be attached to the fantastic mega-machines in constant motion or the New Babylon of Constant Nieuwenhuys that dissolves the relations with others by "combining the now-here with the nowhere" (Mari, 1999). However, the issue of the classical subject and its actualization desire in the mid-twentieth century avant-gardes can be inferred through the expectation to be built for the future. The utopia of the New Babylon project "radicalizes and idealizes the transitory aspects of the experience of modernity… For Debord and his partisans, [New Babylon] is clearly limited in scope. They even accuse Constant of functioning as a public-relations officer for capitalism because his project tries to integrate the masses in a totally technified environment… Constant, for his part, does not expect this social revolution to take place in the near future" (Heynen, 1999). Constant's foresight does not change the realism desire of his project that was somehow imagined for the actual field. A different kind of actualized critical representation can also be observed in Raimund Abraham's 'House without Rooms' (1974) drawing which does not abandon the plan-section-elevation tradition and classical dualistic oppositions. "Situated in barren landscapes, either imagined or from memory, schemes are for houses that straddle the earth and the sky, and evoke life's oppositions" (Michelis, 2002).

Breaking with the issue of actualization and the actuality of the subject, this study aims to reveal the architectural representation events of 'becoming' and 'differentiation' in the virtual for creativity. For deciphering an architectural representation medium that is not intended to be built or actualized, it appears in the field of study to abandon the representation habits of the classical subject. Such an emergence causes the study to develop the methodology for the dismantling of case study around/along the inferences of posthuman critical theory (Braidotti, 2013) and deterritorialized philosophy on becoming and differentiation of virtuality (Deleuze, 1994). The study does not focus on the differenciation of actualization but focuses on the differentiation of virtual with posthuman criticism as the dismantling methodology of the case study. Considering the influences of posthuman theory and differentiation of becoming on critical architectural representation in the twenty-first century, extensive research has been constituted in the related lit-

erature (Allen & Pearson, 2016; Cantley, 2011; Spiller, 2018, 2016; Chard & Kulper, 2013; Riley et al., 2002) and the architects such as Nigel Coates, Lebbeus Woods, Neil Spiller, Perry Kulper, Nat Chard, Nic Clear, Mark West, Martin Summers, Ryota Matsumoto, and Bryan Cantley have been encountered. Bryan Cantley is chosen among these architects to discuss and problematize the differentiations of becoming in the virtuality in critical architectural representation. The main reasons for Bryan Cantley choice are that his machinic-becomings seem to reconcile with the machinic assemblage in the body without organs approach of Deleuze (2004) and prosthetic differentiations which create 'subjectified questionings and criticism by assembled objects' as a de-familiarized posthumanism (Braidotti, 2013).

After dismantling Cantley's becoming-representation designs, the study concludes by expounding on the intellectual and formal ideas and dynamics that remain in the 'event', and seep through the crevices of the middle areas; that are differentiated by the 'becoming' of the virtual field. Differentiations of becoming may allow architects to explore the creative atmospheres of architectural events and enrich the designers' imagination in the field of posthuman virtual.

2. Posthuman criticism and differentiations of becoming

Posthuman criticism is inherently explained in the relationality and heterogeneous multiple connectivities of the new subject, perceived in our posthuman era and emerging in the posthuman situation. "Posthuman subject is a complex assemblage of human and non-human, planetary and cosmic, given and manufactured, which requires major re-adjustments in our ways of thinking" (Braidotti, 2013). Posthuman criticism, which emerges after the realization of the view that humanism, as we know in its style, is not humanistic, but points to an arrogant subjectivity that is constructed by the egocentric and Eurocentric attitude, can be interpreted as a humanist, critical and creative since it is not human. Rosi Braidotti reveals the posthuman subject with the comprehension of 'non-human human being' that tries to give meaning through the Deleuzian concepts such as 'immanent escape dynamism', 'dynamic potentials which arise between differences', 'creative multeities which do not fall into pessimism and negation', and 'deterritorialized nomadism of singular virtuality'. "A general internal exit, immanent escape dynamism gives direction to Deleuze's thoughts. But in Deleuze, it is escaped only by kidnapping a certain system (perverse model - 'getting out of philosophy through philosophy')" (Ichida & Zourabichvili, 2016). Thus, the immanent escape dynamism of Deleuze becomes a perverse model of the potentials among the countless detours instead of the 'main road', by deviating within the virtual that keeps the 'becoming' constantly fit. We can perceive this 'main road' as the historicist actuality of classical subject philosophy. For posthuman criticism, the possibility of another human being that is not human is a theoretical conception that emerges against the crisis in the historicist construction of the classical subject organizations. The posthuman subject is an alternative subjectivity that can be detached from the management of anthropocentrism and merge with non-human things. It can flow by transforming the organized body as body-without-organs. It can be liberated from the prison of stable identity and be opened up to differential tensions in the merger of nonlinear universes with grabbing. The difference in itself belongs to the inorganic and imponderable grabbings of the 'body without organs', which can assemble with other bodies and becomings, rather than the organic body which is restricted in its internal circuits. In this sense, for the rationalist subject "the difference in itself remains condemned and must atone or be redeemed under the auspices of a reason which renders it livable and thinkable, and makes it the object of an organic representation" (Deleuze, 1994).

The critical posthuman subject, who embraces the difference in itself with great enthusiasm, is "within an eco-philosophy of multiple belongings,

as a relational subject constituted in and by multiplicity, that is to say, a subject that works across differences and is also internally differentiated" (Braidotti, 2013). The relationality of the posthuman subject, unfolding in this insight, invokes the nonlinear tensions of other collective events along the flow and differentiations, precisely to scatter the strict organizations of egocentrism.

Another conception of the posthuman situation is the idea of problematizing the egocentric consumption of the classical subject, who places his judgmental continuity and conformist assurance on solid foundations by placing nature under the yoke of his laws. In this situation, the posthuman subject unfolds towards the expansion of reification in the multiplicity of non-human things. The thought to be emphasized is the possibility of becoming in the transition of the subject to reification among things. It is the relationality in which the classical constitution of the subject melts into the non-human field. The subject's collective desires begin to flow in the transitions where the subject-object boundaries are blurred. In this sense, the posthuman subject, "is a transversal formation that is fully involved in the non-human (animal, plant, virus) network. The posthuman state is a state in which our awareness regarding the connectivity with others increases" (Çelik, 2017). Thus, the posthuman criticism sprawls "in a position that transposes hybridity, nomadism, diasporas, and creolization processes into means of re-grounding claims to subjectivity, connections and community among subjects of the human and the non-human kind" (Braidotti, 2013).

Becoming-posthuman which appears in the expansion of nonlinear temporality by leaving from the Eurocentric causality principles of history tends to give meaning to its theoretical criticism through Deleuzian readings. The methodological criteria of Braidotti's posthuman critical theory are "cartography accuracy, with the corollary of ethical accountability; trans-disciplinarity; the importance of combining critique with creative figurations; the principle of non-linearity; the powers of memory and the imagination and the strategy of de-familiarization" (Braidotti, 2013).

To combine critique with creative figurations, it is needed to stay in the flow without falling into the negation of oppositions. 'Opposition in the predicate', which is one of the 'four iron collars of representation' (Deleuze, 1994) extinguishes critical creativity. Deleuze mentions the four roots of the principle of reason [ratio], which we come across throughout the history of philosophy, which covers the virtual space. These four roots keep the striations and coordinations under the assurance and control of each supervisory actualism. Four roots direct 'difference' in a predictable, historically detectable, and presumable field of surveillance. For these principles, the differential value of the difference needs to be conceivable and measurable. The four roots of the reason mean that the organs of representation can be known and the organicity of representation is trapped in its inner order. This condition does not allow the representation to assemble with other bodies. "In any case, the difference in itself appears to exclude any relation between different and different which would allow it to be thought. It seems that it can become thinkable only when tamed - in other words, when subject to the four iron collars of representation: identity in the concept, opposition in the predicate, analogy in judgment and resemblance in perception" (Deleuze, 1994).

The issue of 'opposition in the predicate' becomes more perceivable when we start to think of 'the beginning' and 'the end' oppositions. The laziness of settling at the beginning or the end is avoided in the inorganic Ocean of dissemblance (Deleuze, 1994). Deterritorialization in the grabbings of the middle area opens the space of becoming for critical creativity. "Starting from the middle and gaining speed in the middle of things, the expansion through 'becomings' and 'differentiations' gets rid of the static structures, ready-made ideas, and settled patterns that reside at the beginning and the end. Starting from the middle is always needed. Everything interesting, remarkable, worth thinking happens in the middle and in between" (Yücefer,

2016a). In this sense, Braidotti affirms that any potential for differentiation at the in-between of oppositions triggers critical and creative becomings. Establishing on the poles, such as nature/technology, female/male, and present/past as dualistic oppositions, cannot escape from the actuality of negating each other. "These in-between states defy the established modes of theoretical representation because they are zigzagging, not linear and process-oriented" (Braidotti, 2013).

However, Deleuze particulary makes a distinction between the word 'différentiation', and 'différenciation'. "While the différentiation takes place as the process of differentiation in the virtual field or the determination of the Idea's virtual content, the second refers to the differenciation in the sense of actualization of the virtual by being divided into species or distinct parts" (Yalım & Koyuncu, 2017). 'Differentiation' in Deleuzian becoming corresponds to the unknowable dimensions of the difference creations in the virtual. 'Differenciation' takes a direction in the diversification of actualization.

This study is concerned with the creative affirmations in the non-linear encounters of dissemblance that do not fit into history, in the context of the becoming-representation potentials differentiating in the immanence plane of virtuality, rather than the two dimensions of the negative inclusions in the actualized structuralism of the representation tradition which is differenciation. Because "building is a two-way, two-dimensional process. While the *differenciation* is completed with the end of the construction in the state of things, the *differentiation* is interrupted, the virtual space is closed" (Yücefer, 2016b).

For the differentiation of virtual field not to be interrupted, architectural representation does not need to end in actuality. It needs to comprehend the differentiations of becoming-representation in the event, movement, in the dynamic dimension. In singular virtuality, "by making a section of chaos, the plane of immanence requires a creation of concepts" (Deleuze & Guattari, 1994). With all of these inferences which we have discovered in the post-human critical theory of Braidotti and the differentiation theory of Deleuze, we will discuss, give meaning and decipher the becoming-representation atmosphere of Bryan Cantley as the case study of the differentiated and creatively hybridized plane of immanence in architectural representation.

3. Differentiations of becoming in Bryan Cantley's critical representation

The critical being in Bryan Cantley's architectural representation may have the potentials that can be interpreted in a network of posthuman critical and differentiation theories which contains the concepts of deterritorialization, hybridization, the principle of non-linearity, and the subjectivity between human and non-human. Observing this experiential architecture medium, the machinic-prosthetic topographies created by Bryan Cantley synchronously flow and melt with the critical theorization through machine-architecture becoming. This representation area can be read as the visual theory of architecture drawings and imaginations which is thought de-familiarized, nonlinear, combining critique with creative questionings (Braidotti, 2013) and not visualizing the centuries-old arrogance of classical humanism that can be overlapped with posthuman criticism.

Cantley's architectural representation practices are designed in an atmosphere that does not follow the architectural traditions of classical subject humanism. For Cantley, traditional "architectural drawing means a set of instructions, a legal document, a reductive artefact" (Cantley, 2016b). His atmosphere is "a world where the computer reigns supreme and where machines and virtual machines are forever changing guises and functions" (Spiller, 2011). The spatiality of Cantley's flow, differentiation, change, and articulations restructure the terminology of the representation medium with its lexicon. Cantley creates his concepts as the Deleuzian difference in itself because "the concept is not given, it is created; it is to be created. It is not formed but posits itself in itself - it is a self-positing" (Deleuze &

Guattari, 1994). In this representation medium, "Contemporary existence involves navigating and operating a gamut of differing technologies and being conversant with a whole number of operational protocols. FORM:uLA's architecture surfs, records, and posits in these fluxing machinic topologies and typologies" (Spiller, 2011), (Figure 1).

With his speculative machinic becomings, "Bryan Cantley is one of the architects who has sensed a need to develop new ideas, tactics, and strategies to save the architectural profession from navel-gazing itself into extinction" (Spiller, 2011). Therefore, various questions emerge. With what kind of policy does the architectural practice begin to destroy itself? Does the product of architecture put its static monumentality in front of the acts of establishing space and diversifying the spatial experience? "Architects are obsessed with form, they like the way their buildings look at the expense of everything else. Whilst this is not a crime in itself, it can leave them myopic to the great boon of the virtual - interconnectivity, expediency, and enabling of delight" (Spiller, 2011).

Cantley's atmosphere is the architecture of not obsessing form, which develops mechanical becomings that infect obsessive forms and get stuck, embedded, or settled in them. In the representation lexicon of this architecture, metamorphic conceptual creations and terminological designs appear. The term often encountered in his architecture is revealed as 'mechudzu', "a kind of weed that grows wild on the body of our mechanical culture, luxuriating in its ability to draw energy from those forms, spreading quickly and choking off each single organism as it continues its sprawl" (Betsky, 2011). In other words, Cantley's architecture is "made from the paraphernalia that enables our human web of interconnections and interactions to exchange, classify and store this multidimensional web of digital transactions" (Spiller, 2016). 'Mechudzu' collects contextual data streams by messing with urban structures, buildings, squares, and streets. It constantly blurs a critical formation with the information it scans. Its "virulent, tendril-like propositions are made of the same stuff as the city: steel, cable, sockets, conduits, signage.

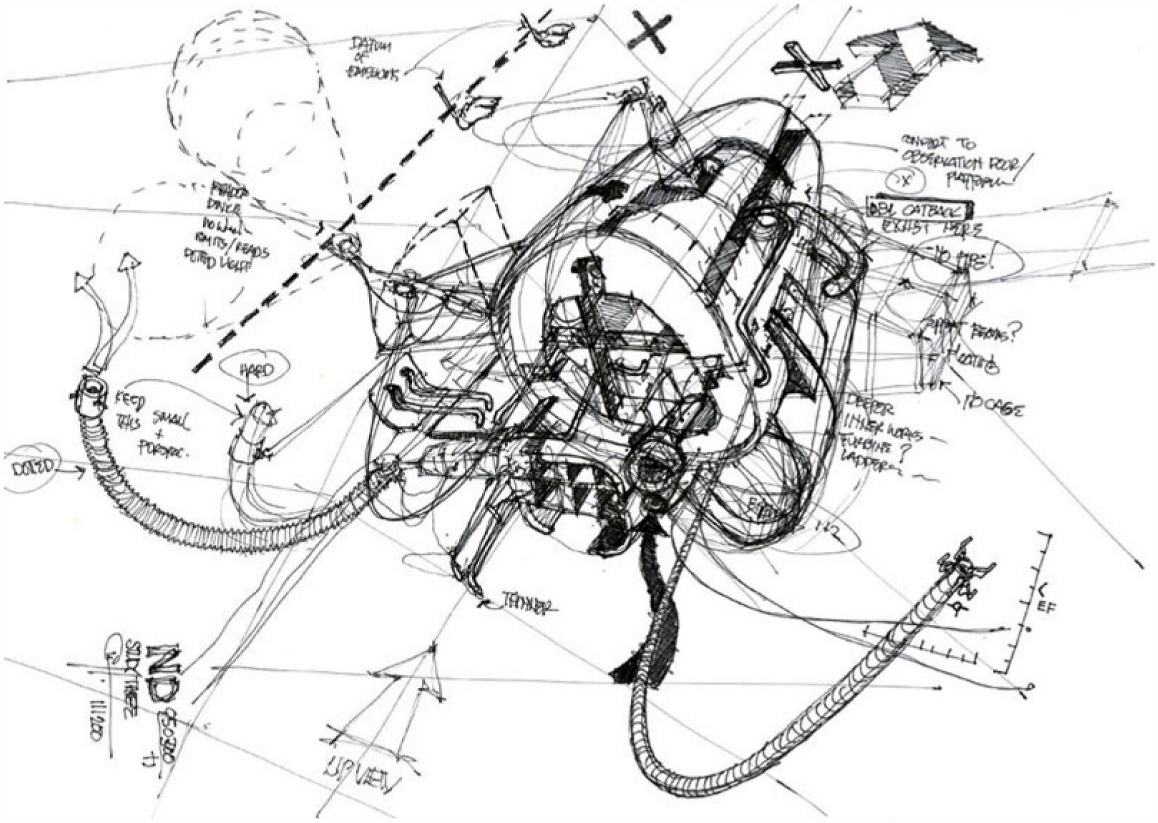

Figure 1. *Sketch of Bryan Cantley (Cantley, 2011).*

Like its kudzu namesake, it has no respect for established urban order" (Spiller, 2016). The palimpsest fusion of the old (urban space) and the new (mechudzu) also breeds the prosthetic re-signification. In Cantley's drawings, becoming-mechudzu both contain mechanical montages in themselves and sprawl by being montaged to the urban 'old'. Thus, mechudzu's architectural representation simultaneously creates critical, mechanical, prosthetic, and palimpsest differentiations of becoming (Figure 2).

One of the other terms frequently encountered in Cantley's lexicon is 'thirdspace'. The thirdspace is the space of hidden drawing which is not discussed in the tradition of architectural drawings produced in the context of classical subject structuralism. It is the other-representation area of architectural drawing. The drawing atmosphere of Bryan Cantley's thirdspace, ignored by tradition, grows precisely in the 'being-in-itself'. It permeates the urban space or its constructions as the actualized entity that problematizes and tends to differentiate its becoming which is similar to its 'kudzu' namesake. Cantley suggests that the drawing can be the thing itself. "This condition requires a recognition and perhaps occupancy of the liminal space between there and elsewhere. The '(t)here' is where the drawing resides, ironically distanced from any potential physical conclusion" (Cantley, 2016b), (Figure 3). Cantley's liminal space for his architectural drawings may also be read through the posthuman critical theory. His in-between approach that is between here and there, human and non-human things, drawing and subject/object does not actualize itself as a physical conclusion, as the negation of the actuality which closes the differentiations of virtual field. His liminal thirdspace seems "zigzagging, not linear and not concept-driven" (Braidotti, 2013) because the drawing is distanced from the 'opposition in the predicate' of Deleuze's (1994) four iron collars of representation.

The practice of problematizing the spatial patterns between drawing and building emerges in the immaturity of thirdspace. These drawing problematizations are revealed in the naivety of critical understanding and inter-

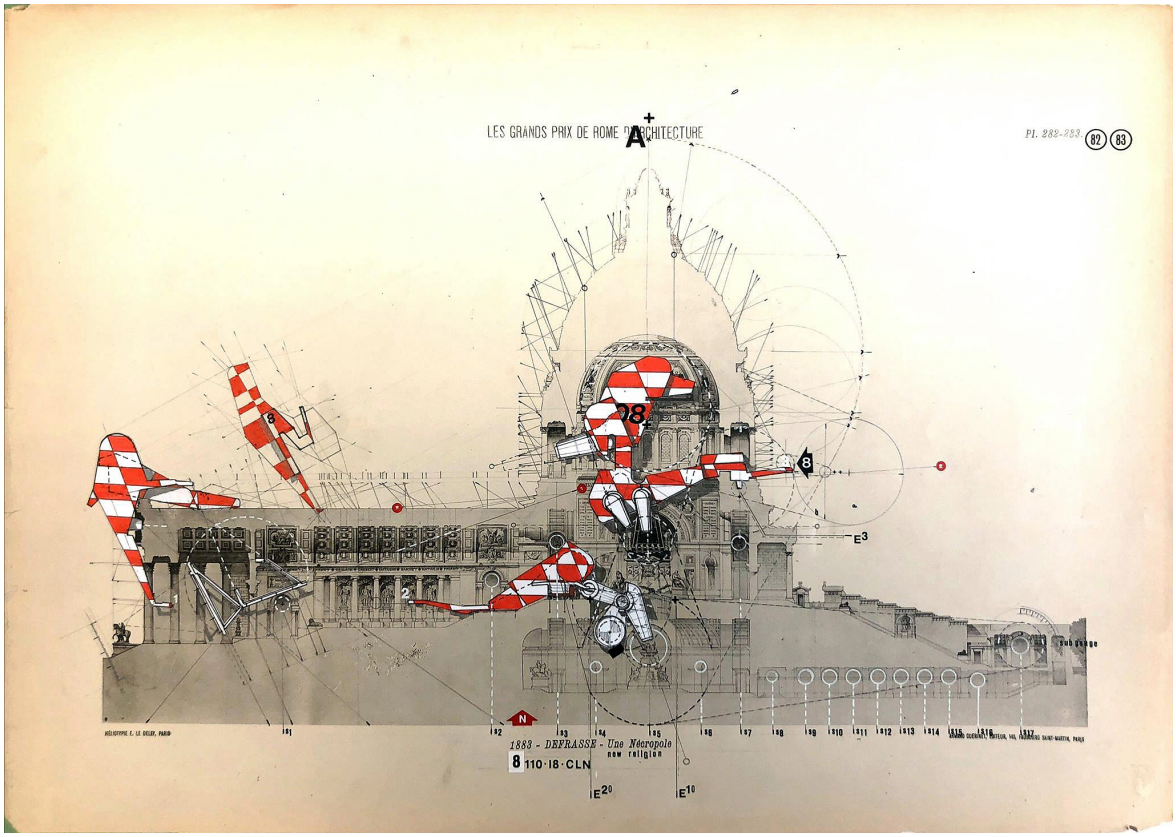

Figure 2. *Palimpsestuous Relationships (Spiller, 2018).*

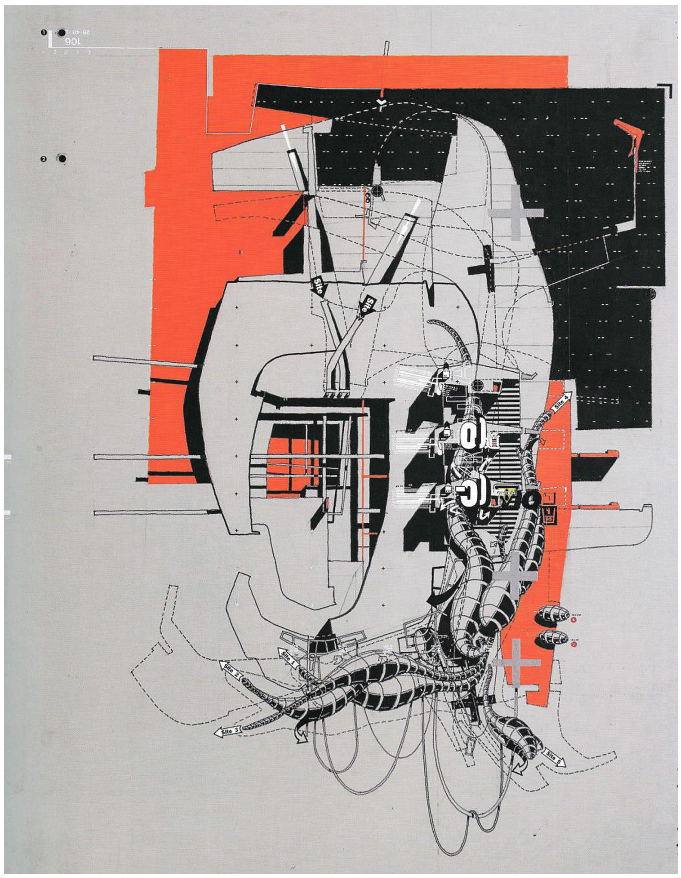

Figure 3. *Deconstructing the OC (Spiller, 2016).*

pretation rather than a critical act of judgment. The drawings, which tend to hang in the problematic of interpretation, are unfortunately not visible and observable in myopic views of Cartesian structuralism. Cantley's "thirdspace is collapsed into nothingness or near-nothingness in the case of the traditional architectural drawing - it has no ability to be reread creatively" (Spiller, 2018). The other becoming-representation of thirdspace arises from its interpretation of the architectural drawing world and its questioning of infiltrating the everyday scenarios of public space. The parallel projections of "construction drawings are meant as highly specific instructions for understanding, and have gone through the stage of reduction in order to make them clear without interpretation. When we define the drawing as a condition of the here (the entity itself), then the thirdspace becomes an active occupant in the construct" (Cantley, 2016).

The palimpsest becoming of the thirdspace can be interpreted as the 'new' mechudzu which collects data from the 'old'. It emerges in an architectural representation that is unfinished, unripe and uncompleted which refers to the architect's being on the road rather than reaching the target. This mechudzu in the thirdspace where it migrates into the differentiations of virtual "envisions a world where the mechanical certainty with which we have shaped our physical environment dissolves into the endlessly hovering limbo of the freeway, the collage of the televised world view, and the directional certainty of diagrams that tell us where we are in nowhere" (Betsky, 2011). But the design that is ripening in mechudzu's representation may not be trying to reach ripeness. The ripe thing is the determinant of actual space for the happened and finished situation. Cantley's drawing atmosphere may be interpreted as the difference-in-itself as a questioning of yet-unripe that permeates into what has already happened. For this speculative representation, the development towards the ripening seems to be quite aware of the need to feed the rawness while it is maturing. Differentiations of becoming in Cantley's thirdspace can wander while settling and migrating, and can also be assembled in the context of any earthly life. It is revealed from the anatomical structure of the human body. "In human physiology, the interstitial space between organs and skin membrane is referred to as thirdspace. Fluid often collects here when the body is in a state of malfunction. The hollowness is designed to house internal organs, but serves as an overflow container for breakdowns of these entities. This is the thirdspace of drawing" (Cantley, 2016b).

4. Deciphering the differentiations of becoming in Bryan Cantley's projects

Cantley's three works; Placemaker / Seedplanter and Enanthiomorphic Inversions are chosen from the 'Theoretical' section of his book "Mechudzu: New Rhetorics for Architecture" (Cantley, 2011), and Sur-face Excavator[s] is chosen from the source Drawing Futures (Allen & Pearson, 2016). The reason of choice for the project of Enanthiomorphistic

Inversions is the potential of expanding the discussion through the Deleuzian reading of Lewis Carroll's Alice in Wonderland. The reason of choice for the other two projects is the deterritorialization potentials of the machinic-becomings that can create the critical dialogues of immanent escape dynamism subjectively though they are objective assemblages. However, the other representations of Bryan Cantley convey holistic philosophy in which the 'mechudzu' principles sprawl among the spatiality of his drawing narratives.

4.1. Placemaker / Seedplanter

The narratives of projects designed by any drawing encounters of Bryan Cantley differ from the architectural design norms with their transformative questions and theoretical discourses. In the section entitled 'Theoretical' in his book Mechudzu: New Rhetorics for Architecture, he presents the inversive narratives for our de-familiarizations through the FORM:uLA studio's theory-practice interface. The Placemaker / Seedplanter project acts as the architectural context healer that settles and migrates into two mechanical systems which turn into the roles of each other as an 'architecture creation machine'. "The Seedplanter is attached to a given generic architectural condition. It gathers data from the context; from the street; from the surrounding area; from inhabitants and passersby – and plugs the information back into itself. After processing occurs, epigenetic pods are planted/embedded on the site to develop into programmable architectural parasites" (Cantley, 2011).

The becoming mechanism of Placemaker / Seedplanter is also concerned with the technological and established values of contradiction phenomenon. This architecture creation machine not only uses technology as a phenomenal value but also reproduces it as a critical transformer/enquirer. Technological 'new' mechanisms of the proposal system firstly move our memories through the 'old' machine parts of mechanical objet trouvé, then drag them into future fiction with seed sowing capsules of prosthetic nanotechnology. Even more interestingly problematic is that this mechanic-formation is hesitant in migration while settling, in settlement while migrating. "The Placemaker also deals with the ideas of replicating redundant and contradictory technology. The force of a turbo-charged hovercraft system is in conflict with the grace and simplicity of the air balloon support mechanism. The tubing and ducting that supply power to the unit as well as serve as data collection conduits are fighting the cable tiebacks to ask the question - is this itinerant or fixed?" (Cantley, 2011). We can comprehend that FORM:uLA produces its instabilities regarding the contextual contradictions of the urban fragments where it is settled while learning to create and creating to learn through the collected data waves. This kind of deterritorialization "designs ways to explore the flows and to catch their vicissitudes in his surreal machinery. His structures scan, surf and superimpose information" (Spiller, 2016), (Figure 4).

The issue of superimposing the information becomes problematic in the context of Cantley's rhetoric. Architecture creation machines attempt to make sense of the information within a theoretical framework that they obtain from the experienced and scanned world. For Cantley, technology's disruption of life traditions also calls for social change. In line with this indication, various questions emerge to be asked into the virtual differentiations of the machinic scan. For instance "what is a disruptive technology? What is being disrupted - an existing physical structure; the fabric of a culture/society … the facade of an existing building or a generic mesh … comfort levels … laziness factors?" (Cantley, 2011). Does the 'generic mesh' expression criticize the orthogonal structuring of gridded organizations? Do the products of the Cartesian architectural spaces which are assigned to maintain order, represent the comfort levels? Moreover, are the assigned architectural spaces de-attendant-alized through their attendancies? It is precisely on this occasion that mechudzu penetrates its parasitic capsules into the urban context to question their causalities in the objectification of spatial objects that spread problem-

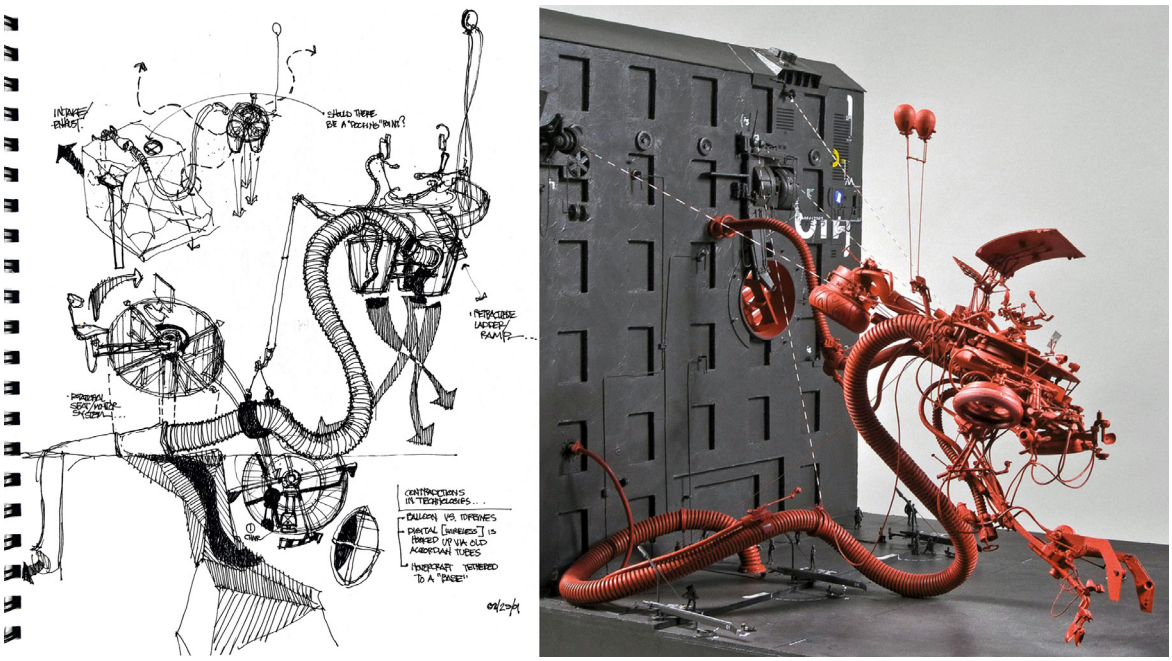

Figure 4. *Placemaker / Seedplanter (Cantley, 2011).*

atic signs and that are put into sleep. Mechudzu's machinic prosthetic-becoming continues its techno-logical criticism with all its deterritorialized contextualization. The subjectivation of 'other' machinic questionings emerges from the objectified criticism which is reconstructed from the data stream collection. "This something 'other' is conceived as a force already at work in human subjectivity, but hiding in it, and also destroying it… The action of this force follows two paths: the path of actual history and the development of technology, and the path of poetry and the poetic creation of fantastic imaginary machines. This conception demands a new thinker (a new subject of thought, 'death to the Cogito'), new concepts (a new object to be thought), and new forms of thought (which integrate the old poetic unconscious and today's powerful machines)" (Deleuze, 2004). Mechudzu's data analysis continues its questionings: "What is the disruptive social change? A new physical structure… or an adapted one? Fragmentation/rebirth/reconstruction? A new social order? An embarrassed social order? An apathetic one? Is it a new weave, blended with the old, or a completely futuristic entity? Higher comfort levels equaling higher apathy factors?" (Cantley, 2011).

The Placemaker / Seedplanter does not have discourses such as intending to start an architectural trend or aestheticizing a pioneering formation/content for the world of architectural design. While this project is learning architectural practice from the spatial components of traditional buildings where it is attached and embedded, it is also engaged in teaching architecture with its criticism. Iconizing this architectural language can staticize Cantley's differentiations of becoming. "This is only the planting device. It is not necessarily representative of the architectural language that may develop over time. The pods suggest no stylistic or formal movement. They are embryonic by their nature, with the vision of seed being as much actual as it is poetic" (Cantley, 2011).

4.2. Enantiomorphistic Inversions - Through the Looking-Glass Housing [The Alice Projects]

One of the works produced in the FORM:uLA design laboratory is entitled Enantiomorphistic Inversions. This project is based on the book 'Through the Looking Glass', which Lewis Carroll wrote as the sequel to his famous novel Alice in Wonderland. The project "equivocates the physical landscape, the narrative landscape and the landscape of the physical book" (Cantley, 2011). In this sense, including the Lewis Carroll readings of Gilles Deleuze may be meaningful

in illuminating Enantiomorphistic Inversions, which has Deleuzian becoming on many sides. "Alice progressively conquers surfaces. She rises or returns to the surface. She creates surfaces. Movements of penetration and burying give way to light lateral movements of sliding… Pure events escape from states of affairs. We no longer penetrate in depth, but through an act of sliding pass through the looking-glass, turning everything the other way round" (Deleuze, 1998).

In this project, the concepts that emerge in the braids of the event appear as transition, transformation, a reversal that traverses both sides, reflection and defamiliarization. The phenomenon of transition is shaped around/through the issue of 'postliminal fuzz', which is another conceptual creation in FORM:uLA's representation lexicon. The transformation that is becoming differentiated and blurred in the virtual field of postliminal fuzz is the transition "from: Paper Architecture to: Paper > Architecture. 'Postliminal fuzz' is a circumstance of the recognition of liminal space, the physical and conceptual properties of the drawing surface and the production of new policies based on their collision(s)" (Cantley, 2016b).

Enantiomorphistic Inversions are closely concerned with the atmospheric becoming of Alice's transformation into the differentiated dimensioning each time she passes through the various liminal spaces. In the project "the narrative landscape is one in which Alice must negotiate a checkerboard of brooks and hedges to progress to what she conceives as the end point" (Cantley, 2011). Cantley interprets the dimensions, which Alice must pass, through the x, y and z axes. The x-axis represents the movement of water in the brook. Here, with a Deleuzian approach, we can think that what is smooth in the concept of 'smooth and striated' (Deleuze & Guattari, 1987) is the movement of water in the brook. Deleuze & Guattari "define the smooth surface as the space of nomad, and in this space, there are no roughnesses, lines, layers, borders, definitions and codings. It is a slippery and smooth space" (Yavuz, 2018). The y-axis represents the task of traversing the channel. "The process of transformation also requires Alice to pass through a vertical membrane to apply / affect / restructure the fabric [the z-axis]. After Alice passes over each brook, her environment morphs into a completely alternative situation" (Cantley, 2011).

This time, Cantley's project is not embedded in the tradition of urban space, but in the contextual narrative of an imaginative book. The landscape of the physical book becomes to differentiate. "The Enantiomorph is likened to Roland Barthes' Death of the Author, in that it reverses the role of authorship to one of the scriptor/reader, as well as the way in which a cover, page, and text are distinct surfaces with radically variable meanings" (Cantley, 2011). Therefore, the initiator enantiomorphs of this project become the author and reader. The author finds its image in the reader, and the reader finds its image in the author. It is as if Alice needs her readers to be able to knit her narrative with hundreds of different pattern possibilities, to create the images of her adventure. "Alice depends on the Enantiomorph to wayfind across the x-y-z axes, but no architectural interface, no landscape, unfolds so logically" (Cantley, 2011), (Figure 5).

4.3. Sur-face Excavator[s]

For Cantley, architectural drawings which feed on actualizations of realism are shaped and reduced by the politics of the world. However, Cantley is not tended to exclude or otherize the existing built architectural environments and the drawings which enable his critical creations. He looks at the conventional architectural constructions and drawings as nurturing/enhancing case studies for the problematizations in his experiential laboratory. Cantley believes that "his drawings look at the act of drawing, the political nature of the drawing in the architectural discipline, and provide a critical pass at the role of the architect in their own work" (Cantley, 2019). At this point, focusing on the textual narrative of another becoming-representation of Cantley's drawings may be efficient to recall how everyday reality is differentiated with

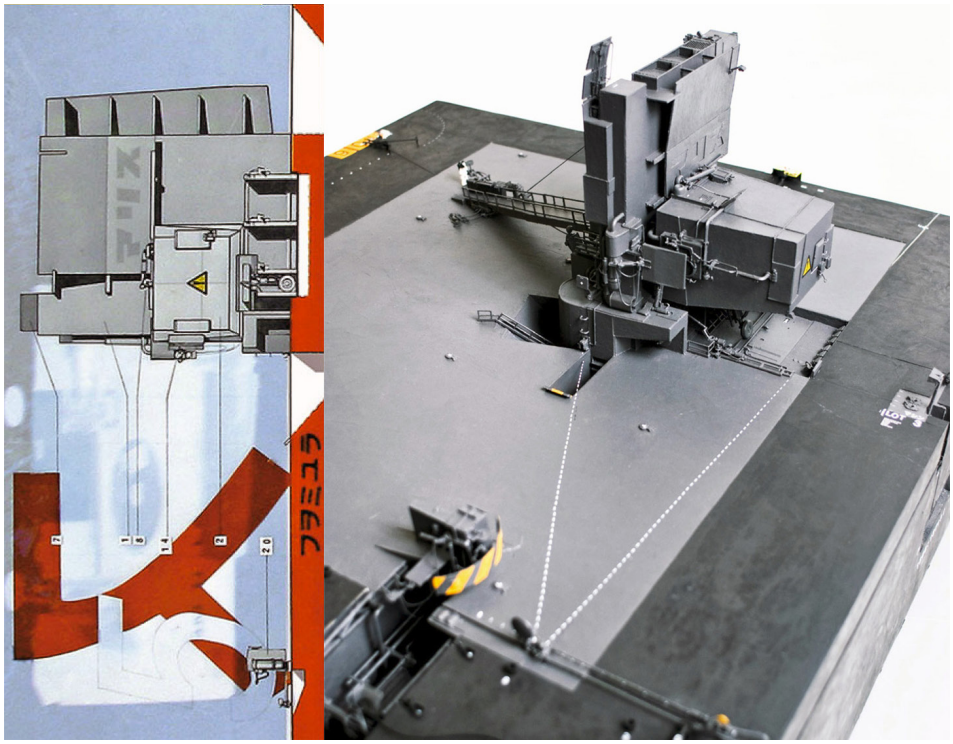

Figure 5. *Enantiomorphistic Inversions - Through the Looking-glass Housing [The Alice Projects], (Cantley, 2011).*

the virtuality of other possible worlds. Cantley's drawing project Sur-face Excavator[s] "is an attempt to construct a set of architectural and political issues that might manifest in a series of devices: mechanisms that unzipped, excavated, probed, and re-positioned the very physical and conceptual layers on which it/they were produced" (Cantley, 2016a). In this project, the 'physical and conceptual layers on which they were produced' are the layers of architectural actualities. The architectural and political issues that may arise in the device become the event of the architectural creation machine by reprocessing damaged data received from actuality. However, the machinic-becoming creates the questioning of not only repositioning but also the sequence of actions that generate. It reads both the critical plays of the sur-face context and plays of itself. Sur-face Excavator[s] which is "the exploration and in-validation of the sur-face as an intellectual and physical construct begins a series of conversations about and with the fabric of the shell itself, the space of media, as opposed to the space advocated or implied by media" (Cantley, 2016a), (Figure 6). In this event, the subjectivation of machinic-becoming with the act of subjective conversations as the object, is blurred and melted in the self-reification of the subject Bryan Cantley by himself. Because "what depends on a free creative activity is also that which, independently and necessarily, posits itself in itself: the most subjective will be the most objective" (Deleuze & Guattari, 1994).

Cantley's experimental fictions may be perceived as the creative differentiations of becoming against the conformist and uncritical architectural closed spaces and drawings of one period which are separated, do not communicate with each other and do not problematize the classical subject humanism. Cantley "combines them to create a critical representation of what is usually just the background noise to the images we consume without thinking" (Betsky, 2011). Cantley's critical representations "let them run riot across the picture plane to create cacophonies of exquisite architectural corpses. Points of view and multiple perspectives cascade across the page - the objects and their traces ontologically blurred" (Spiller, 2018). The differentiations of machinic-becoming in FORM:uLA design laboratory both

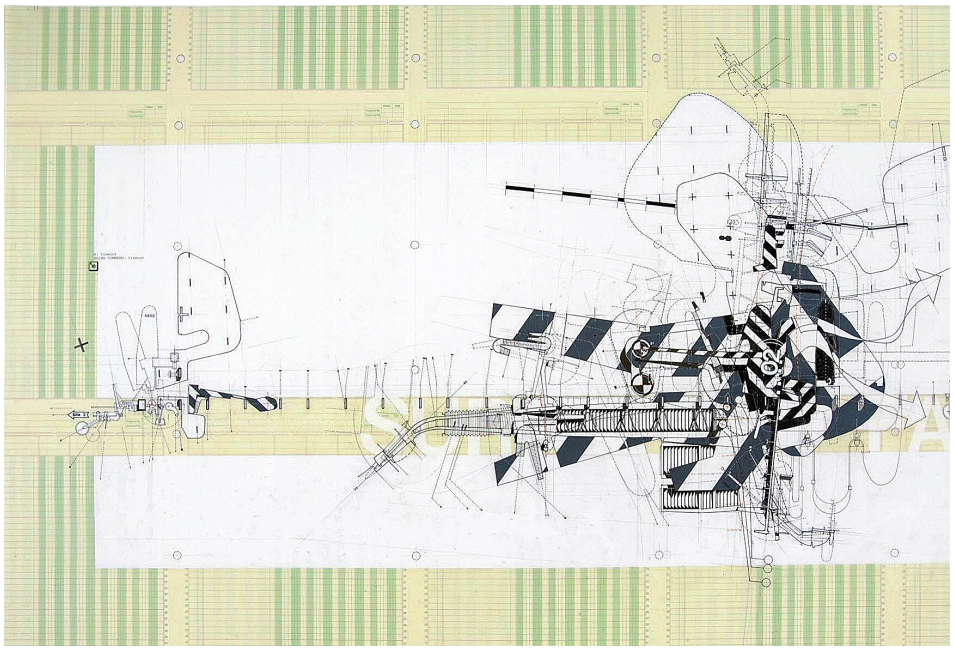

Figure 6. *Sur-face Excavator[s], (Cantley, 2016a).*

dismantle the anywhere and nowhere. "It is both site-less, and of many sites. It lies somewhere between the idea of mobility and multispatiality" (Spiller, 2011). For Cantley, a Deleuzian approach of "deterritorialization seems a natural condition to create/dwell in an experimental world. The drawings leave their territory of the architectural crisis of reduction and the architectural objects depart from their traditional aesthetic roles of 'looks like a building'" (Cantley, 2019). The montages of FORM:uLA architecture are articulated to the urban tradition by differentiating the scenarios of confronting its conservative political discriminations, deciphering the inner faces of its invisible spatial contexts, transforming them, and migrating elsewhere. It is unknowable where it will settle. The architecture of traditions everywhere calling for transformation invite Cantley to emerge the differentiations of becoming prosthetic architecture machines.

5. Conclusion

Architectural representation can be thought of as the place where theory and practice are articulated in architecture. However, the classical subject of modernity instrumentalizes architectural representation for administrative and actual building desires. Starting from the seventeenth century, the critical architectural representation medium, which is not intended to be built, begin to imagine utopian architectures and the spatialities of drawing. Since the perception of the image is conceived as the thing inside of the Cartesian subject's conscious, the desire for the actualization of the critical architectural representation medium can also be observed in the Constructivists and Expressionists in the early twentieth century. On the other hand, in this period, the liberation of the image emerges as replacing its situation from the inside of the conscious as a thing, to the outside of the conscious as an act. The solidarity of Dadaists and Surrealists in the early twentieth century causes the actualization and the virtual to mix with each other. In the mid-twentieth century, the destruction of the cities of modernity after the Second World War generates the anti-city actualization in critical architectural representation and classical subjectivity leaves its place for postmodern subjectivity. The subjective desire for critical architectural representation, shifting from the actualization to the actual, can be found in various practices until the mid-seventies.

However, this study has aimed to reveal not the *differenciation* of the actualization in critical architectural representation, but the virtual field *differentiations* of the becoming in the event.

The study required to radically escape from the historicist subject habits to discuss the becoming and differentiation of one critical architectural representation that does not approach the actualization and does not desire the actuality. For this reason, the study has explored Braidotti's posthuman critical theory with the becoming and differentiation in Deleuze's philosophy as the dismantling methodology of case study research. The posthuman subject was perceived as a thing that opens up to the cosmos by releasing the entity of its subjectivity to the intersections of all non-human things, and while doing this, it can combine criticism with creativity in the becoming of events. It has been elucidated that the field which leaves the oppositions in the predicate and contains the unpredictable creative becomings of the middle areas can reside not in the differenciation of the actualization, but the differentiation of the virtual. For this reason, the study has examined the relevant representation literature to discuss the differentiations of becoming in the virtual field of critical architectural representation, and has chosen the case studies in the representation atmosphere of Bryan Cantley, which reveals differentiating and subjectified machinic-prosthetic, object-oriented events.

The study did not encounter the classical subject actualization in Cantley's critical architectural representations. His neverendingly differentiated drawing intentions seemed causing him to give up the classical subject by melting and montaging it among the objective relationalities. The machinic-prosthetic assemblages in his drawing medium have created numerous differentiations through the unfolding of drawing sets. The being-in-itself of the architectural representation has blurred the architectural persona of the drawing subject into creative becomings by deterritorializing the drawn events. The objectivity of the becoming-machinic assemblages has exhibited posthuman criticism by problematizing the comfort levels of the urban tradition with subjectivized questions. Subjectivizing the interrogations of objective machinic assemblages has inclined Cantley to reveal his own conceptual creations. None of the events in his representations has implied the desire to be completed in the actual but implied the immanent escape dynamism in singular virtuality with the criticism of actualization. In this sense, it has been revealed that creativity in critical architectural representation may be relevant to the differentiations of becoming in the virtual by leaving the subjectivity, rather than adopting the differenciations of actualization to maintain subjectivity.

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Minding the city: A case study on the new conceptualizations of human experience in the built environment

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Abstract
The study intends to mind the city by taking the information gathered through the senses and processed in the human brain as the primary concern in understanding the human experience in the built environment. This refreshing approach deals with human behavior, perception, cognition, sensation, and emotion that requires a well-defined conceptual framework. Therefore, as the study's primary objective, minding the city investigates the conceptualizations based on human evolutionary cognitive tendencies: biophilia, bilateral symmetry, mirror neurons, pareidolia, proxemics, thigmotaxis, curvilinearity and rectilinearity. The human experience is investigated, considering it as an individual human self, interpersonal human beings, and through human-built environment interactions and human-nature interactions. The paper was designed as qualitative research employing a case study strategy to develop explanatory and exploratory empirical inquiry. The conceptualizations were studied through fieldwork using observational measurements, mapping techniques, and the declaration of participants' own experiences. The fieldwork was conducted through a serial workshop entitled 'Minding the city: Bring your brain into the built environment' in İstanbul and Famagusta in 2019. As the output of the study, the visual and verbal representations of conceptualizations and urban codes were presented and discussed with the related literature. Ultimately, the acquired knowledge applied to a theory-building structure expands the theory of human experience investigated through the idea of minding the city. In sum, the study presented evolutionary aspects of human experience in a new way by identifying generalizable patterns, presented as urban codes, occurring in the daily experience of individuals and groups.

Keywords
Cognitive sciences, Human-built environment interaction, Human-nature interaction, Human evolutionary cognitive tendencies, Neuroscience.

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1. Introduction

Research on the human experience in the built environment has extensive literature encompassing various disciplines. In the past several decades, human experience has played an essential role in architecture and urban studies with a particular interest in scientific perspectives and findings. The new perspectives based on neuroscience and cognitive sciences have become the most effective multi-disciplinary approach to studying human experience (Eberhard, 2007; Pallasmaa et al., 2013; Zeisel, 2006). Cognitive architecture (Hauptmann et al., 2010; Sussman & Hollander, 2015) and neuro-architecture (Edelstein, 2015; Frascari, 2012) have emerged as new study fields under these circumstances prioritizing the human response to environmental stimuli with a specified interest in the human brain, mind, and psyche. Therefore, it would be of particular interest to investigate human experience in the built environment through the lens of those emerging fields concerning it as an individual human self, interpersonal human beings, and through human-built environment interactions and human-nature interactions.

The present study intends to mind the city by taking the information gathered through the senses and processed in the human brain as the primary concern in understanding the human experience in the built environment. Minding the city considers Lynch's (1960) theory of reading the city as a pioneering study model. The empirical inquiry of individual human experience first appeared in Lynch's studies, mainly concerning the form of the city, and eventually ended up with an inspiring method and mind-opening theory of urbanism. Lynch (1960) prioritized the visual perception and the look of the cities in capturing the urban patterns and categorizing them with their features. However, minding the city concentrates on understanding the experiential use of an urban setting through the knowledge of the human brain. The insights of brain studies contribute to understanding the sensory, cognitive, emotional, and behavioral dimensions of human experience in architecture and the built environment. Additionally, they have provided valuable information for creating common grounds between the disciplines to conduct a systematic inquiry for understanding the human experience (Karakaş & Yıldız, 2020). This refreshing approach constitutes a relatively new area dealing that requires a well-defined conceptual framework. Therefore, as the study's primary objective, minding the city investigates the conceptualizations based on human evolutionary cognitive tendencies: biophilia, bilateral symmetry, mirror neurons, pareidolia, proxemics, thigmotaxis, curvilinearity and rectilinearity.

As humans, we come from a common evolutionary past shaping our tendencies and priorities that are primarily unconscious, innate, and hidden. The conceptualizations based on human evolutionary tendencies have been adapted from broad disciplinary studies covering biology, psychology, anthropology, cognitive sciences, behavioral sciences, neuroscience, and cognitive sciences. However, the literature relating the conceptualizations to architecture and the built environment is a maturing area with flourishing studies on cognitive architecture and neuro-architecture. Sussman and Hollander (2015) introduced the new conceptualizations in the built environment as a set of principles, including biophilia, bilateral symmetry, pareidolia, proxemics, thigmotaxis, and curvilinearity and rectilinearity. Morabito (2016) extended the set by adding mirror neurons and mnemonics. Hollander and Foster (2016) studied the concepts, named them cognitive architecture (CA) principles, to score an urban setting by using EEG (electroencephalography) measurements without reference to the subjective experience of participants. However, there is no adequate research that has investigated these conceptualizations through an empirical inquiry in terms of adding the insights of individuals on understanding the human experience in an urban setting. Therefore, we formulated the research question: "How would the human experience be understood through the new conceptualizations based on human evolutionary cognitive tendencies in a real urban setting?".

The present paper was designed as qualitative research employing a case study strategy to develop explanatory and exploratory empirical inquiry. Therefore, we used observational measurements, mapping techniques, and the declaration of participants' own experiences. A challenging problem arising in this domain is operationalizing the available knowledge for minding the city study because of the novelty of the study field. Thus, we developed two phases of the case study. First, we designed a preliminary stage which was the pilot study. Then, we conducted the main study. Both studies included fieldwork designed as workshops. After a brief on the pilot study identifying its contributions, the main study was presented in detail. The fieldwork of the main study developed for the Eastern Mediterranean University 9th International Design Week with the name "Minding the City / Famagusta: Bring your brain into the built environment." Throughout the workshop, comprehensive visual and verbal data was collected. The data were represented as multilayered and cognitive outputs, including videos, photographs, diagrams, sketches, architectural drawings, and notes. Finally, the collected data were analyzed and synthesized to produce visual and verbal representations of the conceptualizations and to generate the urban codes [1]. The final outputs of the study were cognitive maps, digital drawings, and generated urban codes developed separately for each conceptualization. They were presented and discussed within the related literature in the discussion part. In conclusion, an overall interpretation of the case study was developed.

2. The new conceptualizations

2.1. Biophilia

In 1984, Edward O. Wilson defined the term biophilia as "the innate tendency to focus on life and lifelike processes" (Wilson, 1984, p.1). Followingly, the concept of biophilia, even if it was not mentioned as biophilia specifically, has been studied in diverse study fields, including philosophy, anthropology, psychology, physiology, medicine, environmental studies, architecture, and urban studies. Briefly, biophilia is an urge, a biological need, and an evolutionary tendency to be connected to nature and other organisms. In the literature, the concept of biophilia has been discussed through the savannah hypothesis (Orians, 1980, 1986), biophilia hypothesis (Stephen R. & Edward O., 1993), connectedness to nature (Zylstra et al., 2014), attention restoration theory (Kaplan, 1995), and stress recovery theory (Ulrich, 1984; Ulrich et al., 1991) which are concerned about human mental and physical health and well-being. Furthermore, in recent years, the application of biophilic patterns to design processes has gained importance regarding psychological benefits and effects on health and well-being (Ryan et al., 2014). Therefore, we applied the biophilia concept to our study to investigate the human experience as an individual human self and through human-nature interaction.

2.2. Bilateral symmetry

Bilateral symmetry is a biological term used to explain symmetry with respect to left and right or a vertical axis that divides an organism into two identical parts (Coburn et al., 2017; Moubayidin & Østergaard, 2015). As an essential gestalt principle (Koffka, 1935), symmetry is not only one of the most crucial design patterns (Alexander, 2002) and design organization schemes but also one of the most commonly used design principles that have roots in architectural history (Ching, 2007). Furthermore, according to neuroscience studies, our brain and visual system are susceptible and responsive to symmetry (Ramachandran & Hirstein, 1999), and symmetry in things significantly affects our aesthetic judgment of beauty (Jacobsen et al., 2006). Therefore, we searched for bilateral symmetry in the built environment to study the human experience through human-built environment interaction.

2.3. Mirror neurons

The concept of mirror neurons was adapted from neuroscience studies. The mirror neurons, initially discovered in macaque monkeys' brains, are a specific group of neurons that fires

both during the execution of an action and observation of the same action while performed by others (Gallese et al., 1996; Rizzolatti et al., 1996). Followingly, mirror mechanisms were discovered in the human brain (Rizzolatti & Craighero, 2004; Rizzolatti & Sinigaglia, 2008), which is a more complex issue including not only the actions of individuals but also sensations, feelings, emotions, and mental processes of individuals. According to neuroscience studies, the functional role of mirror neurons in humans might be action imitation and action understanding (Rizzolatti & Craighero, 2004). Therefore, those functionalities may contribute to understanding and repeating the behavioral responses of individuals to certain stimuli. Furthermore, they may create an understanding of a shared experience based on individuals' actions, feelings, emotions, and intentions. We applied the knowledge derived from neuroscience studies of mirror mechanisms to the built environment to create an understanding of the human experience based on interpersonal relations.

2.4. Pareidolia

Pareidolia is one of the oldest biological traits of human beings. According to the Oxford Reference (Concise Medical Dictionary, 2010, pareidolia entry), pareidolia is the "misperception of random stimuli as real things or people," a broader term including all human and non-human characteristics. For example, the tendency to seek and recognize facial expressions in things means facial pareidolia, which is the most common type of pareidolia.

Faces are so crucial for the human perception that evolutionarily, we prioritize faces and people (Sussman & Hollander, 2015), and face perception is our most highly developed skill (Haxby et al., 2000). Furthermore, as Gallese (2022) stated, 'the face is the first means used to build interpersonal relations.' So, naturally, we tend to see faces in buildings and objects. However, in the literature, few studies relate the pareidolia concept with the design disciplines and aesthetics, which establishes its relevance for design contexts (Wodehouse et al., 2018) and its effects on human affective perception (Abbas & Chalup, 2021; Chalup et al., 2010). Therefore, we applied pareidolia concepts to our study to investigate the impact of face-like forms on the human experience through human-built environment interaction.

2.5. Proxemics

Proxemics is a spatial behavior based on the regulation of distancing between both people and tactile stimuli regarding body-space relations. The term proxemics was first introduced by Hall (1959, 1969), which refers to studying spatial relations. Hall (1969) identified four measurable personal spheres referring to a distance between two people; 1) intimate distance, less than 45 cm, 2) personal distance, ranging from 45 cm to 120 cm, 3) social distance, from 120 cm to 360 cm, and 4) public distance, from 360 cm to 760 cm. Thus, those distances become a helpful tool for understanding the human experience in the built environment. As Author (2020) explained, humans regulate their proxemic distances within the environments they are immersed in and locate themselves with personal, social, or public distance according to how they intend to perceive a building element. Therefore, we studied the concept of proxemics to understand the human experience as interpersonal human beings, human built-environment interaction, and human-nature interaction regarding the regulation of inter-relational distancing.

2.6. Thigmotaxis

Thigmotaxis is a spatial strategy used by humans and animals, which "is a way an organism organizes behavior relative to tactile stimuli" (Kallai et al., 2007). In the literature, various terms are used instead of thigmotaxis as wall-hugging, wall-touching, wall-following, centrophobic behavior, and agoraphobia (Creed & Miller, 1990; Harris et al., 2009; Kallai et al., 2007; Schnörr et al., 2012; Sussman & Hollander, 2015; Walz et al., 2016). Briefly, thigmotaxis is the tendency to stay close to the boundaries of space during spatial exploration,

which is directly related to the human experience of architectural and urban space. In architecture and urban studies, Jan Gehl, one of the most critical actors in examining citizens' public life and behavioral experiences, introduced the concept of the edge effect in 1987 (Gehl, 1987). According to Gehl (2011), people move close to the boundaries of public spaces and choose physical boundaries or threshold locations where they can see the whole area clearly while standing and sitting, a tendency similar to thigmotaxis. We investigated the thigmotaxis concept to understand the human experience through human-built environment interaction and human-nature interaction concerning the boundaries of space.

2.7. Curvilinearity and rectilinearity

The influence of curvilinearity and rectilinearity have been studied from the perspectives of various disciplines over the years, such as architecture, neuroscience, psychology, aesthetics, and neuro-aesthetics. Curvilinear and rectilinear forms as physical attributes might influence the human experience regarding behavioral, emotional, and cognitive responses and the aesthetic experience of the users. In the literature, it has been investigated through diverse topics such as the potential of triggering emotional responses (Dazkir, 2009; Madani-Nejad, 2007), approach and avoidance behavior (Vartanian et al., 2013), environmental preferences (Bar & Neta, 2006; Leder et al., 2011) and beauty judgment (Coburn et al., 2017; Vartanian et al., 2013, 2019). Most studies indicated that curve lines and forms are preferred, more beautiful, pleasing, visually complex, approachable, serene, and joyful than rectilinear shapes and forms made of straight lines. Therefore, we studied the concept of curvilinearity and rectilinearity to understand the human experience through the human-built environment interaction with the contours of a space.

3. Method: Developing a case study

We conducted a case study research design to create an explanatory and exploratory empirical inquiry. The study's explanatory target is to interpret the behavioral patterns that occurred in the experiential use of an urban setting by exploring conceptualizations based on human evolutionary cognitive tendencies. The exploratory target of the study is to investigate those conceptualizations in understanding the human experience as an individual human self, interpersonal human beings, human-built environment interaction, and human-nature interaction to apply to a theory-building structure. Therefore, the case study investigated the conceptualizations in real-life contexts by applying systematic observation, self-declaration tools, and mapping techniques to reach multiple sources of evidence. The case study was developed through sequential workshops in Istanbul and Famagusta, presented as the pilot and the main study.

3.1. Participants

We recruited workshop participants with an open call for senior architecture students. The participants of the pilot and main study have a joint team. We designed the pilot study as a workshop for architecture students studying at the University on 4-6 April 2019. The application requirements included 1) taking a photo from an urban environment representing a particular organizational scheme parallel to the ground surface and 2) writing a short essay explaining the selected vantage point. We aimed to recruit fully immersed students. Five students, three of them were 4th year, and two were master's students, were chosen. We trained the students in the course of the pilot study.

For the main study, we attended the 9th International Design Week held at Eastern Mediterranean University in Cyprus on 8-10 May 2019 with the trained students. Additionally, we recruited five new participants who applied through design week to join the study team. The newcomers were trained through the presentations and the pilot study findings. We coupled the trained students with the new participants to increase the awareness and attention levels of the study groups. It was crucial for the study's success that

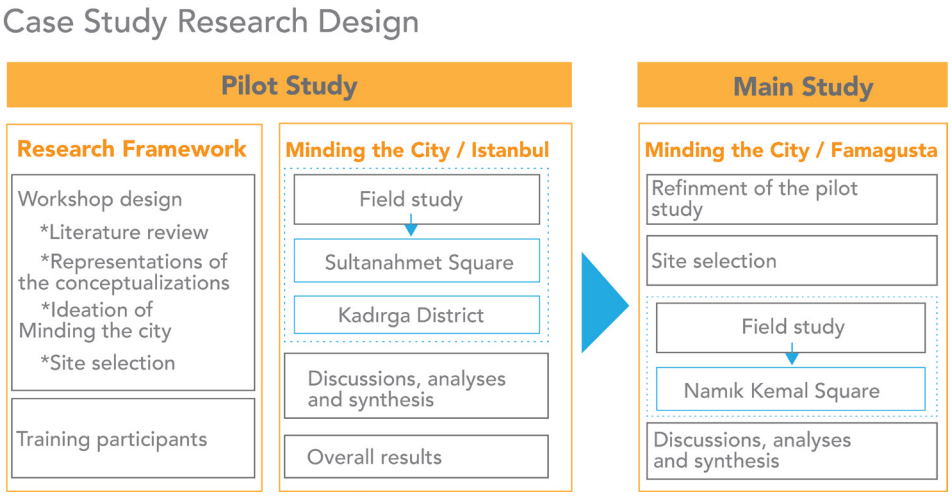

Figure 1. *The case study research design.*

the participants would be prepared for what to observe and how to make their observations and experiences explicit. Then, we assigned the concepts to each group to make them employ the arrangements in the field.

3.2. The case study research design

We designed the pilot study as a preliminary study for the main study, including the field studies and necessary preparations for future studies. The content of the whole case study research design is shown in Figure 1.

Within the pilot study, we developed a detailed study covering the requirements of the research framework and the field studies; 1) workshop design and the preparation of the workshop materials, including literature review, representations of the conceptualizations developed by the research team, ideation of minding the city, and site selection 2) training the participants. The fieldwork of the pilot study was conducted with the Minding the City / Istanbul: Bring your brain into the built environment workshop, while 'Minding the City/Famagusta: Bring your brain into the built environment workshop was led for the main study.

The workshop design has a generic three-day flow applied to both studies. The research pattern of the workshop included individual and collective processes considering both in-studio and on-site examinations. As the workshop leaders, we were next to the participants to clarify the obscurities in all the phases. However, during the data collection on the site, we had the recognized outsider position aiming not to create research bias and to observe the participants' study experiences.

On the first day of flow, the workshop starts with the presentations that include three topics; 1) What does 'Minding the City Mean?', 2) How to observe?, and 3) Conceptualizing the built environment. First, we introduce the idea of minding the city, which refers to an alternative way of reading the city. Then, we trained the students on the systematic observation and mapping techniques, the defined conceptualizations, and the production techniques of the final output. After the training sessions, we introduce the study fields' context to the participants. Followingly, the on-site process starts with the individual observations of the participants as secret outsiders and full participant positions. Next, the participants observe the user's environmental behaviors and the physical traces on the site left behind. They used mapping, counting, tracing, photographing, and sketching tools to collect the data. They searched for biophilia, bilateral symmetry, mirror neurons, pareidolia, proxemics, thigmotaxis, curvilinearity and rectilinearity, and mnemonics concepts. However, the concept of mnemonics was excluded in the course of the pilot study. The concept of mnemonics could not be studied in the flow of a three-day workshop conducted in such dense urban settings due to the mnemonics' strong refer-

ences to space's historical and narrative characteristics. Participants recorded their observations and experiences as annotated diagrams, photographs, drawings, sketches, and notes for each concept.

The second day is planned as an in-studio examination. First, the participants individually analyze their on-site observations and experiences to refine and classify the collected data. Then, the participants create digital drawings of their analyses, including the data reproduction and their insights. Next, we asked them to express their experiences as written statements identifying the conceptualizations. Finally, in the second half of the second day, joint discussion sessions are made to sync up all work done so far with the contributions of all participants.

The last day is planned as a collective work. Firstly, we revised the digital drawings produced by the participants to produce the final version of visual and verbal representations of the synthesized data. Then, we held a round-table discussion to finalize the written statements as the urban codes. First, the statements written by each participant were examined and compared one by one. Then, the non-repetitive and singular experiences were eliminated. Ultimately, the written statements based on the shared experiences were generated as urban codes framing the human experience in the built environment through human evolutionary cognitive tendencies.

3.3. The pilot study

Conducting a pilot study was required for many reasons. Firstly, studying a novel topic in the design disciplines demands more attention; for this reason, examining it in an existing environment reveals the knowledge for implementing it in practice. Secondly, developing a pilot study allows adding the participants' perspectives on the existing literature, enriching the study field for future studies. Thirdly, we practiced our research design's efficiency to maximize the main study's accuracy. Finally, it created the opportunity to work with experienced participants.

In the scope of the pilot study, we organized two field studies in Istanbul with different qualifications; 1) A linear route ending with a small-scale urban park, Kadırga District (Pier Loti Street and Kadırga Square), 2) A large-scale touristic square, Sultanahmet Square. The aim of selecting two sites is to compare the pros and cons for efficiently examining the conceptualizations. In addition, the participants marked the locations where they had experienced and observed the conceptualizations on the sites to gather location-based data. According to the results of the two study fields, we would be able to plan well-organized fieldwork for the main study.

We applied the three-day workshop flow to the Minding the City / Istanbul: Bring your brain into the built environment workshop. First, we introduced the study fields to the participants. The upper image of Figure 2 shows the locations of the sites. Kadırga District is a residential area with a port used for galleys and has a strong neighborhood culture. Sultanahmet Square is a tourist area including significantly important historical landmarks such as Blue Mosque and Hagia Sophia and a large hippodrome area. Sultanahmet Square is also named "Hippodrome of Constantinople," referring to its usage during the Byzantine.

The fieldwork was continued according to the workshop flow. The participants attended all individual and collective processes, both in-studio and on-site. As a final output of the study, the participants produced visual and verbal representations of the conceptualizations and the generated urban codes for two study fields. The final session, which was the overall discussion, contributed to the main study;

- Creating focused groups for each concept would be more beneficial to increase the quality of the outputs.
- Linear routes have many distractions, such as cars and bicycles, which change and affect the human experience.
- The users of a residential district are so familiar with the site that it causes an unheeding relationship with the built environment.
- Touristic squares supply more data

because of the number of users and the liveliness of the space. Additionally, the users of touristic squares generally stay in place to experience the whole space and create precise interactions with the site that make touristic urban squares more efficient for examining conceptualizations.

- Touristic squares are surrounded by designed architectural and urban features that contribute to understanding the human experience concerning the artificial features of the built environment.
- The scale of the square affects the quality of the final output. Sultanahmet Square has so many attributes that make it unable to handle the data causing a shift in the focus of the study.

3.4. The main study

The main study was designed based on the feedback obtained from the pilot study. Within the knowledge gathered from the pilot study, we decided to study an urban square in Famagusta for the main study, which is touristic but smaller than Sultanahmet Square; Namık Kemal Square matched our criteria.

The refinements of the pilot study include the elaboration of the research framework. The novelty of the concepts to the participants and the architecture discipline created some challenges. The participants recognized biophilia and pareidolia concepts because they were easy to picture in their minds. Bilateral symmetry, curvilinearity and rectilinearity were well understood because of their familiarity with design disciplines; however, mirror neurons and thigmotaxis required extended literature research concerning the relational studies with architecture. Unexpectedly, finding the proxemics concept in the built environment and classifying the collected data caused some conflicts as it was hard to measure precise distances between moving individuals and groups. Therefore, we developed standards for the interpretations of the data regarding the visualization through draft drawings. In the training session, we informed the participants about defined arrangements, including the type of experience, what the question should be in mind, and the sub-components based on the characteristics of the experience. Table 1. shows the detailed arrangements for each conceptualization. Eventually, we conducted the fieldwork as defined in the workshop flow.

Figure 2. *The maps showing the pilot and the main study fields.*

3.5. The location and context

Namık Kemal Square is located in the old town area of Famagusta, shown in the bottom image of Figure 2. There are historical places such as Lala Mustafa Pasha Mosque around the square. Lala Mustafa Pasha Mosque is a significant historical landmark mainly built as a catholic cathedral; then converted into a mosque in Ottoman times. This gothic-style building frames the square. The modern-style small buildings are also located around the square. One of the entrances of the square has an arched stone gate.

Namık Kemal square is located in the center of the old town. The roads leading to the square are mainly occupied by commercial and public buildings that make the square significantly crucial for tourists and locals. Additionally, the roads are pedestrianized to leave spaces for public events that create more livable environments. Thus,

Table 1. *The detailed arrangements for the conceptualizations.*

CONCEPTUALIZATIONS	HUMAN EXPERIENCE	THE QUESTION (what to look for?)	SUB-COMPONENT
BIOPHILIA	Human-nature interaction Individual human self	How do people behave around natural elements?	Sun effect Greenery effect Water effect Animal effect
BILATERAL SYMMETRY	Human-built environment interaction	How do people perceive symmetrical designes, patterns and organization schemes?	Symmetry axis Spatial symmetry Object-based symmetry
MIRROR NEURONS	Interpersonal human beings	How do people behave around other people?	Individual behavior Group behavior
PAREIDOLIA	Human-built environment interaction	How do people perceive the face-like forms?	Architectural elements-based face perception Object-based face perception
PROXEMICS	Interpersonal human beings Human-built environment interaction Human-nature interaction	How do people regulate inter-relational distancing?	Intimate distance Personal distance Social distance Public distance
THIGMOTAXIS	Human-built environment interaction Human-nature interaction	How do people move/behave around the boundaries of space?	Floor covering effect Border effect Edge effect-vertical Edge effect-horizontal
CURVILINEARITY AND RECTILINEARITY	Human-built environment interaction	How do people interact with the contours of space?	Curved edge effect Sharpen edge effect

the square's potential users and characteristics are appropriate for conducting fieldwork concerning the human experience.

3.6. Fieldwork and the final outputs

For the fieldwork, we applied the three-day workshop flow. First, the grouped participants visited Namık Kemal Square for fieldwork. They observed the human behaviors and the physical traces around the square. Additionally, they followed their own experiences to understand how they reacted to the built environment according to the defined arrangements.

They documented their insights about other people and their environmental features, behaviors, reactions, and current situations. Their routes were crossed from time to time, and they were also aware of their reactions to each other. The site observations took five hours. During that time, they mainly conducted individual and subgroup work. Recognizing the users' behavioral responses as defined in human evolutionary cognitive tendencies amazed the students. Additionally, they realized that they were experiencing the site the same way, consciously or unconsciously. They enjoyed going deep into their daily experiences and observing others' experiences through the eyes of their evolutionary past. Finally, each group cataloged the collected data with the name of the assigned concept and documented their data as written statements. On the second and third days, in-studio sessions were held to develop an analysis of and synthesize the collected data. Additionally, we met separately with each group to discuss the participants' insights on the assigned conceptualizations. Consequently, they transformed their observations and experiences into meaningful statements to generate urban codes of Namık Kemal Square.

The final output of the study included the production of the visual and verbal representations of the conceptualization and the urban codes for Namık Kemal Square. First, the participants developed both a general site map and individual maps for each concept to mark their observations and experiences in a location-based manner. Then, the groups reproduced the collected data as digital drawings representing the situation that occurred at each location. Finally, they generated the urban codes as written statements for each situation. The final product was prepared as posters representing cognitive maps, digital drawings, urban codes, and a video film showing fragments from the workshop. The final outputs were presented at the closing ceremony of the EMU 9th International Design Week (Karakaş & Dumlu, 2019).

3.7. Results and discussion

In this section, the results of the case study were illustrated for each conceptualization through the final outputs of the main study. However, the concept of bilateral symmetry was better studied at Sultanahmet Square than in other fields due to the size of the square. In addition, Sultanahmet Square provided enlarged vistas and longer symmetry axes to follow reaching a place, accompanied mainly by well-designed landscape features that enhance the symmetry perception.

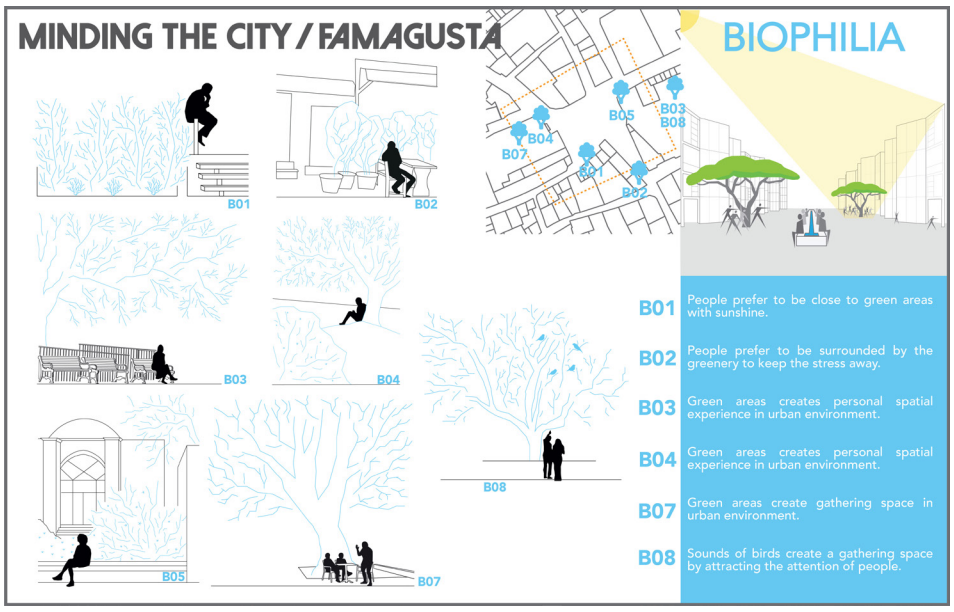

Figure 3. *The biophilia concept.*

Therefore, the pilot study's findings concerning bilateral symmetry were added to the discussion. Finally, the key findings were summarized, and the results were interpreted within the related literature.

3.7.1. Biophilia

The findings of the biophilia concepts showed that it has an appreciable impact on the human experience as human-nature interactions and an individual human self. The research on human-nature interaction has a long tradition in many areas of science. For example, Joye (2007) stated that although there are various perspectives based on the areas of psychoevolutionary, geography, or paleoanthropology in the study of human-nature interactions, these perspectives suggest a common theory on evolutionary processes of human cognitive tendencies toward nature. The theory briefly is that humans have positive affiliations with a specific set of natural elements. Additionally, Ulrich (1991) explained the positive effect of natural elements on stress reduction as restoration. He identified the green areas, sunshine, and water elements as preferable for the personal spatial experience. Figure 3 shows the findings of the present study.

In line with previous studies, it is revealed that humans prefer to be close to natural elements such as greenery, sunlight, water, and animals for sitting, resting, and gathering individually and in groups. Additionally, the multisensorial dimensions of human experience are highlighted based on the sounds of birds, the smell of flowers, and the tactility of plant tissues. Going beyond the previous studies, we obtained the capability of the biophilic features from the findings to create a personal spatial experience in the urban environment. This experience offered individuals the opportunity to turn inward for self-reflection and thus provided an individual experience of the human self.

3.7.2. Bilateral symmetry

Bilateral symmetry was mainly studied through the artificial features of the study fields to examine symmetry perception based on symmetrical designs, patterns, and organization schemes. Spatial and object-based symmetry were detected at different scales ranging from a portal to a massive historic building. Figure 4 shows the bilateral symmetry found in Famagusta and Istanbul.

In the study of bilateral symmetry, the urban squares provided an excellent context where the key findings emerged. In the literature, the importance of being distant to perceived symmetry was stated by Salingaros (2020) that symmetry perception increases when experiencing from a

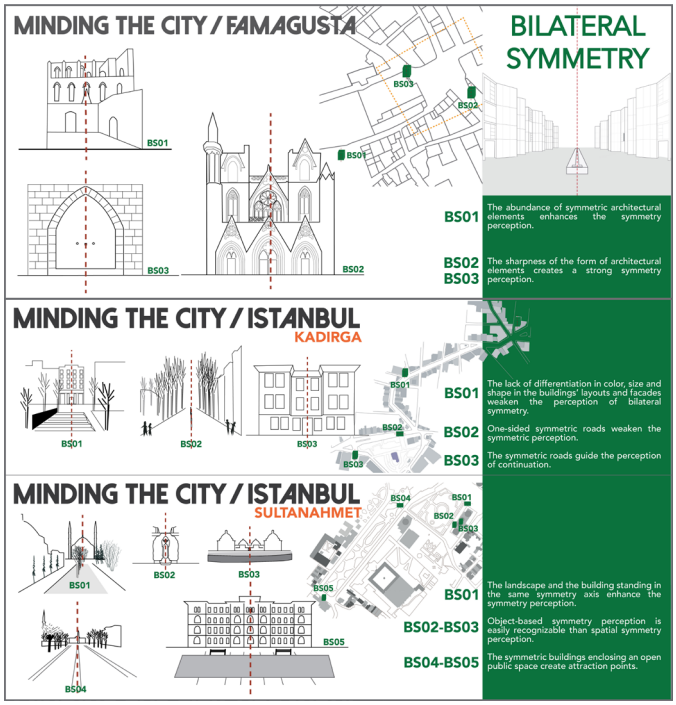

Figure 4. *The bilateral symmetry concept.*

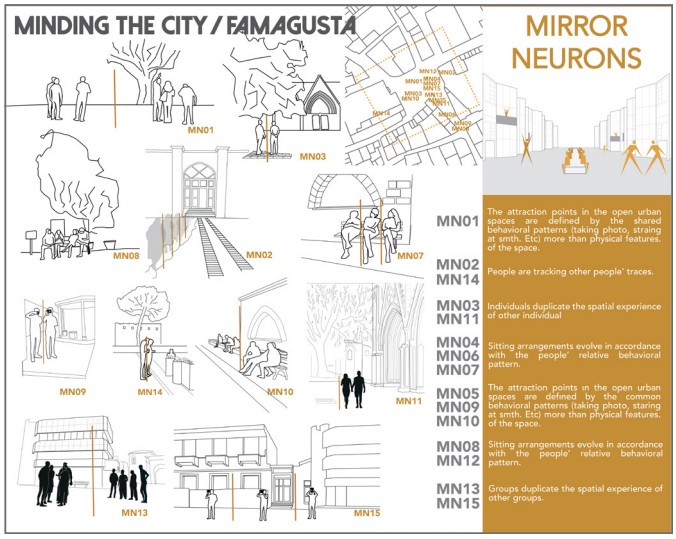

Figure 5. *The mirror neurons concept.*

distance, even if the strength of the perceived image decreases. Additionally, Salingaros (2006; 2010;2020) and Salingaros and Sussman (2020) mentioned the importance of using a coherent pattern, contrast, complexity, engagement, emphasized vertical axis, and multiple sub-symmetries based on the knowledge of our evolutionary past, biological origins and the neural circuits of our brains. In line with those studies, one of our findings supports and furthers that perceiving a building from a distance surrounded by a symmetrically ordered urban landscape using the same symmetry axis enhances symmetry perception. Another promising finding of our study showed that the lack of differentiation in color, size, and shape in the buildings' layouts and facades weakens the perception of bilateral symmetry by creating an endless repetition.

On the other hand, even in the absence of complete symmetry, the repetition of horizontal and vertical sub-symmetries creates a kind of symmetry perception. Additionally, it was revealed that the sharpness of architectural elements might enhance the symmetry perception. Lastly, it was found that the symmetrical building enclosing a public space becomes an attraction point.

3.7.3. Mirror neurons

Even though mirror neurons are a controversial topic in neuroscience studies regarding how the mechanisms develop in the brain, it is evident that mirror mechanisms can be observed through behaviors. Therefore, the present paper focused on evaluating the observational traces of action imitation and action understanding in the built environment (Rizzolatti & Craighero, 2004). Concerning the mirror neurons concept, human experience was searched through the acts of interpersonal human beings. The individual and group experiences were documented as relative and shared, as shown in Figure 5.

The findings revealed that humans tend to duplicate the behavior displayed by other humans in the built environment even if they do not know the logic behind the behavior. They imitate actions like taking photographs, stopping and staring at something, or standing at a spot by following the other's actions individually or in groups. Especially if there is an architectural landmark on the site, shared behavioral patterns occur around them instinctively. Additionally, people orient their actions by understanding others' actions and intentions, like following the physical traces left behind and tracking other peoples' traces.

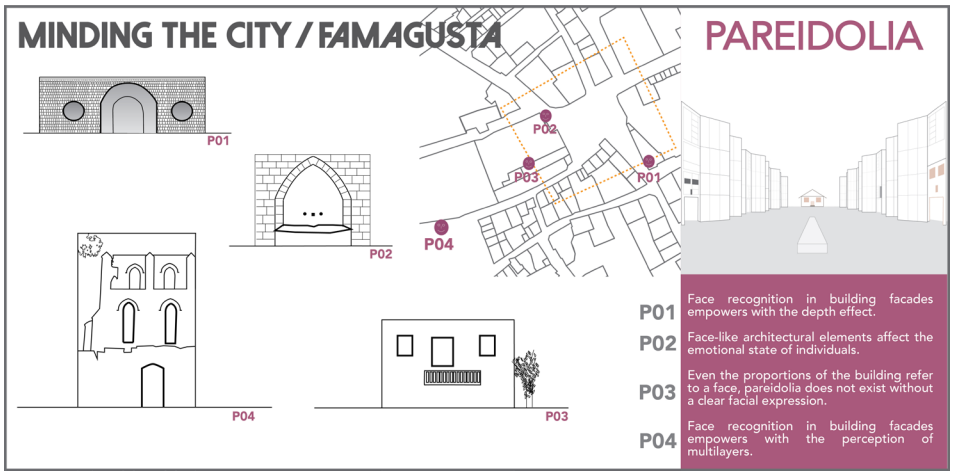

Figure 6. *The pareidolia concept.*

3.7.4. Pareidolia

The pareidolia concept was investigated through human-built environment interactions seeking to find the pareidolia effect in architectural elements and urban artifacts. We followed the hypothesis of Chalup, Hong, and Ostwald (2010), explaining the perceptibility capacity of abstract face-like forms in architectural elements and their potential to evoke emotions from observers. It was inferred from the study that face-like architectural elements are highly recognizable, including shape and emotion recognition. The findings are presented in Figure 6.

One significant result of the study is that the participants look for not only facial features but also facial expressions, which impact their emotional experiences. Furthermore, the illusion of seeing face-like features around the built environment becomes a game-like experience, so looking for pareidolic features in urban space creates a positive environmental experience that triggers certain emotions in people. Additionally, the identification of pareidolic elements only appears in the case of perceiving a clear facial expression, even the proportions of the building proper. Finally, it was revealed that the multilayered elements of building facades enhance the pareidolia effect.

3.7.5. Proxemics

Carmichael & Lockhart (2012) and Hall (1963) defined proxemics through the investigation of the action of increasing or decreasing, basically regulating, the interpersonal distance and the distance between humans and their surroundings. We studied proxemic behavior by accepting their definitions and following Hall's distance categorization: intimate, personal, social, and public. Figure 7 indicates the variety of distancing options found on the site.

The results revealed that the arrangement of urban furniture, the size of the space, the topographic features of the space, the presence of attraction and vantage points, and the greenery affect the proxemic behavior of human beings. The form and the arrangements of the benches change the personal distance. At the same time, the size of the square may demand more intimate relations between the groups, altering social and public distancing. Additionally, it was observed and experienced

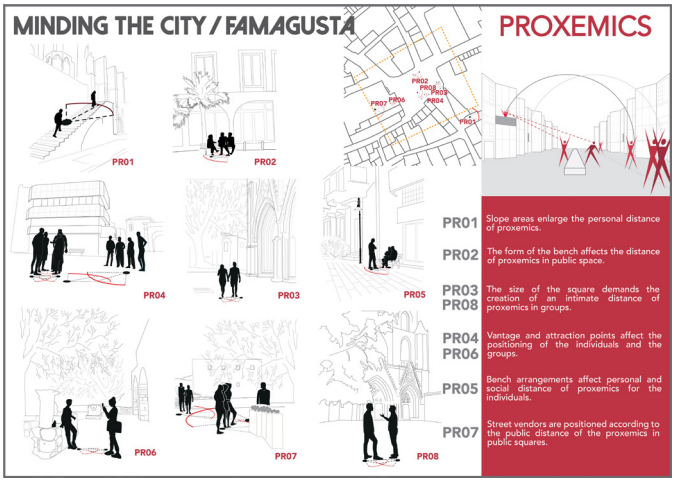

Figure 7. *The proxemics concept.*

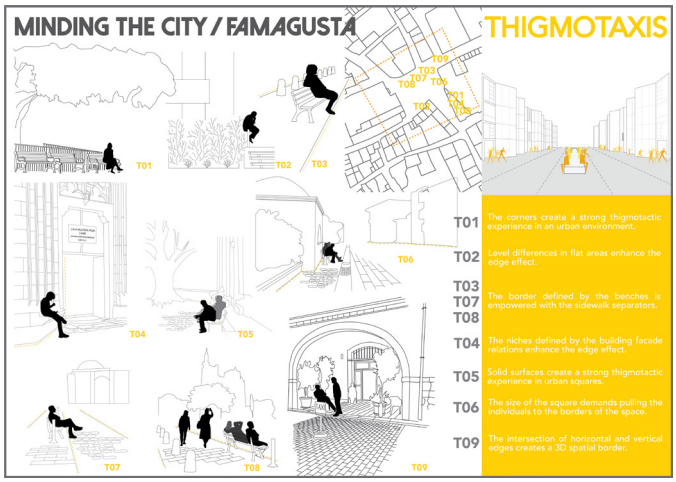

Figure 8. *The thigmotaxis concept.*

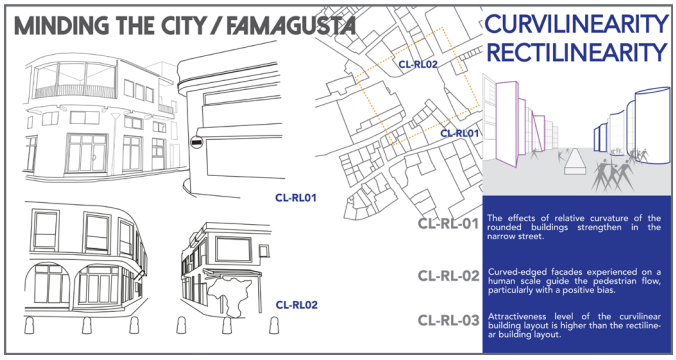

Figure 9. *The curvilinearity and rectilinearity concepts.*

that walking in the slope areas requires larger personal distancing. The presence of attraction and vantage points and the trees have the most significant impact on the human experience as distancing by creating gathering points.

3.7.6. Thigmotaxis

The boundaries of a space significantly influence human preferences for the experiential use of space. Kallai et al. (2007) identified thigmotaxis as an essential element of spatial cognition and emotionally guided, safety-seeking behavior, while Walz, Mühlberger, & Pauli (2016) associated thigmotactic behavior with agoraphobia, a pathologic fear of open spaces, and anxiety sensitivity. In architecture and urban studies, the edge effect, which has similar references to thigmotaxis, is identified as a preference for the use of urban space (Gehl, 2011). We studied the concept by examining the floor coverings, borders, and vertical and horizontal edges of an urban setting. Figure 8 shows the thigmotaxis experiences of users in Namık Kemal Square.

The elements of space creating a thigmotactic experience vary from a niche on the building facades to the line on the street and the level and material differences on the floor and facades. The surface's solidness or transparency significantly impacts the thigmotactic experience. It was revealed that people prefer to sit and watch the square next to solid surfaces. In addition, coupling the thigmotactic elements of space, such as using intersected vertical and horizontal edges and repetitive bench arrangements with the sidewalk separators, intensifies the thigmotactic experience. Lastly, the size of the space stimulates people towards tactile stimuli, as proxemics tend to do. Therefore, it demands pulling individuals to the border of space.

3.7.7. Curvilinearity and rectilinearity

The quality of the contours of space affects the experiential use of an urban setting. In the present paper, interaction with the contours of space is studied with a specific interest in the curvilinearity and rectilinearity concepts. Bar and Neta (2007) found that people prefer everyday objects with curved contours over sharp-angled objects. Additionally, Nanda et al. (2013) explored the impact of contours on emotions through the neuro-architecture paradigm with a particular interest in curves vs. sharp angles. After reviewing many studies concerning the impact of visual stimuli on the human brain, they proposed hypotheses on the impact of curvature as a visual property evoking emotional responses in the limbic system and affecting the individuals' emotional experiences. The people's interactions with the curved and sharp contours of space are shown in Figure 9.

The curvilinearity and rectilinearity of space affect the users' movement and emotional states and the attractiveness level of that space. It was found that the curved elements of building facades experienced at a human scale significantly affect pedestrian preferences with a positive impact. Furthermore,

the attractiveness level of curvilinear forms is higher than that of rectilinear ones. Additionally, the effect of curved shapes changes according to the relative distance. For example, it increases in the narrow streets.

4. Conclusion and future work

The present paper investigated the human experience in multiple urban settings by using the knowledge of the human brain to mind the city through new conceptualizations based on human evolutionary cognitive tendencies; biophilia, bilateral symmetry, mirror neurons, pareidolia, proxemics, thigmotaxis, curvilinearity, and rectilinearity. The insights of individuals on the conceptualizations concerning the experiential use of urban settings were presented through an empirical inquiry. Therefore, the case study research design was developed and applied.

In this particular study, the knowledge derived from various disciplines was applied to the architectural and built environment studies to develop an experiential case investigating human experience as the individual human self, interpersonal human being, human-built environment interactions, and human-nature interactions. The shared behavioral patterns were explained and exhibited as statements converted into urban codes, which provide fundamental material for an enriched human experience in the built environment. The urban codes were presented as the final output of the fieldwork. Ultimately, the acquired knowledge applied to a theory-building structure expands the theory of human experience investigated through the idea of minding the city.

Our findings indicated that the human experience is mainly shaped by the shared behavioral patterns identified by the human evolutionary cognitive tendencies, whether consciously or unconsciously. It briefly means that people experience an urban setting by keeping the other people and the environmental features in mind and regulating their responses to them through the defined conceptualizations. Additionally, the awareness of the concepts creates an enriched and conscious experience that provides more immersed interaction with the urban phenomenon and results in higher recognition of the human experience. The impact of some concepts is more potent than others and easy to recognize. However, some concepts can only be perceived through the eyes of an outsider or through retrospective investigation of self-experience. For example, the biophilic tendencies of human beings are more apparent than all the other concepts, so the relationship with the natural elements is observed and experienced with full awareness.

Similarly, the concept of thigmotaxis has a strong influence on human beings. Participants both found and defined their interactions with the borders of space with clarity. Additionally, bilateral symmetry, curvilinearity, and rectilinearity concepts are easily perceived due to their clear visual cues and evaluated by their significant impact. However, recognizing the pareidolia concept increases with the raised awareness of participants; the more carefully they look around, the more faces they find in the built environment. On the other hand, the proxemic experience of individuals and groups is recognized both at the time of the experience and retrospectively. Observing and defining proxemic tendencies in public space is complicated due to the possibility of creating biases in the interactions of familiar and unfamiliar individuals and groups. Finally, the concept of mirror neurons is mainly perceived by the retrospective investigation due to its highest abstractness level. The participants identified precise behavioral relations based on the imitation and the understanding of the behavioral patterns of individuals and groups. However, they had difficulty making sense of the data and expressing them as written statements. The discussions concerning this peculiar occasion suggested that empathizing with others and adapting to a specific environment might occur even before we intend to do.

In conclusion, minding the city improved the available knowledge of the human experience through the urban

codes. It provided valuable insight into the investigation of the new conceptualizations that emerged in the neuro-architecture and cognitive architecture studies. Additionally, the study presented the evolutionary aspects of human experience in a new way by referring to generalizable patterns in the experiential use of urban settings through the human perceptual, cognitive, sensational, and emotional responses.

The idea of minding the city suggests an alternative way of reading the city through the knowledge of the human brain, which is still in its very early stages requiring lots of future work. Future studies should consider focusing on a single concept to study more deeply. However, developing a holistic view of human evolutionary cognitive tendencies in experiential and experimental studies should be a concern. Furthermore, the concept of mnemonics, which we mentioned in the pilot study but has not been studied yet, should also be investigated. Lastly, future studies should be developed with more trained participants through varied fieldwork.

Endnotes

[1] The term 'urban code' was first used by Mikoleit and Pürckhauer (2011) in the book Urban Code: 100 Lessons for Understanding the City, a set of written statements on the experiential use of an urban setting.

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Changing the identity of a place by changing street names: The process of renaming the streets of Üsküdar between 1927-1934

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Abstract
Street names are part of our everyday lives. People constantly encounter street signs during their daily practices. Their visible position in the urban landscape makes street names suitable to use as visual/linguistic signifiers of cultures, histories, values, and ideologies. Renaming streets is one of the first actions of the new regimes to create their ideological hegemony in the territories they rule. It is essential to resolve the conflicts between urban memory and the sovereign's history to legitimize their geographical claims by changing anything that does not match with their mental constructs in the urban landscape. This article provides a critical discourse analysis of the relationship between space, place, identity, urban memory, and street names by examining the alteration of street names in Üsküdar, a district of Istanbul, between 1927 and 1934. Even though Üsküdar was one of the regions where the minorities lived exceedingly in the Ottoman period, in the current Üsküdar identity, there are only a few traces left of its former inhabitants. Hence, in terms of redefining identity, Üsküdar can be considered a prominent example compared to the other regions the minorities lived in Istanbul. The primary source for this inquiry is Osman Nuri Ergin's *İstanbul Şehri Rehberi (Istanbul City Guide)*, which was published in 1934. Archival documents and newspaper articles about street name changes are also used in this research. The relationship between socio-political transformation in Üsküdar and changes in urban toponymy is investigated in this study.

Keywords
Place, Urban history, Urban memory, Üsküdar, Toponymy.

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1. Introduction

Space is always under construction; it is open, multiple, relational, unfinished, and always becoming (Massey, 2005). Street names are part of space; just like space, they are not fixed, always in the process of being made. They are constituted with space. In the natural process, street names appear as reflections of local people's spatial knowledge, which they gained with everyday practice. City planners usually assign the names that are already in the use of local people to describe the street. Local people determine these names based on their experience with the place. As Massey (1995) mentions in *Places and Their Past*, we think of places mainly in spatial terms when we are asked about them. There, in front of that, across that, near this. These are the words we use to address the location of a place, and "that" and "this" are the reference words used in the street naming process. In that sense, street names are valuable data sources where characteristic information about the city can be read.

In *Arcades*, Walter Benjamin (1999) says that street names turn the city into a linguistic cosmos. However, street names are not only linguistic elements of a city but also a part of spatial politics because spatial knowledge is not the only thing considered in the street naming process. The city can also be read as a topography of a collective memory of mnemonic symbols and traces (Weigel, 1996). Street names can be used to remind specific historical events, figures, and ideologies and reference a static slice of time. Nation-states use street names to create nation's political space. According to Anderson (1983), nation-states are imagined communities that are not based on territories, but rather on mental constructs. The reproduction of the collective memory of the past is one of the critical elements of the nation's imagined identity (Mills, 2010). Nation-states use the power of symbols, images, narratives, monuments, and street names to build a shared identity, i.e., in Berlant's words "national fantasy" (Berlant, 1991).

At the end of the 19th century, with the establishment of nation-states, the extensive nationalizing processes of place names began. Large-scale renaming processes that occurred in the Turkish, Greek and Bulgarian nation-states established with the disintegration of the Ottoman Empire can be given as an example. The name changes in this period are essentially the result of political changes and national identity problems. In this respect, changes in street names are essential in understanding the political process in cities at the end of the 19th century and in the 20th century.

Nation-states change street names to avoid the conflict between urban memory and nation's history. Nationhood expresses the idea of people who share the same culture, usually the language, history, and sometimes religion (Barnard & Spencer, 2010). Shared history, altered by the nation-state, often clashes with the urban memory of the space the nation-state claims. Collective amnesia supported by the state creates conflicting memories of the struggle for representation in the city (Mills, 2010). Therefore, except for the shared cultural and historical values determined by the nation-state, others must be deleted. Everything that expresses otherness should be changed, rendered meaningless, or destroyed. The cultural structure and the built environment, which are based on the natural environmental conditions and social environment, produce the urban identity together (Ünlü, 2017). The state tries to alter urban memory by changing street names, which also leads to a change in urban identity.

To illustrate, during the Early Republican period, the newly established Turkish nation-state aimed to redefine Turkish culture and nation by erasing the traces of the Ottoman Empire and promoting a new modern-secular lifestyle. The modernization of Turkey under secularism aimed to transform Ottoman society with reforms, destruction of political figures, symbols, and institutions related to its past. In this regard, one of the most significant changes was rewriting the new nation's history. Similar to the other revolutionary regimes, the Kemalist regime saw the urban landscape and architecture as visual indicators of cultural mod-

ernization (Gül, 2009). New planning schemes were put into the republican reform agenda, which meant the transformation of the urban landscape spatially, economically, and socially. Also, the street names and public squares were renamed to impose the new language of the secular republic, which is a sign of the rewritten history for the new generation in the urban landscape. The new public spaces had a political significance in making the national history of the new republic.

The Ottoman Empire was a multinational empire where people from different *millets* lived together. The *Millet* system was an administrative structure in which religious dignitaries governed each religious group within the framework of their religious rules. Individuals in the community lived according to the spiritual, financial, and administrative authority of the *millet* they were born in. *Millet* leaders were responsible for the fulfillment of the duties of the community members towards the Sultan. With this system, which lasted until the First World War, non-Muslim communities who lived under the Ottoman Empire's rule could preserve their religion, traditions, cultures, customs, and languages (Kenanoğlu, 2017). At the end of the 19th century, 56.4% of Istanbul's population consisted of Turks; 22.3% were Greeks; 15.3% were Armenians; 4.4% were Jews; and the remaining 1.6% consisted of Albanians, Kurds, Serbs, and Christian Arabs (Karpat, 2010). In the following period, with the advent of nation-state movements, internal turmoils, the First World War, and the occupation of Istanbul by the Allied Forces, minorities in Istanbul started to be identified with the economic, political, and social problems that accelerated the collapse of the Ottoman Empire. After the proclamation of the new republic, they were perceived as traitors and unpleasant reminders of the Ottoman Empire. The existence of minorities conflicted with the state's Turkish-Muslim nation ideal. The new nation-state was organized under the concept of one flag, one nation, one homeland, and one language. In the 1920s and 1930s, anti-minority linguistic and economic policies of Turkification were effective. Significantly, the Turkish language was seen as a key to being an actual Turkish citizen. "*Vatandaş Türkçe Konuş!*" (Citizen Speak Turkish!) campaign and the change of the non-Turkish or non-Muslim street names are the results of this understanding. Changes in urban space result in urban memory changes (Ringas & Stefanidakis, 2011). The contact between individual memory and urban memory is interrupted by alterations in street names. This mass identity erasing operation excluded the ethnic minorities who lived in the places they were born, raised, and lived. Mental boundaries created by the nation-state were imposed on the streets, and they redefined urban memory and identity in these places.

According to the 1914 census, Üsküdar, which once had a non-Muslim/Turkish minority of 38.89% in its population, was one of those places in Istanbul (Sakin, 2008 as cited in Erkan, 2015). Based on the latest municipal election results [1], today, people who live in Üsküdar dominantly favor conservative, nationalist, and religious (Islamic) rhetoric. As for the built environment, except for the few churches, synagogues, and an Armenian High School, which are certainly not the first significant structures that come to mind when one mentions Üsküdar, traces of the former non-Muslim/Turkish residents have been lost from the urban space. Therefore, Üsküdar can be taken as a noteworthy example in terms of redefined urban identity.

This article uses a trans-disciplinary approach that draws on any discipline that deals with space, place, identity, urban memory, and street names: mainly geography, urban studies, toponymy, and social sciences. It provides an approach that rests on the idea of a constitutive and dialectical relationship between street names and urban identity. The main data source of this study is *İstanbul Şehri Rehberi (Istanbul City Guide)* written by Osman Nuri Ergin (1934). The article analyzes the lists of Istanbul's old and new street names in this book. The main focus of the article is the street name changes in Üsküdar between 1927 and 1934. The article classifies these changes under six categories: changes made to delete

non-national names, to replace recurring names, to correct names, directions and typos, to shorten long names, to change vulgar names, and to reference the nation's identity. In addition, Presidency of the Republic of Turkey's Ottoman Archives and the archives of Cumhuriyet, Akşam, and Hakimiyet-i Milliye newspapers were searched to find related documents and articles to support the inquiry. The reason why Üsküdar is the focal point of this research is that although it was one of the regions where the non-Muslim population lived predominantly during the Ottoman period, there is very little information about its former inhabitants in the identity and landscape Üsküdar has today. This research examines the relationship between this social change in Üsküdar and the changes in urban toponymy.

2. How are street names determined?

Signs of street names are reference points of a place. Street names usually reflect spatial knowledge with one to three words, which local people gain through their everyday practices in a place. Personal relations and experiences are significant for remembering places (Gürleyen, 2018). To illustrate, imagine a street where bookstores are usually located. While passing through this street, the first piece of information one will learn about the street will be that there are mainly bookstores on this street. Of course, this information will also be obtained and remembered by other users of the street. When one wants to describe this street (for an address or any other purpose), they will probably say: it is the street where the bookstores are located. Other users will also repeat this, and the street will begin to be described as a street of bookstores at one point. While determining the street names, the words used by the public to describe the street are primarily the first choice of the planners and public officials. However, these words may have been used to describe more than one street in the city. In such a case, what is done would be to refer to secondary words describing the street or to add the name of the region where the street is located. For example, if there is also a famous florist on the street of bookstores, this street may be named Flower Street. However, in the absence of such secondary information, the possible confusion is resolved with "Neighborhood Name + Bookstore Street" formulation. This spatial information-based street naming process considers the morphological elements that define the street. When these elements change, the street names based on them change as well. The formation and change of the city can be read through the street names as well as the physical environment (Ayataç & Zıvalı Turhan, 2018).

On the other hand, morphological elements and spatial knowledge about streets are not the only factors that are considered during the street naming process. Streets are political areas in which the ruling regime's ideals and vision are inscribed into the landscapes of quotidian life (Rose-Redwood et al., 2017). Nation-states use street names to alter urban memory and create the political space of the nation. The intervention of sovereignty aims to change the collective memory about a place to prevent possible opposition between the nation's shared history and urban memory. In this way, ruling regimes legitimize their spatial claims.

3. Changing the identity by changing street names

National identity, national memory, and national belonging are complementary to each other (Figure 1). The nation-state defines a national identity, and national belonging is determined through this identity. Individuals who are part of the nation have ethnocultural characteristics that include them in the definition of a national identity. National memory is shaped according to national identity and belonging. Although the shared national memory appears to be collective, it hides inequalities for groups excluded by the sovereign; thus, it contains conflict with individual memories; because of this conflict, national memory cannot be considered as a collective formation (Mills, 2010). Individual memories are formed under different conditions for individuals with national identity and for the

ones that are excluded. Nationality includes certain conditions that shape memory. For the person recognized by the state as a member of the nation, national belonging determines how to talk about inequalities and injustices against minorities; for minority groups, belonging requires the denial of knowledge and experience of inequalities and injustices outside of their own community. (Mills, 2010). Apart from the collective memory shaped by social, cultural, and political influences, physical reminders of urban history also contribute to the formation of urban memory. Physical reminders act as memory evoking sensory elements in urban space. Urban identity and memory often clash with the created national identity and memory (Figure 1). Physical reminders have the potential to stimulate urban memory and point out the friction with the national memory. Therefore, these reminders are destroyed or modified to cause a loss of meaning.

Street names are one of the elements to be changed due to their relationship with urban memory and identity (Figure 1). Urban memory is a representation of collective memory that has evolved over time in a specific space; it expresses relationships between the past and present of the place (Ringas & Stefanidakis, 2011). In the natural formation processes, street names emerge through the spatial information and identity of the urban space. They contain information about a place's past and present. Under normal circumstances, although they change with the space over time, it is possible to observe continuity while comparing the street names of the same place at different times. Nevertheless, broad name changes policies implemented with the establishment of nation-states have created serious disconnections between the space and its past (Hacısalihoğlu, 2008).

According to Todorov (1982), the naming ceremony is one of the first gestures of possession. Naming streets is frequently used to express authority in battles over symbolic control over public space (Rose-Redwood et al., 2017). Marking places with names belonging to the new ruler's culture, history, and ideology is essential to reflect its political identity. One of the prominent examples of the reflection of nation-state policies on the countryside is the change of the names of villages, towns, and geographical places. As for urban places, street names are seen as the visual/textual indicators of sovereignty.

In Turkey's case, the transformation of toponyms into Turkish started after the defeat in the Balkan War. The Union and Progress Administration started a campaign to turn Greek and Bulgarian names into Turkish in 1913. For instance, the change of Atranos to Orhaneli in Bursa, Lefke to Osmaneli in Bilecik, and Ayasluk to Selçuk in İzmir happened in that period (Nişanyan, 2010). According to a notification document from the Ottoman Archives (Figure 2), besides the names of the villages and towns, the establishments such as schools, casinos, and the streets and avenues with the old Greek names in and outside of Istanbul were also forcibly changed into Ottoman names.

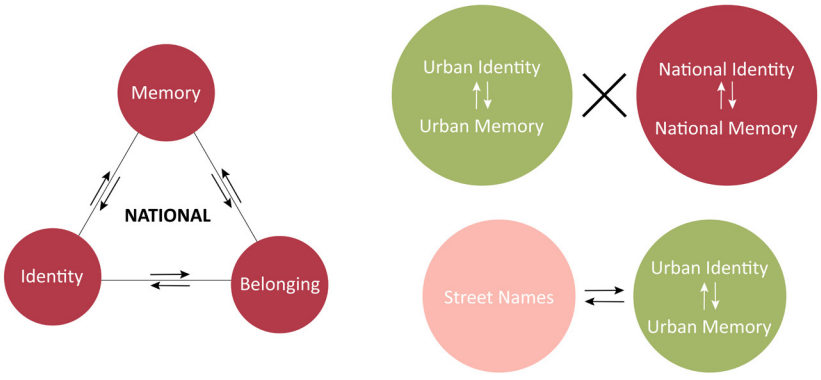


Figure 1. *Diagrams about the relation between identity, memory, and street names.*

On the opposite side, the names of the towns, villages, and streets in the regions that were no longer under the Ottoman Empire's rule were also gradually altered by new sovereign regimes. To illustrate, during the occupation of Cyprus by the British forces, the names of some streets of Nicosia and Limassol were changed. As per a record from the Ottoman Archives (Figure 3), this situation was seen as an unauthorized change to the Ottoman Empire, which still saw Cyprus as its territory. The newly established nation-states formed after the Ottoman Empire's disintegration, such as Bulgaria, and Greece, tried to forge links between political legitimacy and national identity. The legitimacy of a modern state is predicated on the notion of the nation's self-rule (Hart, 1999). Hence, during the 1920s and 1930s, they employed various techniques to implement their national identities in their claimed territories. For example, in Bulgaria, almost all non-Bulgarian toponyms, most of which were Turkish, have been changed since the independence of Bulgaria (Hacısalihoğlu, 2008). In 1934 alone, by ministerial directives, two-thirds of all Turkish place names were altered (Koledarov & Michev, 1973 as cited in Mahon, 1999). The change of place names has been justified in different ways in each country. In Bulgaria, it was a sign of the abolition of the Turkish/Ottoman yoke in Bulgaria (Hacısalihoğlu, 2008).

As for Turkey, after the Independence War, the government of the Turkish Republic aimed to create a modern and secular nation-state that gathered under the understanding of one nation, one flag, one homeland, and one language. With Mustafa Kemal Atatürk's words, "Anyone who lives within the borders of the Republic of Turkey and says 'I am Turkish' is a Turkish citizen." The generation of "citizens" by "nations" requires a symbolic and practical embodiment of a public mindset (Berlant, 1991). This public mindset is created by symbols, narratives, and a shared history. Nation-state constantly exposes its "citizens" to these mental constructs consciously/unconsciously during their daily lives.

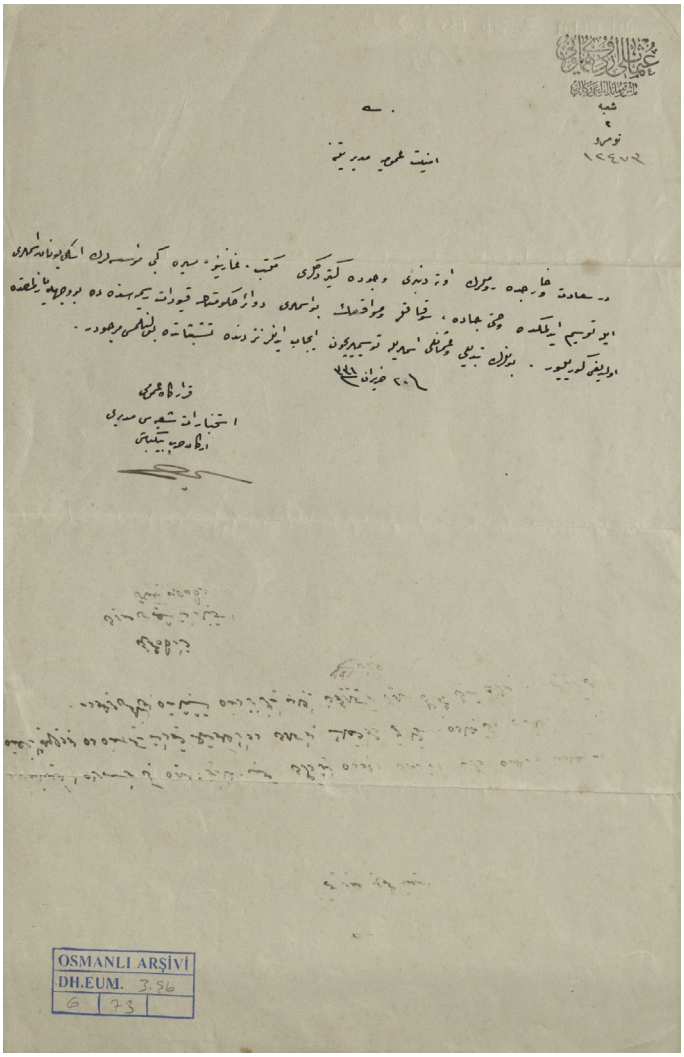


Figure 2. *A notification document about the replacement of Greek names with Ottoman names (03 July 1915).*

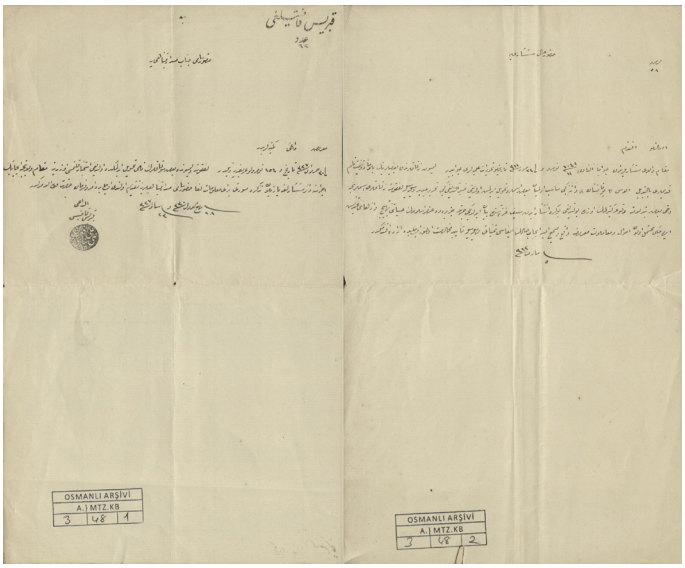


Figure 3. *A document about the unauthorized renaming of some streets of Nicosia and Limassol (07 March 1912).*

As the former imperial capital, Istanbul represented the Ottoman cultural heritage. At that time, Istanbul's

culture and daily life were characterized by mutually recognized differences and shared urban space through multiple cultural practices and languages (Mills, 2010). For this reason, Istanbul has been seen as an important place to declare and represent Turkish national identity. The process of renaming streets in Istanbul was carried out to delete the repetitive, vulgar, and non-national names that contradict the national memory in progress. The street names, which emerged as a result of the relationship between the local people living in that area, were changed because they contradicted the new urban identity that was created by the state. The bonds locals formed with the place were damaged by the erasure of their names and memories from the streets. Üsküdar district, one of the regions of Istanbul where the non-Muslim population has lived predominantly since the Ottoman era, is affected by this process with irreversible identity and memory loss. According to the Üsküdar Municipality's website, today Üsküdar's social structure is mainly composed of conservative people who have migrated from the Black Sea Region and are committed to the Islamic faith and culture. The minority population living here emigrated to a large extent, especially after the events of 6-7 September. Past occurrences have no bearing on the present unless they are mentioned in history books, monuments, various shows, and signs that remind us of the past (Tuan, 1977). When the Turkish national identity became dominant, and almost nothing remained to remind us of the minority identities, so the loss was inevitable for Üsküdar.

4. History of Üsküdar

Üsküdar, located on the Anatolian side of Istanbul, is a district that spreads from the southern shores of the Bosphorus to the east inland. Khrisopolis, which means Golden City, is the first known name of Üsküdar. There are various rumors that this name may have been given by Khrisen, the son of Agamemnon, king of Mycenae, to denote the wealth it once had or the color the sun painted the city's horizons when it went down (Yılmaz, 2017). It is also said that the name Üsküdar came from skutary (shielded soldiers) who served in the region during the Crusaders period (Ayverdi, 1966). Another claim made by Evliya Çelebi is that the name Üsküdar derives from the "eski (old) dar (narrow)" (quoted in Haskan, 2001).

Üsküdar has been an important transportation and trade center since the Byzantian times due to its geopolitical location. During the Ottoman period, Istanbul was divided into four administrative districts: *Dersaadet* (the region inside the city walls) and *Bilad-ı Selase* (Three Regions). Along with Eyüp and Galata, Üsküdar was one of the tripartite regions. It was managed as a separate administrative district until 1926. Üsküdar was one of the places where the zoning works and mosque constructions were mostly concentrated outside the city walls. For this reason, it was also referred to as "Istanbul's Medina" (Yılmaz, 2017). Another name of Üsküdar was "*Mercü'l-Berreyn*", meaning "the place where two lands shook hands" because of its role as a bridge in the transition between Asia and Europe (Yılmaz, 2017). It was also called "Belde-i Tayyibe" as the Surre procession and the pilgrims were sent off from Ayrılık Çeşmesi (Fountain of Separation). Üsküdar has been one of the regions where the Islamic identity has come to the fore since the Ottoman period. However, besides its Islamic identity, Üsküdar was one of the areas that non-Muslim/Turkish folk predominantly lived in Istanbul.

Due to the Ottoman laws, non-Muslim people could not live near a mosque, and their sanctuaries should not be close to the mosques. Hence, non-Muslim neighborhoods were usually established out of the Üsküdar's center. Beylerbeyi (old name was Istavroz), Çengelköy, Kısıklı, Kandilli, and Kuzguncuk were those neighborhoods where non-Muslim folk mainly lived. In the center of the district, in neighborhoods such as Selamsız, Bağlarbaşı, Yeni Mahalle, Hayreddin Çavuş, Murat Reis, and Pazarbaşı, both Muslim and non-Muslim people lived together (Erkan, 2015). According to the 1914 census, there were 70,447 Muslims, 19,832 Greeks, 13,296 Armenians, 6836 Jews,

and 1232 other non-Muslim millets in Üsküdar, 63. 10% of the Üsküdar's population consisted of Muslims, and 36.89% of non-Muslims people (Sakin, 2008 as cited in Erkan, 2015).

Increasing minority revolts and internal conflicts in the last period of the Ottoman Empire affected the social structure of Üsküdar. For example, during Babıâli Nümayişi (the Babıâli Protest), which was called Ermeni Patırtısı (Armenian Rumble) by the Turks, raids were made on Armenian churches and houses in Üsküdar, and ammunition was seized (Haskan, 2001). Babıâli Nümayişi, which started to protest the massacres in Anatolia, grew because of the harsh intervention of the state and turned into an internal turmoil that caused the death of many people. In addition, with the 1915 events and the ensuing deportation law (Techir Kanunu), the minority population in Üsküdar started to leave their places due to the increasing tension, even though the forced migration law did not include them. Due to the changes made after the Tanzimat and the increasing political conflicts, Üsküdar clung more to its Islamic identity and became increasingly conservative. Due to social and political events, the balance between Muslim and non-Muslim identities in Üsküdar was disrupted. As a result of those events, the conservative Turkish-Islamic identity was ascendant, while the minority identities were evaporated. French writer Gerard de Nerval describes the 19th century Üsküdar as follows: Üsküdar, the shelter of old Muslims, generally saw the innovations in Istanbul (inside the city walls) as a danger; they believe that European Turkey was going to be a victim of Christians in the near future (quoted in Yılmaz, 2017).

The big fires at the end of the 19th century and the beginning of the 20th century have also accelerated the departure of minorities. During the 1887 Yenimahalle Fire, many buildings and an Armenian school burned down. With the 1926 İcadiye Fire and 1927 Great Selamsız Fire, Selamsız (Selamiali) neighborhood was almost completely destroyed; 600 houses in Yenimahalle, İcadiye, and Sultantepe were also destroyed in this disaster (Haskan, 2001). The immigration of minorities kept increasing after the proclamation of the republic. Especially after the 6-7 September events in 1955, most Greek, Armenian and Jewish inhabitants of Üsküdar left. On the other hand, new settlements of Muslim Turks, mainly from the Black Sea region, continued to increase. The traces of the minorities who left Üsküdar were meticulously erased. As a result of the renaming process that started in 1927, minorities' ties with the place were cut off. People's names and memories were deleted from the streets; they were excluded from the places they were born, raised, and lived.

Today, Üsküdar is a region known for its mosques, lodges, dargahs, fountains, and according to Üsküdar Municipality's website, its religious and conservative people [2]. The following two examples are weighty for understanding the identity change of Üsküdar. On the website of the Üsküdar Municipality, Üsküdar's culture is as follows: " Üsküdar is very rich in terms of culture. Thanks to the richness of its historical heritage, a unique Üsküdar culture has emerged over time. This culture shows a multicultural structure in the center of Turkish tolerance." In other words, Üsküdar's culture is built around Turkish tolerance, as long as the Turkish culture permits the other cultures, they can exist in Üsküdar's "multicultural" structure. In addition, the book set titled *Yüzyıllar Boyunca Üsküdar (Üsküdar Through the Centuries)*, published by the Municipality of Üsküdar provides valuable information about Üsküdar's history, from which this article benefited. However, in these three volumes, the section devoted to the non-Muslim culture that once existed in Üsküdar is relatively short. The place of non-Muslim folk in social life, their structures, and their culture is only mentioned in the sections gathered under "Değişik Konular" (Various Topics) at the end of the third volume.

5. History of Üsküdar's street names

In the Ottoman period, the smallest unit of the city division was the neighborhood (mahalle), and the neighborhood organization was called "nahiye". Neighborhoods were

divided by the main street, which were connected to dead-end streets. These streets helped to ensure privacy and security by preventing outsiders from secretly entering the neighborhood (Canatar, 2015). Neighborhoods were physical places without sharp boundaries, and they functioned almost like a big house. Streets worked as the corridors of this house, and their dimensions were narrow like house corridors. Neighborhoods were shaped around the identity of the community that lived there. These identities were mainly related to religion, ethnicity, occupation, and marital status. In most cases, it is possible to say that the neighborhood was equal to the community in the Ottoman Empire. Istanbul neighborhoods were generally sanctuary (mosques, churches, monasteries, synagogues) centered

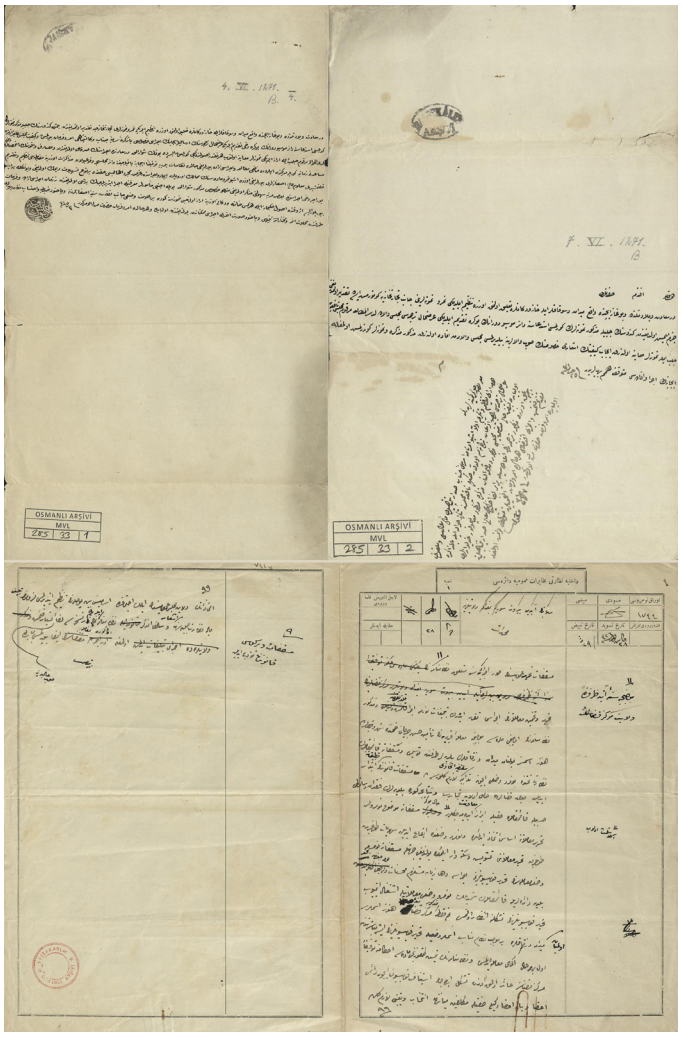


Figure 4. *On top Monsieur Devra's request about the signs to be hung on the streets (25 February 1855) and at the bottom a document about giving proper names to unnamed streets (11 January 1911).*

living spaces and administrative units (Canatar, 2015). Commercial and residential zones were often separated from each other. Commercial areas were primarily under the supervision of the state, and the people of the neighborhood managed the neighborhoods. Commercial districts functioned as public, and neighborhood districts functioned as private spaces.

As part of the modernization movements made after the proclamation of the Tanzimat, some changes were made in the direction of the development and regulation of the city administration. New developments for Istanbul came to life with the Order of the City Commission (İntizam-ı Şehir Komisyonu), which was established in 1855 and consisted mainly of Muslims, non-Muslims, and merchants who knew foreign languages (Ölçer, 2014). Monsieur Devra's request about the signs to be hung on the streets and a document about giving proper names to unnamed streets by district governors and municipalities can be seen in Figure 4. From 1855 on, the city administration was transformed into a municipal organization. Municipal units such as Üsküdar, Beşiktaş, and Fatih were created, and neighborhoods were connected to these municipalities. The street names started to be assigned with *A Regulation Concerning Streets (Sokaklara Dair Nizamname)* in 1859. Signs with street names hung just like European countries. Before that, without street names and signs, people were given addresses using phrases like "across from this neighborhood" or "near that neighborhood". In previous periods, neighborhood names could be examined as a linguistic representation of the identity of a place.

After the Turkish War of Independence, the government of the Republic of Turkey passed the "Law on Numbering Buildings and Naming Streets" in 1927. The purpose of this law was to prepare the organization of the planning census. According to a newspaper article from the newspaper Hakimiyet-i Milliye about this issue (Figure 5), it was decided to hang street signs on all Istanbul streets and to give new numbers to the houses as of September

1, in preparations for the census. The readability of urban space is crucial for the surveillance functions of the state (Yeoh, 2017). Osman Nuri Ergin was the person responsible for this process in Istanbul. First, the existing street names were determined, and names were given to the unnamed streets. Street names are usually given according to the spatial information of the street; hence common names such as Cami Sokak (Mosque Street) and Mektep Sokak (School Street) have been determined. They had been renamed mostly using the formulation "Neighborhood Name + Repetitive Name + Street". In addition to repeating names, vulgar, non-national, and non-Muslim street names have been changed. As a result of this process, nearly 6,000 of the estimated 10,000 street names in Istanbul were changed in a brief period, like five months.

A new perspective on Turkish history and linguistics was established on 01 November 1928, with the Script Reform (Harf Devrimi). Latin script began to be used instead of Arabic alphabet. Therefore, the renaming process took place again in 1929. The budget request and a newspaper article about the process can be seen in Figure 6. During the renewal of the street signs from old letters to new letters, Osman Nuri Ergin found a chance to complete the incomplete job that he had done in a great rush to finish up until the 1927 census (Ölçer, 2014). According to a newspaper article in Cumhuriyet (Figure 6), on 19 January 1931, the committee of Istanbul Municipality accepted the street name changes. During the renaming process, street names thought to be incompatible with Turkish history, language, and customs, as well as repetitive street names such as Kuyu (Well) and Çeşme (Fountain) were changed. Names of people who served Turkish literature, music, and their homeland, as well as names thought to be catchy because of pronunciation were given to the streets. In total, 6,129 streets were renamed.

The changes in street names of Üsküdar mainly took place between 1927-1934. In the following years, street names continued to be changed for particular purposes, and they still do.

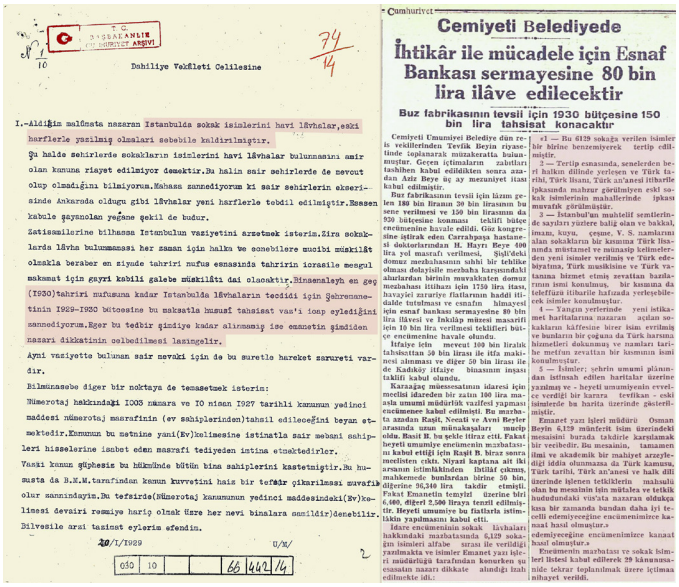
Figure 5. *A newspaper article about the numbering committee and census preparations in Istanbul (21 August 1927).*

6. Street name changes in Üsküdar

According to the data from *Istanbul City Guide*, the names of 447 of 620 streets in Üsküdar were changed between 1927-1934. Of these 447 streets, 300 were changed for replacing repetitive names, 42 for correcting names, directions, and typos, 14 for shortening long names, 7 for referencing the nation's identity and history, 2 for replacing vulgar names, and 62 for deleting non-national names. The reason for renaming 20 streets could not be identified. In this process, new names were also given to the newly opened streets in addition to renaming the existing streets. According to Istanbul

City Guide, 20 newly opened streets in Üsküdar were named, and 11 of these 20 streets are located in Selamsız. The highly possible reason for more new streets openings in Selamsız compared to other neighborhoods is the 1926 İcadiye and the 1927 Great Selamsız fires, which caused significant damage to the neighborhood.

The map of the distribution of the changes made in the renaming process in Üsküdar can be seen in Figure 7. As can be observed from the map, the changes aimed at deleting non-national names are concentrated in the neighborhoods where minorities predominantly live. This situation also reveals the mutual relationship between street names and local people. According to this map, it is possible to determine the areas where minority groups live the most in the neighborhoods. The maps from the Istanbul City Guide 1934 were used while drawing this map.



Dahiliye Vekâleti Celîlesine

74/4

I.-Aldığım malûmata nazaran İstanbulda sokak isimlerini havi lâvhalar,eski harflerle yazılmış olmaları sebebile kaldırılmıştır.

Şu halde şehirlerde sokakların isimlerini havi lâvhalar bulunmasına amir olan kanuna riayet edilmiyor demektir.Bu hâlin sair şehirlerde de sevcut olup olmadığını bilmiyorum.Mahsus zannediyorum ki sair şehirlerin ekserisinde Ankarada olduğu gibi lâvhalar yeni harflerle tebdil edilmiştir.Hasen kabule şayanolan yeğâne çekil de budur.

Zatisamilerine bilhassa İstanbulun vaziyetini arzetmek isterim.Zira sokaklarda lâvha bulunmaması her zaman için halkı ve sonebilere mucibi müşkilât olmakla beraber en ziyade tahriri nufus esnasında tahririn icrasile mengul makamat için gayri kabili galebe müşkilâtı dai olacaktır.Binaenaleyh en geç (1930)tahriri nufusuna kadar İstanbulda lâvhaların tecdidi için Şehremaneteinin 1929-1930 bütçesine bu maksatla hususî tahsisat vaz'i icap eyleldiğini zannediyorum.Eğer bu tedbir şimdiye kadar alınmamış ise esasen şimdiden nazarı dikkatinin celbedilmesi lazımgelir.

Ayni vaziyette bulunan sair mevkiî için de bu suretle hareket zarureti vardır.

Bilmünasebe diğer bir noktaya da temasetmek isterim:

Nümerotaj hakkındaki 1003 numara ve 10 nisan 1927 tarihli kanunun yedinci maddesi nümerotaj masrafının (ev sahiplerinden)tahsil edileceğini beyan etmektedir.Kanunun bu metnine yani(Ev)kelimesine istinatla sair mebanî sahiplerî hisselerine isabet eden masrafı tediyeden imtina etmektedirler.

Vaki kanun şüphesiz bu hükmünde bütün bina sahiplerini kastetmiştir.Bu mumasta da B.M.M.tarafından kanun kuvvetini haiz bir tefsir çıkarılması muvafik olur zannındayım.Bu tefsirde(Nümerotaj kanununun yedinci maddesindeki(Ev)kelimesi devairi resmiye hariç olmak üzre her nevi binalara şamildir)denebilir. Bilvesile arzı tazimat eylerim efendim.

20/I/1929 Ü/M/

030 | 10 | 66 442/4

Cemiyeti Belediyede

İhtikâr ile mücadele için Esnaf Bankası sermayesine 80 bin lira ilâve edilecektir

Buz fabrikasının tevsii için 1930 bütçesine 150 bin lira tahsisat konacaktır

Cemiyeti Umumiyei Belediye dün reis vekilliğinden Tevfik Beyin riyasetinde toplanarak müzakerattа bulunmuştur. Geçen içtimaların zabıtları tashihen kabul edildikten sonra azadan Aziz Beye üç ay mezuniyet itası kabul edilmiştir.

Buz fabrikasının tevsii için ihzarı geçen 180 bin liranın 30 bin lirasının bu sene verilmesi ve 150 bin liranın da 930 bütçesine konması teklifi bütçe encümenine havale edildi. Göz kongresine iştirak eden Carrahpaşa hastanesi doktorlarından H. Hayrı Beye 400 lira yol masrafı verilmesi, Şişlideki domuz mezbahasının sıhhi bir tehlike olması dolayisile mezbaha karşısındaki ahırlardan birinin muvakkaten domuz mezbahası ittihazı için 1750 lira itası, havayiei zaruriye fiatlarının hadsiz ilâdale tutulması ve esnafın himayesi için esnaf bankası sermayesine 80 bin lira ilâvesi ve İnkılâp müzesi masrafı için 10 bin lira verilmesi teklifleri bütçe encümenine havale olundu.

İtfaiye için mevcut 100 bin liralık tahsisattan 50 bin lirası ile itfa makinesi alınması ve diğer 50 bin lirası ile de Kadıköy itfaiye binasının inşası takliti kabul olundu.

Karaağaç müessesatının idaresi için meclisi idareden bir zatın 100 lira maaşla umumi müdürlük vazifesi yapması encümence kabul edilmişti. Bu mevzuda azadan Raşit, Necati ve Avni Beyler arasında uzun münakaşaları mucip oldu. Raşit B. bu şekle itiraz etti. Fakat heyeti umumiye encümenin mütalaasını kabul ettiği için Raşit B. biraz sonra meclisten çıktı. Niyazi kaptana ait iki arsanın istimlâkinden ihtilâf çıkmış, mahkemede bunlardan birine 50 bin, diğerine 36,340 lira takdir etmişti. Fakat Emanetin temyizi üzerine biri 4,600, diğeri 2,500 liraya tenzil edilmiştir. Heyeti umumiye bu fiatlarla istimlâkin yapılmasını kabul etti.

İdare encümeninin sokak lâvhaları hakkındaki mütalaasında 6,129 sokağın isimleri alfabe sırası ile verildiği yazılmakta ve isimler Emanet yazı işleri müdürlüğü tarafından kemurken şu esaslara nazarı dikkate alındığı izah edilmektedir idi.:

«1 — Bu 6129 sokağa verilen isimler bir birine benzemeyerek tertip edilmiştir.

2 — Tertip esnasında, semtlerden beri halkın dilinde yerleşen ve Türk tarihi, Türk lisanı, Türk an'anesi ittihartip işkasında mahzur görülmiyen eski sokak isimlerinin mahallerinde ipkası muvafık görülmüştür.

3 — İstanbul'un muhtelif semtlerinde sayıları yüzlere baliğ olan ve bakkal, imam, kuyu, çeşme, V. S. namlarını alan sokakların bir kısmına Türk lisanında müstamel ve münasip kelimeler den yeni isimler verilmiş ve Türk edebiyatına, Türk musikisine ve Türk vatanına hizmet etmiş zevattan bazılarının ismi konulmuş, bir kısmına da teleffüzü itibarile hafızada yerleşebilecek isimler konulmuştur.

4 — Yangın yerlerinde yeni istikamet haritalarına nazaran açılan sokakların kâffesine birer isim verilmiş ve bunların bir çoğuna da Türk tarihine hizmetleri dokunmuş ve namları tarihe mefhum zevatın bir kısmının ismi konulmuştur.

5 — İsimler; şehrin umumi planından istihsal edilen haritalar üzerine yazılmış ve - heyeti umumiyenin evvelce verdiği bir kararla - tertibat - eski isimlerde bu harita üzerinde gösterilmiştir.

Emanet yazı işleri müdürü Osman Beyin 6,129 münferit isim üzerindeki mesaisini burada takdirle karşılamak bir vecibedir. Bu mesainin, tamamen ilmi ve akademik bir mahiyet arzeylediği iddia olunmasına da Türk kamusu, Türk tarihi, Türk an'anesi ve halk dili üzerinde işlenen tetkiklerin mahsulü olan bu mesainin işin mütalaa ve tetkik hududundaki vüs'ata nazaran oldukça kısa bir zamanda bundan daha iyi tecelli edemiyeceğine encümenimizce kanaat hasıl olmuştur.»

Encümenin müzabatası ve sokak isimleri listesi kabul edilerek 29 kânunusanide tekrar toplanılmak üzere içtimaa nihayet verildi.

Figure 6. *The budget request for the renewal of street signs (21 January 1929) and a newspaper article about the street name changes (20 January 1930).*

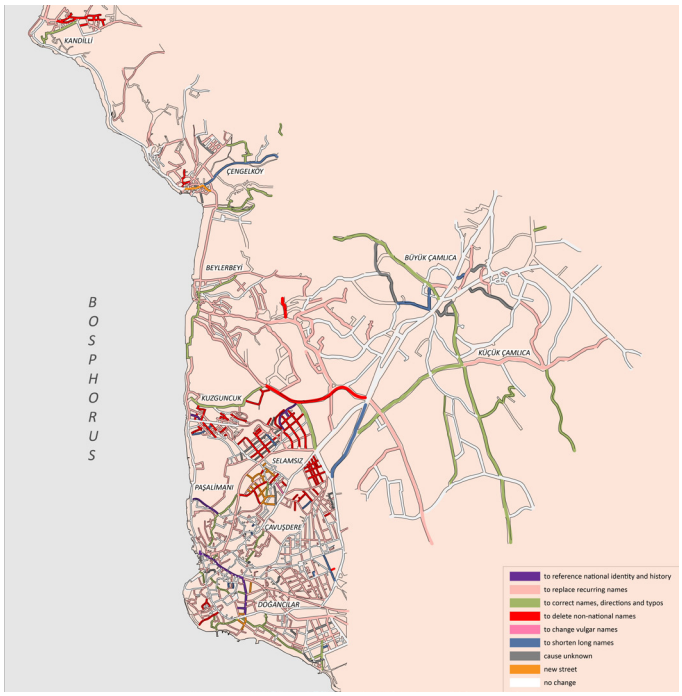


Figure 7. *The map of the distribution of the name changes made in Üsküdar.*

While making the classification regarding the reasons for the change of street names, it was considered whether there was a loss of meaning in new names, whether the same treatment was applied to names with similar problems, and the relevance of the newly given names with spatial information. To illustrate, while changing repetitive "Cami Sokak" (Mosque Street) names, whether the full name of the mosque was given or the name of the neighborhood was added to make it unique. However, for repetitive "Kilise Sokak" (Church Street) names, the word church was utterly deleted, and names that were given are irrelevant to spatial information. Similar to this, while all of the Aziziye Sokak (Sainte Street) changed with irrelevant names, variations of Aziz Sokak (Saint Street) were used without significant meaning changes. Considering the close-to-church locations of Aziziye Sokaks, it can be deduced that Aziziye has been considered as a reference to the Virgin Mary and deleted. Therefore, while classifying the reason for the changes, it was chosen to " to replace recurring names" for "Cami Sokak" (Mosque Sokak) and "to delete non-national names" for "Kilise Sokak" (Church Street) and "Aziziye Sokak" (Saint Street). Examples of these changes can be viewed in Table 1.

Moreover, while determining the changes for shortening long names, correcting names, directions, and typos, whether there was a loss of meaning is considered. If the street's name did not repeat more than once and a word was removed from the name without causing a situation that would greatly affect the meaning, this was considered a change made to shorten long street names (Table 1). Likewise, if there wasn't any repetition and the

street's name was changed with a name containing reference to national history and identity, this situation was evaluated as a change to reference national history and identity.

Some points stand out in the changes made to delete non-national names. As can be seen in Table 1, the place of minority proper names such as Kirkor, Manok, Oskiyan have been replaced with Turkish proper names such as Mümin and Mahmut or wholly removed. To determine whether proper names in street names belong to minority groups, the Nişanyan Dictionary of Names website and Zafer Işık's (2020) "Guide to Armenian and Greek Names in the Ottoman Archives" were used. Another notable situation is that the new names, which are replaced by non-national names that have been changed in a way that can be interpreted as overcompensating, make direct references to Turkish identity, history, and mythology (Table 1). Moreover, it is observed that the changes made for

Table 1. *Examples of street names changes.*

Old Name of The Street	New Name of The Street	District	Reason of Change
Cami Sokak (Mosque Street)	Hacı Hesna Camii Sokak (Hacı Hesna Mosque Street)	Üsküdar	to replace recurring names
Cami Sokak (Mosque Street)	İhsaniye Camii Sokak (İhsaniye Mosque Street)	Üsküdar	to replace recurring names
Cami Sokak (Mosque Street)	İnadiye Camii Sokak (İnadiye Mosque Street)	Üsküdar	to replace recurring names
Kilise Sokak (Church Street)	Görümce Sokak (Sister-in-law Street)	Üsküdar	to delete non-national names
Kilise Sokak (Church Street)	Tanrıverdi Sokak (God Gave Street)	Üsküdar	to delete non-national names
Aziziye Sokak (Sainte Street)	Azizbey Sokak (Mister Saint Street)	Üsküdar	to delete non-national names
Aziziye Sokak (Sainte Street)	Peltek Sokak (Lisp Street)	Prince Islands	to delete non-national names
Abdi Efendi Sokak (Mister Abdi Street)	Apti Efendi Sokak (Mister Apti Street)	Üsküdar	to correct names, directions and typos
Nişan Taşı Caddesi (Nişan Taşı Avenue)	Küçük Çamlıca-Nişan Taşı Yolu (Küçük Çamlıca-Nişan Taşı Road)	Üsküdar	to correct names, directions and typos
Su Yolu Çıkmazı (Waterway Dead-end Street)	Sulu Yol Çıkmazı (Watery Way Dead-end Street)	Üsküdar	to correct names, directions and typos
Hacı Şevket Bey Sokak (Mister Hadji Şevket Street)	Hacı Şevket Sokak (Hadji Şevket Street)	Üsküdar	to shorten long names
Bekarderesi ve Su Yolu Sokak (Single's Creek and Watercourse Street)	Bekarderesi Sokak (Single's Creek Street)	Üsküdar	to shorten long names
Meyhane Sokak (Tavern Street)	Üzüm Özü Sokak (Grape Essence Street)	Üsküdar	to change vulgar names
Çarşıboyu Caddesi (Çarşıboyu Street)	Hakimiyet-i Milliye Caddesi (National Sovereignty Street)	Üsküdar	to reference the nation's identity and history
Kefçe Dede Sokak (Grandpa Kefçe Street)	Halk Caddesi (People Street)	Üsküdar	to reference the nation's identity and history
Gülşen Sokak (Gülşen Street)	Nevcivan Sokak (Nevcivan Street)	Üsküdar	unknown
Hamam İskelesi Sokak (Bath's Pier Street)	Kaynana Sokak (Mother-in law Street)	Üsküdar	unknown
Kürkçü Kirkor Sokak (Furrier Kirkor Street)	Kürkçü Mümin Sokak (Furrier Mümin Street)	Üsküdar	to delete non-national names
Taşçı Manok Sokak (Stonemason Manok Street)	Taşçı Mahmut Sokak (Stonemason Mahmut Street)	Üsküdar	to delete non-national names
Topal Oskiyan Sokak (Crippled Oskiyan Street)	Topal Oskiyan Sokak (Crippled Street)	Üsküdar	to delete non-national names
Ayazma Adası Arka Sokak (Ayazma Island Back Street)	Kurt Bağrı Sokak (Wolf Chest Street)	Üsküdar	to delete non-national names
Eleni Sokak (Eleni Street)	Yeniçeri Ağası Sokak (Janissary Agha Street)	Beyoğlu	to delete non-national names
Araplar Sokak (Arabs Street)	Araplar Sokak (Arabs Street)	Fatih	-
Kürtler Sokak (Kürts Street)	Kürtler Sokak (Kürts Street)	Fatih	-
Arnavut Çıkmazı (Albanian Dead-end Street)	Bozacı Çıkmazı (Boza Seller Dead-end Street)	Üsküdar	to delete non-national names
Piyer Loti Caddesi (Pierre Loti Avenue)	Piyer Loti Caddesi (Pierre Loti Avenue)	Fatih	-
Krepen Pasajı (Krepen Passage)	Krizantem Geçidi (Chrysanthemum Passageway)	Beyoğlu	to delete non-national names
Frederiç Pasajı (Frederic Passage)	Frederiç Geçidi (Frederic Passage)	Beyoğlu	to correct names, directions and typos
Haçopolo Pasajı (Hazzopulo Passage)	Haçopolo Han Geçidi (Hazzopula Passageway)	Beyoğlu	to correct names, directions and typos
Hafız Ahmet Efendi Sokak (Mister Hafiz Ahmet Street)	Hafızı Kurra Sokak (Hafiz-i Kurra Street)	Üsküdar	to delete non-national names
Tekke Sokak (Dervish Lodge Street)	Bedevi Tekkesi Sokak (Bedouin Dervish Lodge Street)	Üsküdar	to replace recurring names
Tekke Arkası Sokak (Behind the Dervish Lodge Street)	Tekke Arkası Sokak (Behind the Dervish Lodge Street)	Üsküdar	-

erasing non-national identities concentrate on minority groups that left the Ottoman Empire and established new nation-states and were perceived as traitors by being associated with the occupation forces by the Turks. To illustrate, while the names of Albanians, Greeks, Armenians, and Jews were erased from the streets in this process, the names of Arabs, Kurds, and Tatars were preserved (Table 1). In addition, the name of Pierre Loti, who is approached as a friend-of-Turks person, has not changed despite being a foreigner. Also, even if there are non-Turkish names, the names of the passage streets are mainly left unchanged.

The names that are thought to contradict the Turkish national identity, history, and values are not only the names of minorities. The name of the Hafız Ahmet Efendi, who gave the Ankara fatwa that declared it was legitimate to kill the Kuvay-i Milliye people and was seen as a name standing against the Turkish national independence struggle, was also changed in this process (Table 1.) However, contrary to the secular national identity that was tried to be established, the names of the dervish lodges and zaviyes that were closed in 1925 were preserved.

Between 1927-1934, throughout Istanbul, the number of street names that were changed to delete non-national names is determined as 410. The first three where the most changes are made for this purpose are Beyoğlu with 126 changes, Üsküdar and Fatih with 62 changes, and Adalar (Prince Islands) with 61 changes. The map in Figure 8 shows the distribution of the number of changes district by district to delete non-national names. In this map, the areas where the changes of non-national street names were intensified were the districts where minority groups lived predominantly during that time. It is possible to say that one can determine the districts where minority groups live the most by looking at the street names, thanks to the street names-identity relationship. Istanbul City Guide 1934 was used while drawing this map.

To identify the objections to these changes, the news from the two of the newspapers with the highest circulation rate [3] in the Turkish press, Cumhuriyet and Akşam, were searched from August 1929 to March 1930, from the announcement of the comprehensive change in 1929 to the completion of the changes. After this search, only one article (Figure 9) was found that mentioned objections. The article did not specify what the objections were

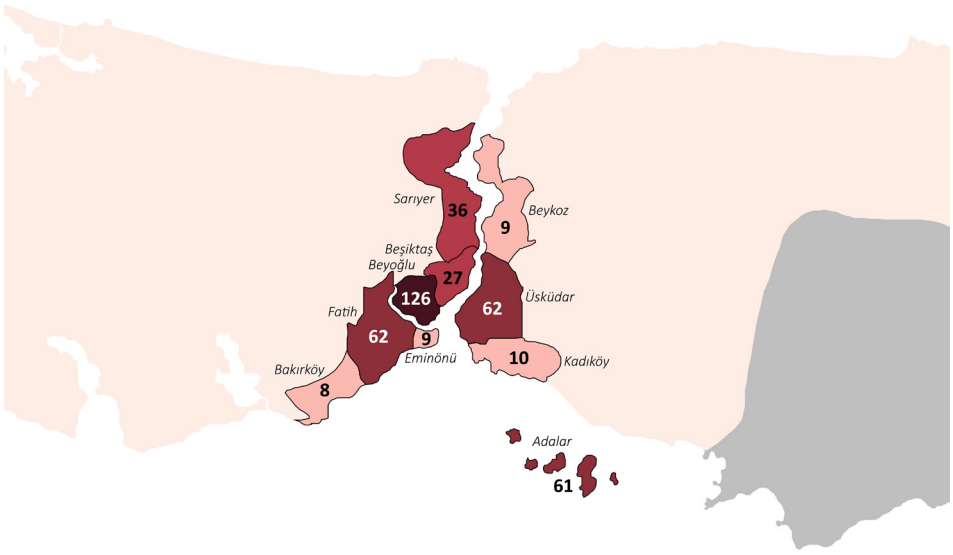
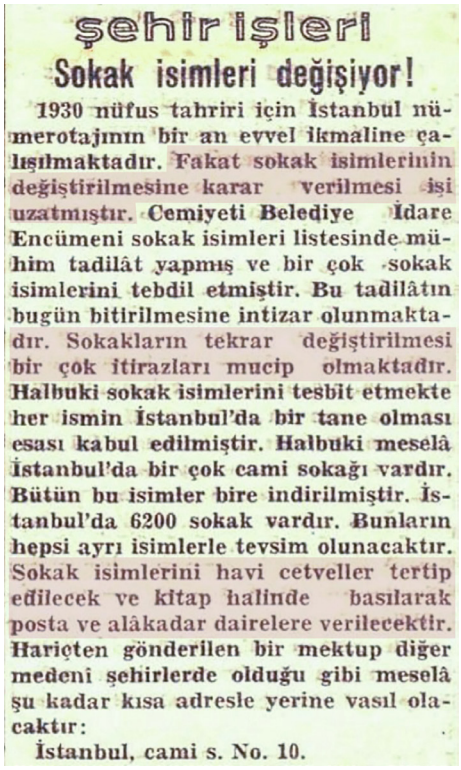


Figure 8. *The map of the numerical distribution of the changes to delete non-national names in Istanbul.*



şehir işleri

Sokak isimleri değişiyor!

1930 nüfus tahriri için İstanbul nümerotajının bir an evvel ikmaline çalışılmaktadır. Fakat sokak isimlerinin değiştirilmesine karar verilmesi işi uzatmıştır. Cemiyeti Belediye İdare Encümeni sokak isimleri listesinde mühim tadilât yapmış ve bir çok sokak isimlerini tebdil etmiştir. Bu tadilâtın bugün bitirilmesine intizar olunmaktadır. Sokakların tekrar değiştirilmesi bir çok itirazları mucip olmaktadır. Halbuki sokak isimlerini tesbit etmekte her ismin İstanbul'da bir tane olması esası kabul edilmiştir. Halbuki meselâ İstanbul'da bir çok cami sokağı vardır. Bütün bu isimler bire indirilmiştir. İstanbul'da 6200 sokak vardır. Bunların hepsi ayrı isimlerle tevsim olunacaktır. Sokak isimlerini havi cetveller tertip edilecek ve kitap halinde basılarak posta ve alâkadar dairelere verilecektir. Hariçten gönderilen bir mektup diğer medeni şehirlerde olduğu gibi meselâ şu kadar kısa adresle yerine vasıl olacaktır:

İstanbul, cami s. No. 10.

Figure 9. *An article about the objections to street name changes (05 January 1930).*

about. However, it is also mentioned that changing the street names will prolong the numerical work of streets for the upcoming census. For this reason, it can be interpreted that the objections mentioned are directed towards this prolong. In the same article, that is also mentioned that to avoid possible confusion, Istanbul General Assembly decided to issue a city guide, Istanbul City Guide 1934, written by Osman Nuri Ergin, which is used as the primary data source in this research. Unfortunately, a similar search was not possible to conduct in minority newspapers on the subject because there were no archives open to access in Turkey for the three minority newspapers with the highest circulation rate [4]: Apoyevmatini (Greek Press), Zhamank (Armenian Press), and Le Journal D'Orient (Jewish Press).

7. Conclusion

Urban space, as the basis of everyday practices, is an essential element of social memory and urban identity (Boyer, 1996). Urban identity is a non-physical concept that emerges related to the city's physical, cultural, historical, and socio-economic characteristics (Erdoğan&Ayataç, 2015). Urban identity becomes with the urban space; hence alterations in the urban space lead to a change in urban identity.

In this respect, the relationship between street names, a part of the urban space, and the urban identity shows a dialectical and constitutive structure. Street names appear as a result of the bond that the local people establish with that place and the spatial information they learn from there. Street names contain information about the characteristics of a place; they can provide morphological, social, political, and cultural information. Also, due to their position in the urban landscape, they have the power to remind past events, significant personas, and ideologies to large audiences. Space serves as a conduit for connecting to society through emotions and memories (Gürleyen, 2018). The nation-states alter urban space to impose their national history, culture, and values on the everyday life of the society. Therefore, while modifying the urban space, street names can be used as a tool by the ruling regime to reflect their identity and history. Nation-states use street names to create the political space of the nation.

In the Turkish Republic's early periods, streets provided a virtual space for the government to promote the new Western lifestyle and Turkish identity. Street names, an essential part of the urban landscape, were also used for this purpose. Between 1927 and 1934, a grand renaming process occurred in Istanbul. The purpose of the street renaming process is defined as changing the repetitive, vulgar, and non-national names. Changing recurring names was essential for the planned census, and changing vulgar and non-national names was necessary to create the "nation's shared identity" and values. During the process, 410 street names were replaced to delete non-national names in Istanbul. One of the regions where most changes occurred for this purpose was Üsküdar. During this process, the name of 447 streets was changed in Üsküdar. Most of these changes happened because of repetitive names. The second leading reason was the erasure of non-national names. It is possible to say that the urban identity of Üsküdar grounds on the conser-

vative Turkish-Islamic identity, based on the last municipality election won by the conservative-nationalist alliance candidate in Üsküdar and the declaims made on the website of Üsküdar Municipality regarding the conservative Islamic characteristics of the local people. Even though once it was one of the regions where minority groups lived exceedingly, in the current Üsküdar identity, they are only mentioned as a diverting feature, and for the urban space, most of the traces of these old inhabitants are gone. Hence, in terms of redefined urban identity, Üsküdar can be seen as a notable example. The most significant reason for this situation was most possibly the overpowering Islamic identity that Üsküdar owned for a long time in addition to the non-Muslim identities, which the other areas where non-Muslim folk also lived predominantly do not have, such as Adalar (Prince Islands), Beyoğlu, Galata, and Samatya. This identity, which had a balance with non-Muslim identities for a long time, started to get overpowered after the social incidents and internal conflicts in the last period of the Ottoman Empire. The process of changing street names in the early years of the Turkish Republic dealt the final blow to the minority identities that oppressed against Turkish-Islamic identity. Traces of its former inhabitants have been largely erased as if they had never lived in Üsküdar. Social and physical changes in Üsküdar's urban landscape lead to urban memory and identity changes.

Although studies on broad-scale changes in place and street names, such as this inquiry, are mainly based on those that occurred in the late 19th and 20th centuries, we see that the renaming strategy is still used for the same purposes today. A process that can be shown as an example of this situation recently took place in Ukraine, which was invaded in late February 2022 by Russia. Name of the streets and subway stops that are related to the Russian Empire or the Soviet Union started to change as a "decolonization" movement (Solomon, 2022). According to an article from the New York Times, Ukrainian officials perceive this process as a defense of the country on the cultural front lines (quoted from Solomon, 2022).

The use of street names to spread national discourse in urban space continues today as in the past. In urban space, the identity of the space is tried to be compatible with the national identity by changing the street names. Street names provide us with various clues about the culture and ideology of those who live in a place, and the change in street names gives us a picture of the social and cultural change in the place. In this sense, it is possible to obtain valuable information about the city's history and trace the urban identity change through studies on street names.

Endnotes

[1] According to the results from Yüksek Seçim Kurulu (Supreme Election Council), in the 2019 local governmental elections, the candidate of the Cumhur İttifakı (People's Alliance), which has conservative, religious and nationalist political tendencies, won in Üsküdar with 48.25 percent of the votes.

[2] Based on the information from Üsküdar Municipality's website, under the section of "Sosyal Durum (Social Situation)" https://www.uskudar.bel.tr/tr/main/pages/sosyal-durum/30

[3] Rıfat Bali, Tarih ve Toplum Dergisi, "Gazete Tirajları", (May 2002), pp.18-19

[4] a.g.e.

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The role of usability in the technology acceptance of projection-based user-interfaces

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Abstract
This paper aims to discover the role of usability on the technology acceptance of projection-based user-interfaces in the kitchen context. VUX–Virtual User Experience; a system consisting of a hob, a hood and a dishwasher machine controlled by a projection-based user-interface, was chosen as the product. The Unified Theory of Acceptance and Use of Technology (UTAUT) model was chosen as the theoretical frame. A two-phase study was conducted with 30 participants based on the functional prototype. The first phase consisted of a structured user-test in a showroom kitchen environment in which participants were requested to complete pre-defined tasks. The second phase was a UTAUT questionnaire including 32 questions organized in 9 sections. Content analysis and statistical analysis were used to analyze qualitative and quantitative data from the UTAUT questionnaire. It has been found that although the projection-based user-interface has a great role on technology acceptance based on usability, most of the users defined their behavioral intention to use VUX by their attitude toward using technology, experience, and anxiety in the kitchen context. In terms of user-interface design, it has been found that the design characteristics of the user-interface, such as form of icons, color and shape, did not have a significant effect on the technology acceptance of VUX. In terms of usability, errors and safety concerns were found to be the most effective factors in the acceptance of technology by determining the usability of the system.

Keywords
Technology-acceptance, Usability, User-interface design, Projection-based user-interface.

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1. Introduction

With the technological developments and advancements, the design and technology of user-interfaces is continuously progressing while providing new interaction typologies to users. Projection-based user-interface (PBUI) that is used in various applications such as projected keyboards, interactive tables etc., is a new technology that can provide a new interaction style to the user. Although they are computerized user-interfaces based on icons and menus, instead of being displayed on a screen; these elements are projected on a surface to be controlled by the users' hands or fingers.

However, the acceptance of new technologies by users is a problematic issue and is the subject of a large number of studies based on the concept of technology-acceptance research. Due to the facts stated above, the technology acceptance issues related with PBUI have attracted the academic interest of the authors.

A number of models such as UTAUT have been developed in order to better understand the process of acceptance of new technologies by users. In these models, usability is considered to be one of the primary factors which directly affects the acceptance of a new technology by prospective users. The number of studies focusing on the usability of consumer products having a PBUI is limited. Besides personal computer peripherals and home entertainment; the application areas of PBUIs are constantly increasing by including restaurants and exhibition designs (Roeber et al., 2003; Dalsgaard & Halskov, 2011).

Prior research has examined technological acceptability in various fields and sectors; including website designs, medical devices, smartphone applications and military systems (Wu et al., 2007).

Also, most of the research (Hiraki et al., 2019; Lin & Lin, 2013, Mewes et al., 2016; Huber, 2014) that study PBUIs focus on ergonomics-based issues of the technology. However, concerning a computerized user-interface usability is a key factor for the effective, satisfactory and error-free usage of any product. The user-interface is the medium where all interactions between the user and the product take place. It must provide the user sufficient information about the way the product works and its status to be able to operate the product intuitively. A badly designed user-interface will result in an ineffective and unsatisfactory usage along with errors.

Based on the facts stated above, the aims of this study have been identified as follows: the first aim is to investigate the factors that influence the acceptance of a product system with a PBUI in the context of kitchen appliances; the second aim is to explore the role of usability and their effects on the technology acceptance of PBUI and the third aim is to question whether the selected product will be preferred by the users in the future. Arçelik VUX (Virtual User-Experience), which is a concept product that is not commercialized yet, has been chosen as the product to be studied and explored for this study.

Therefore, regarding to the aims stated above, this research attempts to address the following research questions: (1) Which factors of UTAUT influence the user acceptance of PBUI systems; (2) What effect do PBUI features have on kitchen product acceptance; and (3) What is the role of usability issues on the technology acceptance of PBUI kitchen system.

The usability of a user-interface of any consumer product has an important role on its overall design quality. When users interact with a product, the lack of intuition in the interaction process can result in the product failing. In such cases, users may refuse to use the product (Oliveira & Baranauskas, 1998).

2. Technology acceptance

Technology acceptance research tries to explain cognitive and psychological factors required for the use of a new technology. Originating from the Theory of Reasoned Action (Fishbein & Azjen, 1975) in the field of psychology, there exist a considerable number of models that developed incrementally to explain the acceptance of a new technology by humans. Davis, considered to be the

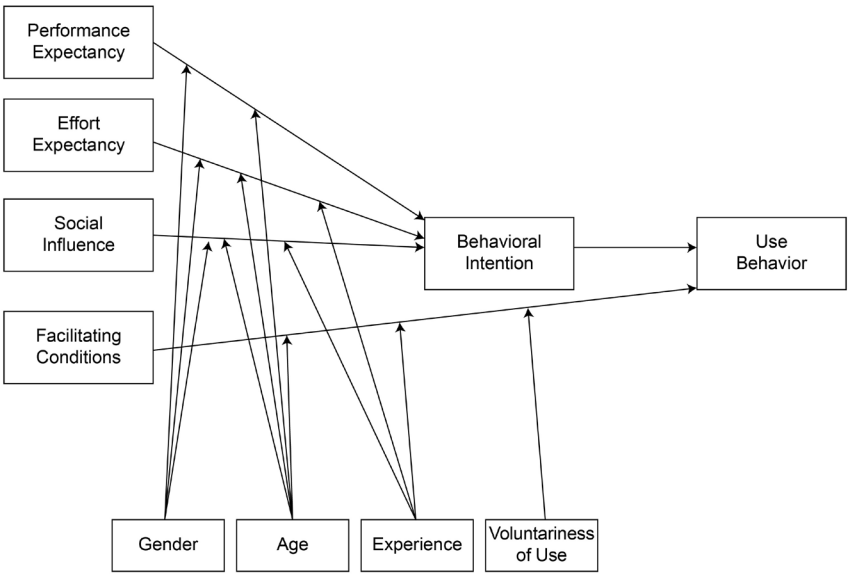

Figure 1. *The unified theory of acceptance and use of technology (Venkatesh et al., 2003).*

pioneer of the technology acceptance field, (1989) combined social behavior with technology acceptance from the disciplines of psychology and sociology. Dillon and Morris (1998) described technology acceptance as "observable willingness of using a specific product of information technology for a specific user group". Teo (2011) defines the concept of technology acceptance as "a person's desire to fulfill a task or achieve a goal using technology". Much work has been done to understand the factors that increase technology acceptance and willingness to use technology by information technology researchers and practitioners (Wang & Yang, 2005; Wu et al., 2007; Carlsson et al., 2006; Wong et al., 2013)

In order to evaluate the intention and use of a technology in relation to previous acceptance models, an extension of Technology Acceptance Model (TAM), named Unified Theory of Acceptance and Technology Use (UTAUT) has been proposed by Venkatesh et al. (2003). This model includes four main determiners that affect user acceptance with use behavior. Performance expectation, effort expectation, and social influence determine directly behavioral intention to use. Facilitating conditions determine use behavior as shown in Figure 1. Effect of individual differences on technology usage was also examined. The moderators were defined as gender, age, experience and voluntary use. This model differs from previous theories by the variance it covers. Previous theories can only explain 30-40% of the variance, whereas UTAUT can explain 70% (Venkatesh et al., 2003). In this way, it can form the basis for new theories.

There exist a wide range of research focusing on UTAUT in the literature such as, mobile applications and mobile technology (Chang, 2013; Ma et al., 2016; Okumus et al., 2018; Di Pietro et al., 2015; Palau-Saumell et al., 2019; Wu et al., 2007), transportation systems (Ooi et al., 2018; Ye et al., 2020; Adnan et al., 2018; Madigan et al., 2016; Rahman et al., 2017), medical device and software research (Chang, 2020; Garavand et al., 2019; Hennington & Janz ,2007; Lin et al., 2016; Singh & Mittal, 2020; Arfi et al., 2021,), technology applications in the education field (Abu-Al-Aish & Love, 2013; Chiu & Wang, 2008), sports technologies (Seol et al., 2017; Mahalil et al., 2020; Cavdar Aksoy et al., 2020) as well as military-based research (Tunnell IV, 2013).

Most of the research cited above attempts to explore how a product's physical properties affect people's adoption of technology, and it suggests that these attributes have an effect on

people's expectations for performance, effort, self-efficacy, and anxiety.

However, the literature on the technology acceptance of products designed and developed for use in the home environment using the UTAUT model is very limited. Ficocelli and Nejat (2012) designed a voice-controlled auxiliary kitchen system for the elderly and evaluated the interface using the UTAUT model.

They proposed an enhanced UTAUT model that includes additional determinants which are perceived adaptability, perceived ease of use, perceived usefulness, and trust. Mayer et al. (2011) investigated the technology acceptance of smart products in the kitchen context with UTAUT. In terms of determinants their model was similar to the original UTAUT model and also they added new determiners such as importance, personal relevance, and innovativeness. With an extended version of Ficocelli and Nejat. (2012); Asghar et al. (2017) examined a remote assistance system with projection technology for the elderly. Another study focusing on kitchen activities was the study by Orso et al. (2017) which was examining the technology acceptance of a wearable smart device.

Intention is suggested as the primary factor influencing behavior, according to UTAUT and related models. New models have been generated including more moderators and determiners in the literature. On the other hand, although the UTAUT 2 model is more recent, it includes additional determiners such as hedonic motivation, price value, and habits that were not focused on in this study. For this reason, the authors preferred to utilize the UTAUT as the background of the study.

3. Usability and projection-based user-interfaces

International Standards Organization defines usability as: "the extent to which a system, product or service can be used by specified users to achieve specific goals with effectiveness, efficiency and satisfaction in a specified context of use" (ISO 9241-11, 2018).

As a concept that emerged from the needs of software industry as well as personal computer users, usability studies were initially focused on the problems of software user-interfaces developed for personal computers. Since the first use of the concept by Eason (1984) many researchers (Gould & Lewis, 1985; Norman, 1990; Shackel, 1991; Nielsen, 1993; Preece et al, 1994; Jordan, 1998; Constantine & Lockwood, 1999; Chen & Sherry, 2005; Seffah et al. 2006; Hornbæk, 2006; Rubin & Chisnell, 2008) explored and developed theoretical boundaries of the field. Most of the primary concepts, principles as well as research techniques were developed with the efforts made within the boundaries of these studies.

However, as a result of technological advancements, new user-interface technologies are developed and applied into consumer products. With the advancements in user-interface technologies a wide spectrum of research focused on the usability problems of user-interfaces found in smart products, smart phones, digital products etc. Researchers such as Sade et al., (1998); Keinonen, (1998), de Vet, (1993), Han et al., (2000); Freudenthal and Mook (2003); Connell et al., (2004); Wiklund et al. (2011); Liljegren, (2006); Rümelin and Butz, (2013) focused on the usability problems of smartphones, vending machines, ATM machines,' automobile infotainment systems and similar consumer products. As a new interaction type, PBUIs are based on projection technology. A two-dimensional user-interface is projected on a surface by a projector and the user is expected to control a device or product by interacting with the two-dimensional user-interface elements such as buttons, rotary knobs, keys etc. Although this user-interface technology is not new; it is still not fully commercialized in the market. Also the usability of a PBUI is not sufficiently explored and studied in the literature. Cao et al., (2007); Ko et al., (2010); Song et al., (2007) are among few researchers who studied different aspects of projection-based user-interfaces in mostly computer game environments. To our knowledge, only Lin and Lin (2013) studied PBUIs focusing on more basic ergonomic issues such as fingertip detection, fingertip tracking and gesture recognition. Therefore,

usability research concerning PBUIs in home environments is an unstudied area of research.

In terms of products that are available in the market, there exist very few examples or systems that are based on PBUIs; however, most of them are uncommercialized. For example, in IKEA's "A Table for Living" concept for kitchens in 2025, the smart kitchen table has a projector (URL-1). The kitchen table serves as a guide with a projector, which may interact with other electrical devices on the table and recognize objects on the table. Users can remove the ingredient list and reflect it on the table which can be used as a stove. Another example is the Xperia Touch, a product released by Sony that can make daily tasks simpler (URL-2). The product is a portable desktop projection device that projects the user-interface to a surface or on a wall. Because it's a portable product, a family can play games at a table by turning on the projector. MIT researchers worked on creating a self-aware, digitally connected kitchen that could identify all of the activities taking place there using a PBUI (Bonanni et al., 2005).

4. Methodology

The methodology of this study consists of two main phases in order to answer research questions written in the introduction section. The first phase is a user test consisting of a semi-structured interview and an observational study focusing on usability. The second phase is a survey based on the UTAUT model focusing on technology acceptance.

4.1. Participants

A total of 30 participants (15 male and 15 female), consisting of engineers, technicians, designers and other office staff, selected on a voluntary basis, contributed to the study. The age distribution of male participants varied between 24 years and 46 years (average= 31.5, SD = 5.604420024). The age distribution of female participants was between 23 years and 49 years (average = 30.4, SD = 7.64198927). 14 participants are younger than 29 years, 13 participants are between 30-39 years and 3 participants are older than 40 years. All the participants were novel users to PBUIs and have never used or tested before. The product could not be transported anywhere for study. Also this product was a working prototype and was not available for consumers to test and use. Therefore, due these facts stated in the preceding statements, the study was conducted in the Arçelik Campus with Arçelik staff who did not work in a project related to and did not have knowledge about the product.

4.2. Product

The product that is investigated and analyzed in the study is a kitchen system that is controlled by a PBUI system, designed and built by Arçelik to operate a hob, a hood and a dishwasher. A projector that is placed in the front side of the hood projects a two-dimensional user-interface which includes buttons, keys and other controls to the kitchen counter. The user-interface is also customizable by allowing the user to locate the user-interface to the front side, left side or right side of the hob. This customization also causes the re-arrangement of the user-interface elements. The hob, the hood and the dishwasher do not have their own separate user-interface and can be only operated by the same

Figure 2. *Product group used for the study.*

Figure 3. *Projection-based user-interface used for the study.*

PBUI, The elements on the user-interface are activated and controlled by the user's hand gestures. Touching the user-interface is not required for the operation of the product. The dishwasher and the hob have separate On/Off buttons. For the observational study a working and fully-functional prototype of VUX has been used. In order to establish a realistic usage environment, the prototype has been located as a modular part of the showroom kitchen.

4.3. User test

In order to refine and fine-tune the user test a pilot study was conducted with 10 participants. After the completion of the pilot study the main user test has been conducted with 30 participants. At the beginning of each test, participants were informed about the study subject and a warm up interview including demographic data was conducted to the participants. During the warm-up interview a short video about the specifications and functionalities of the PBUI was also shown to the participants. Participants were questioned regarding their initial impressions after the film had finished playing. The warm-up interview was followed by the user-test. The showroom located in the Arçelik campus was used as the user-test environment. To obtain an isolated study environment, the showroom was closed during the user-tests to other participants or any people who were not related with the study.

For data collection purposes an observation form was used to collect data from each user test. The form included standard usability data such as: total task time, pass / fail, negative actions, number of negative actions, frequency of negative actions, observations, verbal expressions. As shown in Table 1, 4 main headings and sub-steps consisted of the user-test. Verbal data resulting from the user test has been analyzed using content analysis based on the principle concepts of UTAUT.

Table 1. *Interview questions and tasks.*

Warm-up interview questions	**User test Tasks**
1. Personal Information: Can you briefly introduce yourself (such as your age, education, occupation, marital status.) 2. Cooking: How often do you cook? Who cooks at home? 3. Kitchen plan: Which white goods do you have in your kitchen? How are their placements? 4. Hob usage: What kind of hob do you use? What features do you like and dislike? How long do you use your hob on average and how often do you operate your hob and hood together? 5. Have you ever used projection user-interface products? If so, which ones? After that, an introduction video of chosen product/user user-interface was shown to participants.	TASKS RELATED TO GENERAL SYSTEM 1 Activate the system 2 Control functions 2.1 Activate hood menu 2.2 Activate the hob 2.3 Activate dishwasher menu 3 Set the system menu 3.1 Change the menu position 3.2 Adjust volume 3.3 Adjust light intensity 3.4 Activation of child lock TASKS RELATED TO HOOD 4 Activate the hood 4.1 Set power 4.2 Turn the light on TASKS RELATED TO HOB 5 Boil egg 5.1 Place the pot 5.2 Adjust temperature 5.3 Adjust time 6 Brew tea 6.1 Place the teapot 6.2 Adjust temperature 6.3 Adjust time TASKS RELATED TO DISHWASHER 7 Select a program 8 Set functions 9 Run the dishwasher 10 Cancel the operation

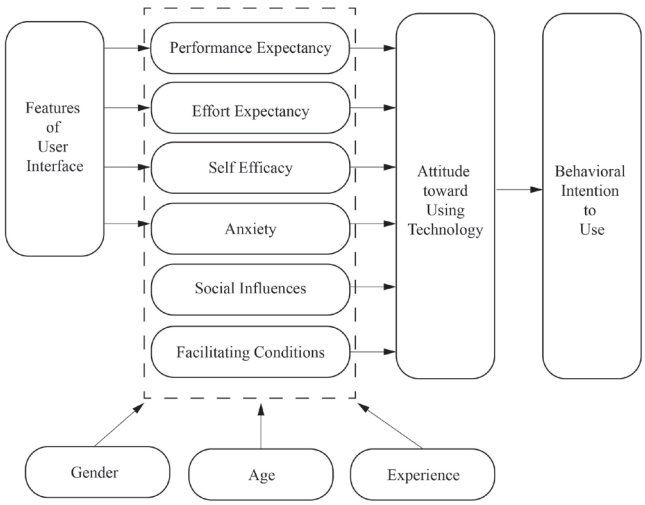

Figure 4. *Proposed research model.*

4.4. Survey (UTAUT)

In the second phase, participants responded to a questionnaire based on the UTAUT model. Selected questions on personal information and kitchen experience were asked to the participants in the first section of the questionnaire. The second part of the questionnaire contained 9 question categories related to the technology acceptance model. The total number of 32 questions were rated based on a 1 to 5 Likert-scale rating.

As emphasized by Nielsen (1994), UTAUT can be employed to gather data regarding a user's attitudes and beliefs towards the usage of technology. Some moderators of the original UTAUT model; gender, experience and age were added to this study.

On the other hand, Venkatesh et al. (2003), discussed the inclusion of the effects of anxiety and self-efficacy in the UTAUT model and reformulated the model by defining these two factors as indirect determinants. However, in contrast to Venkatesh et al. (2003) according to Çınar (2019) these indirect determiners can be examined directly within the kitchen context.

In contrast to the original UTAUT model, use behavior was not the end variable. For the purposes of this study, the user's anticipated usage of the product in the future is considered to be an important factor; therefore, as illustrated in Figure 4, the end variable was altered to behavioral intention. It is aimed to understand whether the features of the user-interface of a product affects new product's acceptance. Users' suggestions for improving the user interface will be taken into consideration while the product is currently in the development stage.

For the purposes of this study the survey included experience as a moderator. On the other hand, in the context of this study the authors defined the term "experience" as "technology experience". Technology experience relates the participant's familiarity with the product's technology and functionalities. The hob's use was selected as the factor that would determine the experience.

Gas hob users are referred to as inexperienced users. Participants who previously used products, which have PBUIs, were defined as experienced users. Scores on the questionnaire between 1 and 4 were used to determine experience level. As in the original UTAUT model, gender and age are hypothesized as moderators for the technology acceptance of PBUI based products

5. Findings

5.1. Findings of the user test

The initial impressions of participants on the product were as follows: "I have never seen a user-interface on the hob like this before. It is very innovative", "Sometimes it's hard to cook in the kitchen. I think I can cook more easily if this product is commercially available. I'm pleased I had the opportunity to try such a product", "I like to see the status of the hob and dishwasher on my VUX paired phone".

All participants attempted to obtain information at the start of the user test by first selecting the "Info" icon in an effort to better comprehend the system and the user-interface they were using for the first time.

Although some of the operational failures were related to the fact that the product was a functional prototype, participants' impressions about their experience were positive. The child camera feature was defined as "favorite feature" by most of the participants. The first impression of a participant who was a parent as well who saw the camera at first glance was as follows: "My wife will love this product just be-

cause of the child camera feature."

Although the product is operating based on gesture recognition; some participants thought the system was operating based on touch-screen technology. As a result, they said that the surface on which VUX is projected will need a special liquid for cleaning purposes. They also stressed that, with the exception of one participant, they would prefer to use the user-interface through touch since the physical contact it provides makes them feel safer, even though the controls could be engaged without touching. On the other hand, it would be useful if the counter is unclean for those who wished to utilize it without touching it.

In terms of visual appeal, participants found the user-interface quite "stylish". Participants also appreciated aspects like the hob's ability to set the time, the dishwasher's ability to show how to wash dishes, and the user interface's interchangeability for child safety. Positive and negative appraisals by the participants are shown in Table 2.

Concerning the total task completion times, the longest time for the participants to complete the tasks is 19.03 min., the shortest time was 11.29 min. and an average of 14.7 minutes. The success levels of the participants in user tests were recorded in a standard observation form.

Also, it was discovered that the prominent usage problems generally focused on the understandability of the icons as user-interface control elements. The majority of these problems were encountered during learning the interaction typology, and it was noted that as the test progressed, fewer issues were encountered.

Problems that are observed during the user test, problem frequency (PF), problem severity rating (PSR) and the interpretation of usability problems are shown in Table 3. Problem frequency has been calculated based on how many participants faced the same problem. A problem that is faced by 1-10 participants were defined as a "low frequency problem", a problem that is faced by 11-20 participants were defined as a "high frequency problem" and a problem that is faced by 21-30 participants were defined as a "very high frequency problem". These usability problems are grouped into 9 usability problem types based on the similarity of the problem observed. 5 types of usability problems were the most frequent occurring problems as follows: operation technique cannot be understood by the user, the button is not properly designed, the buttons are located very closely, the technology of the user-interface is not clearly understood, the user-interface is not properly organized. On the other hand, 3 usability problems cause low frequency rates during the user-test: the warning is not properly designed, hob color (warning) is not properly

Table 2. *Users' positive and negative appraisals about the features of VUX.*

Positive Appraisals	Negative Appraisals
- Easy to use. - No physical buttons. This makes it easy to clean. - Timer and baby cameras such as extra features - Innovative - Multi-product control can be provided from selected area - Hob automatically senses pots. - Ability to use the hob with pots in different sizes - Ability to change the location of the control user-interfaces	- Slow response/feedback - Some of the icons are not understood - Excessive function, unnecessary function - Large design, requires large space - Perception that it will be expensive - Time setting indicator is small. - Menu positioning can be accidentally changed - Proximity of hob to dishwasher

Table 3. *Usability problems of VUX.*

PC	USABILITY PROBLEMS DETECTED	PF	PSR	INTERPRETATION OF THE PROBLEM
1	The on/off button of the hood and the on/off button of the VUX system is confused	High	2	The button is not properly designed
2	The function of VUX navigation button cannot be interpreted by the user	Very high	2	The button is not properly designed
3	The VUX user-interface is perceived as a touch-operated control panel	Very high	1	The technology of the user-interface is not clearly understood
4	The user cannot find the setup function menu	High	1	The button is not properly designed
5	The user accidentally activates the child lock button instead of the child camera button and locks the system.	Very high	3	The buttons are located very closely
6	The child lock button is confused with the child camera button	High	2	The buttons is not properly designed
7	The activation of setup function button cannot be interpreted by the user	Very high	2	Operation technique cannot be understood by the user
8	The user cannot make the correct selection of functions	Low	3	The buttons are located very closely
9	Accidental activation of the auto mode	Low	2	The button is not properly designed
10	Flashing system on/off button cannot be interpreted by the user	Low	3	The button is not properly designed
11	The limits of the heating areas on the hob are not properly perceived	High	1	İnnovative forms cannot be easily understood
12	The case that hob buttons are separately grouped together creates confusion in users mind	Very high	3	The user-interface is not properly organized
13	(-) and (+) icons on the hob are to small to use	High	2	The button is not properly designed
14	The flashing light at the end of timer cannot be understood	Low	3	The warning is not properly designed.
15	The flashing light that indicates the correct placement of pans etc on the hob cannot be interpreted by the user	low	2	The warning is not properly designed.
16	The warning that signals the over heated hob surface cannot be interpreted	Low	3	The warning is not properly designed.
17	"Over heated surface" disappear as the system is turned off	Low	3	Hob color (warning) is not properly designed
18	Accidental activation of the dishwasher	Very high	3	The buttons are located very closely
19	The user fails to exit from the device function menu	Low	2	There is no separate exit button
20	The user cannot the correct button to stop the dishwasher	Very high	3	The button is not properly designed

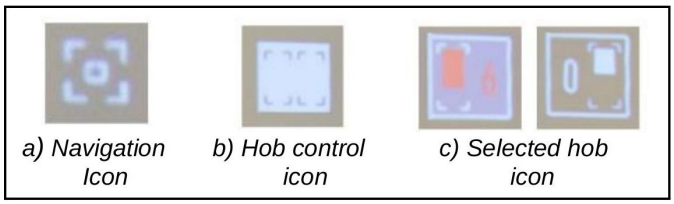

Figure 5. *Examples of similarity of the icons causing a confusion on participants.*

designed, and there is no separate exit button.

Table 3 shows that the design of the user-interface elements individually as well as the general organization of the user-interface and operation principles have strong roles on the usability of the PBUI. Participants' expectations for performance and effort have an impact on how usable they feel. Some users have also noted problems that may result from technology of the product. Most of these problems were based on basic visual qualities related to product's legibility and understandability. These basic visual qualities were visibility, brightness, and contrast etc. These problems also may have an important role on the usability of the product.

Instead of taking the quickest route, the users in the scenarios followed alternative steps to get at the aimed objectives. These informal operational sequences that are not part of planned design may constitute a basis to increase the product's usage and its acceptance. For example; when a participant was requested to turn off the whole system, he/she first turned off the hob and later turned off the whole system. However, the shortest action was to turn off the whole system without turning off the components. Features like icon alert control and timing adjustment are included in the third and fourth scenarios' steps, which some customers have never used before. In these situations, the participant was questioned about how to perform the desired task. Due to their failure to complete the assigned work, several users were hesitant to follow this scenario.

The majority of participants misunderstood what the navigation icon meant (P2). Some even describe this symbol as the icon that activates the selection function for the hob to be used or as an icon connected to the hob control. An example of the similarity of the icons causing a confusion on participants is shown in Figure 5.

Different gestures such as, holding and dragging the menu, touching two different icons at the same time, and tapping and releasing the navigation icon, were observed during tasks based on rearranging the menu. As the user-test progressed, participants become more adapted to the meanings of the icons (P7). Also, participants felt it was not easy to access the system configuration menu. Some participants attempted to activate the setup menu by touching the info icon on the user-interface. After at least three attempts, it has been figured out how to open the settings menu by simultaneously touching two separate icons. Some participants entered the settings menu and unintentionally turned on the child lock.

When compared with other devices the number of problems resulting from tasks based on the hood were lower. In order to predict how to use the PBUI participants tried to make an analogy with touch screen technology that they are familiar with in their daily lives. Few participants attempted to use the PBUI's projection feature, in other words operating the user-interface without physically touching the surface. They quickly became familiar with the slider tool on the hob user-interface because they are used to using it on phones or tablet computers like the Apple iPad every day. Due to the close proximity of the power adjustment slider and the hood menu icon, issues with accidental power setting changes and on/off switching have been noted.

Problems based on visibility of the icons concerning the dishwasher programs and interpretation of the functions have been observed during the user-test. The majority of the participants accidentally activated the "run" icon and the "function" icon because of the closeness of both icons. Additionally, some participants were unable to finish the stop and cancel activities. Vertical positioning the menu, in other words projecting the menu on the surface vertically, caused problems of confusion in reading and visual discrimination of menu icons because of limited projection space (P19).

5.2. Findings of the Survey

As a result of the questionnaire, the relationship between user-interface features and product acceptance was confirmed and during the evaluation process, prominent determiners and moderators were determined. According to the UTAUT model, 32 questions were divided into 9 sections. The section with the highest average score out of 5 points was attitude toward use with 3,975, and the section with the lowest average score was social impact with 2,9. The average scores of the other sections are as follows; effort expectancy with 3,733, self-efficacy with 3,721, behavioral intention to use with 3,666; facilitating conditions with 3,566, performance expectancy with 3,502, user-interface features with 3,475, anxiety with 3,01.

The results of regression analysis on user-interface features and other variables with moderators are given in Table 4. First regression results show a significant correlation between user interface features and expected effort of 27%. Other variables do not have a statistically significant influence, but might be mentioned as follows: 2% between user-interface and anxiety, 0.7% between user-interface and performance expectation, and 0.6% between user-interface characteristics and self-efficacy. In addition, user-interface had no significant effect on anxiety, self-efficacy, or performance expectations.

Second regression revealed that independent factors (performance expectation, effort expectation, facilitating conditions, anxiety, social influence, self-efficacy) and moderators (age, gender, experience) have no significant effect on attitude toward the usage of a PBUI. This finding suggests that attitude toward use might be considered an independent variable in the proposed model.

In the last part of the regression analysis, the researchers performed multiple regressions to explore the relation between determiners and moderators on behavioral intention to use. According to Table 4, the attitude toward use as has the highest influence on the behavioral intention to use. Functions of the PBUI have positive effects on attitude. Anxiety and experience also noteworthy effects on behavioral intention. This study's research model predicted that anxiety would have a negative effect on behavioral intent. Although the original UTAUT model eliminates anxiety components, both questionnaire findings and participant comments match the study model's predictions for the kitchen scenario.

The original UTAUT model suggests that determinants have a strong effect on behavioral intention to use. According to the findings of our second regression analysis it can be claimed that the original UTAUT determinants' impact on the behavioral intention to use a new technology is negligible. Although most of the users

Table 4. *Results of regression analysis.*

Dependent Variables	Independent Variables + Moderators	Beta	R^2
Performance Expectancy	Interface Features	,083	,007
Effort Expectancy	Interface Features	,523	,273
Anxiety	Interface Features	,147	,022
Self Efficacy	Interface Features	(-),079	,006
Attitude toward use	Performance Expectancy	,271	,194
	Effort Expectancy	,208	
	Anxiety	(-),082	
	Self Efficacy	(-),135	
	Social Influence	(-),054	
	Facilitating Conditions	,296	
	Age	(-),071	
	Gender	(-),093	
	Experience	(-),249	
Behavioral intention to use	Performance Expectancy	(-),049	,603
	Effort Expectancy	,191	
	Anxiety	,417	
	Self Efficacy	(-),175	
	Facilitating Conditions	,252	
	Experience	(-),582	
	Age	(-),286	
	Gender	,026	
	Attitude toward use	,326	
Behavioral intention to use	Age	(-),297	,685
	Experience	(-),516	
	Attitude toward use	,495	
	Anxiety	(-),462	
Behavioral intention to use	**Experience**	**(-),482**	
	Attitude toward use	**,531**	,603
	Anxiety	**(-),368**	

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

Table 5. *Themes, codes and categories used in the content analysis.*

Theme	Participants' Verbal Expressions	Codes	Categories
Concerns about kitchen experience	*"My wife is better at cooking than I am. She chooses the products to be taken into the kitchen. "*	my wife	Social influence
	"The gas stove feels like it heats better and faster."	faster	Performance expectancy
	"My product at home is easy to use"	easy to use	Effort expectancy
	"My electric hob works very simply, I would choose it again"	simple, choose	Effort expectancy, Behavioral intention to use
	"It is difficult to find recipes. This can slow me down."	difficult, slow	Effort expectancy, Performance expectancy
	"I live with my cat. Considering that, I buy products that are not scratched."	cat	Social influence
	"My house is narrow, I cannot buy large items. If my house was bigger, I would like to have a dishwasher.	would like	Behavioral intention to use
	"My hob is very old. I don't like grills and knobs at all."	don't like, grill, knob	Attitude, Interface features
	"My hood is very old and sounds loud. That's why I don't use it."	loud, don't use	Performance expectancy, Behavioral intention to use
Concerns about VUX before the user test	*"It's nice that the functions don't appear at first glance."*	the functions don't appear	Interface features
	"Is it difficult to press the interface?"	difficult	Effort expectancy
	"Is it a product that you get used to when you use it?	get used to	Effort expectancy
	"I am very excited to use this product."	excited	Attitude
	"I feel like it's a complex product."	complex	Effort expectancy
	"Is there a child lock feature? My wife wants to buy this product just for this feature."	my wife	Social influence
	"I am familiar with computer programs. Will I be able to use this easily?	familiar, easily	Self-efficacy, Effort expectancy
	"Is the system detection slow or fast?"	slow or fast	Performance expectancy
	"Are we going to have fun?"	have fun	Attitude
Concerns about VUX' s usability after user test	*"Although it is a product that I am not familiar with, I think I used it easily."*	easily	Effort expectancy
	"I am not sure if the product is safe for cooking."	safe	Anxiety
	"I would like to run the product I want with a voice command."	voice command	Interface features
	"Using this interface in a restricted area is useful."	useful	Performance expectancy
	"The voice control feature can provide ease of command and enable even a child to use this product."	voice control, ease of command	Interface features, Effort expectancy
	"I wasn't sure if I should long touch the interface during use or just press it once."	wasn't sure, long touch,	Anxiety, Interface features
	"I prefer VUX after the technology has improved a bit."	prefer	Behavioral intention
	"I need to learn to use this product."	learn	Self-efficacy
	"The product is running slowly."	slowly	Performance expectancy
	"Gesture control feature can be added."	gesture control	Interface features
	"Doesn't seem to save time."	save time	Performance expectancy
	"Especially for the elderly, the interface brightness is a challenge for vision."	brightness, challenge	Interface features, Effort expectancy

said that the PBUI would improve their performance in the kitchen with minimum effort, the survey results presented a different data. In contrast to the original UTAUT model, performance expectation was found to have no significant effect on behavioral intention. As an evaluation of answers to open ended questions, it is stated that participants made much more comments on performance and effort expectancy compared to other moderators.

Our findings show that the social effect associated with performance expectation may not have a significant effect on behavioral intention. The original UTAUT model's proposal was refuted by both the survey results and the participants' comments. According to the original UTAUT, facilitating conditions have an effective role in product acceptance. It was found that the facilitating conditions were not significantly related to the behavioral intention to use by both the survey results and the comments of the participants. The majority of novice participants did not require additional instruction and reported that the PBUI was simple to use.

The findings of our survey supports the assumptions of the original UTAUT model in term of importance degree of self-efficacy. It was observed that the participants' self-efficacy did not affect the behavioral intention to use. It is observed by the authors that younger participants showed a higher degree of self-efficacy performance in user tests than older participants. The original UTAUT model suggested that age and gender had a significant influence on behavioral intention to use.

However, our questionnaire results contrasted with the suggestions of the original model in the context of PBUI. Female participants have more behavioral intentions to use and found the PBUI more usable.

Three main themes, their codes and categories were identified to conduct the content analysis of verbal data. These themes are concerns about kitchen experience (21 codes), concerns about VUX before the user test (20 codes) and concerns about VUX's usability after user test (30 codes). Examples from the content analysis data are shown in Table 5. The codes that resulted from verbal expressions of the participants have been categorized in categories that are UTAUT factors.

The content analysis of the verbal data revealed that male participants were more focused on the advantages of using a usable product, as they were more result-oriented and more easily adapted to new technologies; whereas female participants were more affected by social influences in other words can be more easily affected by other users. Performance expectancy was a more significant determiner for male participants whereas effort expectancy and social influence were more dominant determiners for female participants. On the other hand, in real-life situations, some external factors may affect users' willingness to use. For example; people living in rental houses may not be able to change the kitchen layout without the owner's knowledge or relocate the fixed products in the house. Another factor is the size of the kitchen. The dimensions of the area are important in the selection of the products to be purchased. Therefore, there may be users who do not wish to utilize an unsuitable product. Thus, the UTAUT model was not adequately validated, and the original UTAUT model does not accurately depict product acceptability in the kitchen setting with the selected factors. Summary of findings are shown separately in Table 6. Validated hypotheses are H2, H6, H7, H8 and H9.

Participants chose from 18 different given keywords to describe the PBUI in the last part of the questionnaire,

Table 6. *Summary of findings.*

Hypothesis	Dependent Variables	Independent Variables	Moderators	Explaination
H1	Performance expectancy	Interface features	None	Nonsignificant effect
H2	Effort expectancy	Interface features	None	Strong effect
H3	Anxiety	Interface features	None	Nonsignificant effect
H4	Self efficacy	Interface features	None	Nonsignificant effect
H5	Attitude toward using technology	Performance expectancy, effort expectancy,anxiety, self efficacy, social influence,facilitating conditions	Age,Gender, Experience	Nonsignificant effect
H6	Behavioral intention to use	Performance expectancy, effort expectancy,anxiety, self efficacy, social influence,facilitating conditions	Age,Gender, Experience	Anxiety,experience,age and attitude toward using technology affect strongly.Age has no significant effect.
H7	Behavioral intention to use	Anxiety,attitude toward using technology	Age,experience	Anxiety,experience and attitude toward using technology effect strongly. Age has no significant effect.
H8	Behavioral intention to use	Anxiety,attitude toward using technology	Experience	Attitude has the strongest effect on behavioral intention to use. Experience and anxiety have a stronger effect.
H9	Behavioral intention to use	Usability	None	Usability has a significant effect on behavioral intention to use

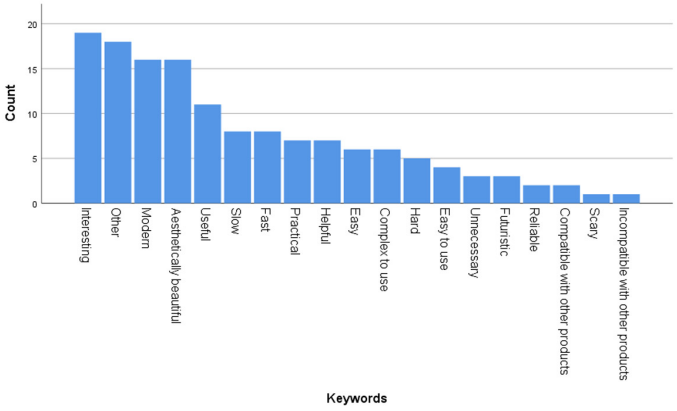

Figure 6. *Keywords selected by participants.*

and 1 "other" section that they could write additional keywords shown in Figure 6. Positive keywords were chosen more. Most selected ones are; interesting (with 13,3%), modern (with 11,2%), aesthetically beautiful (with 11,2%) and useful (with 7,7%). Also, fast (with 5,6%), practical (with 4,9%), and helpful (with 4,9%) are noteworthy. On the other hand, most selected negative keywords are; slow (with 5,6%), complex to use (with 4,2%), hard (with 3,5%), unnecessary (with 2,1%). Some keywords like; beautiful

in terms of space saving, aesthetically improvable, insecure, technological, neither complicated nor simple to use, debatable necessity, a digital product, has many options, hygienic, surprising, unknown, not practical, different size, innovative were related to product features written under other section.

5.3. Discussion

This study provided valuable findings about factors which have a role in the acceptance of a product system to be used in the kitchen environment, which can be controlled from the PBUI, by using methodology based on user tests and surveys. The findings of the user-test have been used as a source to explore the usability problems and to enhance the PBUI designs. The findings of the survey provided a base to understand the relationship between UTAUT and PBUI.

Based on our findings, it can be argued that different variables can affect a product's acceptance. According to the results of the content analysis, the majority of participants' comments concern performance and effort expectations. Prior to using the product, they expressed their concerns regarding their attitude toward its use and their interface expectations. Additionally, according to the findings of the content analysis, social influence can be considered an effective factor in user preferences for kitchen products.

Negative thoughts and concerns influence the behavioral intention of participants. The results of the questionnaire showed that the user-interface design elements can affect users' effort expectancies.

Although participants noted that using the PBUI would improve the user performance, the results of the survey showed that, unlike the original UTAUT model, the expectations in performance issues do not have a significant impact on intended use. In other words, it can be said that the user's performance may not have a significant effect on the behavioral intention.

According to the questionnaire results we can argue that anxiety has a meaningful effect on behavioral intention to use the new product in the kitchen.

In contrast to the model of Venkatesh et al. (2003), reliability and safety issues are crucial and strongly related to anxiety. In the UTAUT model, facilitating conditions were considered as a direct determiner for usage. In addition, the model of Venkatesh et al. (2003) did not include attitudes toward technology use, but this study showed that it can be a determiner of technology acceptance.

In the previous technology acceptance models, TRA, TPB, and TAM, attitude was identified as one of the determinants of behavioral intention In parallel with the recommended UTAUT model, the results of the questionnaire supports the majority of the correlation between product acceptance in the kitchen and attitude toward using technology, anxiety, and experience. On the other hand, we can argue that the primary UTAUT determinants may have no meaningful effect on attitudes toward using a kitchen system with a PBUI. Anxiety and self-efficacy were not integrated in the UTAUT model of Venkatesh et al. (2003). Also, age, gender, experience, and voluntariness were moderators in their model. While the proposed model did not include the voluntariness variable, it was discovered that only experience had a significant impact on behavioral intention to use the PBUI kitchen system. Less anxiety and effort were observed by experienced users.

Young tech savvy users had more difficulty performing tasks than inexperienced users as well as older users. The reason for this may be that young people are used to the user-interface of touch screen technology-based devices such as smartphones and tablets, so they move quickly and want to get quick results. They expected that the system learning time and system feedback time to be fast. In addition, elderly and inexperienced users were more willing to learn how to use the product by reading the warnings next to the icons. The effect of age and experience factors were observed in the relationship between learnability and technology acceptance.

This study shows that there can be a relation between usability and behavioral intention to use and we can pre-

dict that improved usability can result with an increased technology acceptance and use. In terms of user-interface qualities, we found some positive features such as; child camera, time setting function, the visual representation of the dishwasher's current state, the ability to change the location of user-interface (vertical or horizontal), child lock, and having no tangible buttons. On the other hand, slow response, incomprehensible icon design and unnecessary functions were features that negatively affected PBUI's technology acceptance. Also, our findings showed that visual aesthetic qualities can play a strong role in the system usability as well as the technology acceptance of the system.

On the other hand, this study had some important limitations. The first limitation was the difficulty to transport the VUX system in order to test it with real potential users. Because of this technical limitation the study was conducted in Arçelik Çayırova Campus where the product was located and installed. The second limitation was the difficulty of inviting and carrying real users to Arçelik Çayırova Campus due to its location. Therefore, the participants have been Arçelik employees instead of real potential users. The number of participants is the third limitation of the study. As a result of the first two limitations stated above, the size of the sample was limited to 30 participants. Accordingly, increasing the number of participants may result in other usability problems and their effects of technology acceptance. Also methodologically the product is only tested in one session with participants. Therefore, learnability and experienced user-performance could not be measured and evaluated.

6. Conclusion

Concerning the research questions indicated in the Introduction Section; this section presents the results and the conclusions based on the research question.

Research question 1: Which factors of UTAUT influence the user acceptance of PBUI systems?

The most significant factors of UTAUT that influence the user acceptance of a PBUI are experience, attitude and anxiety. Performance expectancy and effort expectancy can be considered as the secondary UTAUT factors that influence the user acceptance of a PBUI system.

Research question 2: What effect do PBUI features have on kitchen product acceptance?

Although the usability and user-interface characteristics were the focus of this study, it was seen that they had no direct effect on behavioral intention to use in PBUI kitchen systems. The results of the survey showed that, the characteristics of the user interface as well as its usability are related to the anticipated level of effort.

The results of the study showed that the design quality of user-interface element as well as the vertical/horizontal arrangement feature may have an important impact on the effective, efficient and satisfactory use of a user-interface based on a new technology. However, it was discovered that the effect of the quality of the user-interface on its technology acceptance is minimal. On the other hand, we must emphasize that each individual component of the user-interface must be able to convey the correct message to the user when the needs for the healthy operation of the system.

Research question 3: What is the role of usability on the technology acceptance of PBUI kitchen systems?

As this study tried to explore the relation between technology acceptance and usability of a user-interface our findings suggest that efficiency and effort may be more important in smart kitchen systems for the acceptance of the technology.

Consumers will buy products with the expectation of satisfaction related to their technology and aesthetic in the kitchen context. A system must perform its main function while providing sufficient information support to its users. The findings of this study clearly showed that when using a system with a PBUI, the user may have expectations that the product to be consistent, compact, sequential, and logical. The control of 3 different products, which

are part of a system, from the same user-interface has led users to find the use of this system efficient.

Based on our findings, the fact that our proposed model is insufficient to explain the acceptance of PBUI systems designed for the kitchen context is an important result. This study's model can be utilized in future research to investigate the technological acceptability of other products as well as the factors that have the greatest influence on acceptability. In addition, new technology acceptance models can be developed by changing the factors of the UTAUT model chosen to be used in this study. Based on the UTAUT model, we did not focus on a particular acceptance variable and instead explored all possible factors that may have an effect.

Most of the participants' comments were about the prototype, which was an uncommercialized version of the product. Therefore, after the product becomes commercially available a similar study can be conducted and the results can be compared. In the near future, PBUIs used in the kitchen can be converted from two-dimensional to three-dimensional user interfaces. Holograms could be new interfaces in the kitchen to help users control their products. Both tangibles and virtual user-interfaces can be used together for interface control, as user preferences may change.

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Quarrying and construction operations in Aeolian Larisa with a reference to "building technology" and "building economy"

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Abstract
Building technology and building economy concepts are relatively new, important research subjects in archaeology. While the term "building technology" refers to technical processes and methods of construction operations such as exploitation, transportation, processing and fine dressing; "building economy" focuses on costs and consumption of resources or quantification of labor forces and costs, etc. Either way main purpose is to apprehend the background of the operations. These studies involve several researchers from various disciplines and each of them contribute according to their expertise, which ease to enrich these research areas. Quarries are initial points of construction operations and they provide useful information regarding building technology and building economy. In Larisa, observations on quarrying and as well as construction processes proceed cordially with the ongoing architectural field surveys which are being conducted since 2010. Observations have showed that every rock cluster in and around the Larisa settlement have been used as a natural resource material for the constructions. More than a hundred traces of stone extraction have been identified and have been documented through drawings and photographs. Besides, most of them have been manually recorded by a handheld GPS and were gathered in a detailed catalogue, according to their places. Thus, the applied method and the entire quarrying process can clearly have been identified through these traces. According to these marks, it is understood that levering and splitting were principal stone exploiting methods that were used in Larisa which have been applied by the entire Mediterranean & Mesopotamian civilizations throughout the centuries.

Keywords
Andesite, Building economy, Building technology, Larisa, Quarries.

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1. Introduction

In recent years, building technology and building economy have become increasingly pivotal and affluent research subjects in archaeology and history of architecture. The term "building technology" refers to technical processes and methods used in construction operations. The related topics of building technology include the exploitation or the production of raw materials, choosing the convenient building area and transportation of materials to the construction site, the tools that were used during different stages of these operations, and the construction operation itself. "Building economy" focuses on the consumption of resources, labor forces, and building costs. In other words, quantification of the expenditure on money, quantification of working hours, and energy consumption for building activities are among the topics of the building economy. Thus, the building technology and the building economy aim to explain the background of an ancient construction project thoroughly. (Martin, 1965; Martin, 1973; Glotz,1965).

Every construction project in the antiquity comprises several stages involving many different actors. Benefactors, architects, contractors, decision makers, construction/building commissions, workers, slaves, stonemasons, sculptors, carpenters, and blacksmiths, among others. The process starts with planning, and continues with providing or manufacturing raw materials, logistics, constructing, and maintenance.

Through excavations, field-surveys, studies on written and epigraphic sources, evaluations and analogies, a considerable amount of literature has been published on every stage of a building operation diachronically or on regional-local basis. Thanks to these studies, many details of ancient constructions have been revealed, and the background of these operations were apprehended clearly.

Besides being an interdisciplinary working area, studies on the building economy and building technology gather diverse experts from various disciplines, including archaeology, architecture, art history, urban planning, geology, sociology, economics, and anthropology, which enrich these studies in a broad sense. As a result, with joint efforts and collaboration of these experts, construction processes can be evaluated from different perspectives.

Quarries are initial spots of construction operations, and they provide useful information on building technology and building economy. They provide not only technical information such as extraction methods and tools used in order to get blocks, or the quantity of gained material or labor forces, but they also contribute to the understanding of the socioeconomic status of the cities, including their prosperity. Quarry areas and quarrying organizations may vary in relation to the economic situation, scale, or construction activities of the city. Some of them covered enormous areas, some were well-organized and well-established. For example, Gebel el Silsila sandstone quarries served throughout New Kingdom in Egypt or Naxian marble quarries in Greece were among the famous well organized quarrying areas of ancient the world. Some of them were smaller and they did not necessitate wide-scale organizations. In either case, these worksites had independent functions, and they were an important part of the economy which indicated potential labor forces, production force and capacity which would clarify "social business space" of a city besides giving technical knowledge on obtaining raw materials and construction. As part of the scope of recent field works at Larisa (Aeolis), quarrying operations, as well as construction processes have been explored systematically[1]. This article aims to contribute to the growing area of research on building economy and building technology by featuring the case of Larisa focusing on the site's quarrying and construction operations, and the related questions.

2. General information and research history of Larisa (Buruncuk)

In ancient times, the region along the Aegean coast and inland between Adramyttion (Edremit) and Smyrna (Izmir) was defined as Aeolis. Larisa on the river of Hermos (Gediz) was

one of the prominent cities of southern Aeolis. The hilltop over the modern Buruncuk village near Menemen, Izmir bears the ruins of ancient Larisa. The ancient settlement occupied two hilltops expanding from the Sardene (Dumanlı) volcanic mountain towards the Hermos Plain (Figure 1). Larisa surely benefited from Hermos River and the valley, which provided wealth and abundance to its inhabitants. The earliest settlers of the city were apparently indigenous people (e.g. Lelegians and Pelasgians), who were residing in the entire Aegean region before the arrival of Greek tribes (Doğer, 1998).

Figure 1. *Larisa and neighboring settlements locating upper part of western Anatolian coast (Külekçi, 2021).*

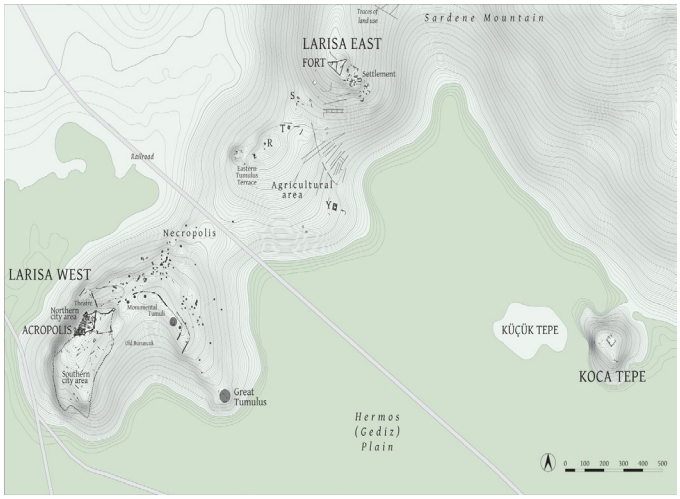

Figure 2. *General settlement plan of Larisa (Buruncuk) (Külekçi, 2021).*

Archaeological finds reveal that the settlement history of Larisa dates back to the Neolithic period. Some wall fragments and small finds from the Bronze Age are also apparent (Özdoğan, 2018, 125). However, the visible architectural remains today belong to the time between the 6th and 4th centuries BCE representing primarily the Greek and Greco-Persian layers. The inhabitants of the city abandoned Larisa abruptly by the beginning of the 3rd century BCE. Due to the lack of Roman and Byzantine settlement layers, Larisa mainly shows the characteristics of an early Greek settlement (Saner, 2018, 14).

The remains of Larisa can be seen at the top of the two hills mentioned above. The area between these two inhabited hills, shows traces of farm buildings and agricultural terraces. The lower hill 100 m. above the sea level, is defined as Larisa West while the higher one, in the East of 180 m. altitude, as Larisa East. Both are residential centers and they represent unique characteristics by means of social dynamics, and structures[2] (Figure 2).

The main settlement Larisa West consists of three districts. The acropolis is surrounded by defense walls, and it houses residential buildings of the rulers, as well as several sacred and public buildings. The urban areas consist of dwellings of the prominent families of the city and a wide necropolis has developed next to the urban center. The higher hill "Larisa East" has two major sectors. One is a triangular-shaped fort probably established during the 5th century BCE. Its construction was closely related to the construction projects of the western acropolis. The fort must have served as a shelter for the eastern dwellers and for Larisa West's

residents in case of a threat or a siege. The other sector in Larisa East is defined by the settlement area, which occupied the terraces that lead towards the Hermos Plain. In this area, there are ruins of simple dwellings meant for the eastern residents of the city, who were most probably responsible for the general logistics (Külekçi & Saner, 2021). Two hillocks rising in the level of Hermos Plain are also considered as parts of Larisa. While there are no traces of buildings on Küçük Tepe, Koca Tepe houses a monumental building, probably a farmstead with thick walls and a courtyard.

In 1902, the first excavations began as the joint effort of Germany and Sweden. Johannes Boehlau, archaeologist and museum curator from Kassel (Germany) and Lennart Kjellberg, archaeology professor from Uppsala University (Sweden) conducted the first excavations in Larisa. Kjellberg's primary motivation was to explain the bonds between Mycenaean culture and orientalizing Greek culture through studies on the history of ornament. Larisa was specifically chosen to be excavated, and to support this hypothesis. The field works terminated after three campaigns held between 1932 and 1934. A three-volume book entitled "Larisa am Hermos" was published consecutively in 1940 and 1942. After the field campaigns, the publication of the results and some further studies in the Istanbul Archaeological Museums, no other work was done in Larisa until 2010[3] [4].

Since 2010, a team from Istanbul Technical University under the directory of Turgut Saner has been conducting an architectural-archaeological field survey. The new studies focus on the documentation of settlement patterns, features of the architecture and construction techniques. Observations on the wider settlement areas have already provided a completely new comprehension of Larisa's urban character (Saner, 2016, 62). A considerable part of the documentation works at Larisa has been devoted to the activities of the ancient quarries, which have remained beyond the scope of the early 20th century field works. The location of ancient quarries and stone extraction techniques were documented with the help of the traces left on solid bedrocks and building blocks[5].

3. Geology of the region and characteristics of the local stone

Geographical formations directly influence the development of the cities in all spheres. Thus, it is crucial to understand the geological and geomorphological essentials around Larisa (Kayan & Öner, 2016, 17) where constructions were primarily based on local andesite.

As mentioned above, the settlement hills of Larisa are natural parts of the volcanic Sardene (Dumanlı Dağ). Kayan and Öner (2016) identified that Dumanlı mountain is a complex volcanic mountain with a wide caldera, which was cut by a recent fault zone running NW-SE. An elongated andesitic ridge which extends from the southern part of this caldera dominates a part of the Hermos Delta Plain, one of the largest coastal plains in Turkey[6].

Hermos Delta Plain and its vicinity are enclosed by high mountains and natural gorges (Kayan & Öner, 2016, 9). Mountain ranges that tend towards east-west and major rivers flowing between these depressions have generated geomorphological formations of the Aegean coasts of Turkey (Kayan & Öner, 2016, 9). Essential fault zones likewise have an important contribution to the formation of the region. In Larisa's case, Dumanlı and Yamanlar mountains determined the basic formations, whereas the natural gorge of Menemen between them marks the link to the interior fertile alluvial plains of Hermos valley (Kayan & Öner, 2016, 8). Another gorge between the Dumanlı mountain and the hilly area of Foça (anc. Phokaia) also provides a natural passage to Kyme, an important harbor city, and to the northern Aegean coastal zone, including Bakırçay-Bergama inner planes (Kayan & Öner, 2016, 8). Provided by these ravines, Larisa possessed a wide and rich hinterland, extending to the inner parts of the Aegean region (Kayan & Öner, 2016, 8). Hence, Larisa's strategic location on the inner edge of the Hermos Delta Plain did not only provide an advantage of dominating and controlling the plain

but it also ensured safety against direct attacks from the sea by being distant from the coast (Kayan & Öner, 2016, 9). The position of the city dominating the fertile Hermos Plain also had control over natural trade routes between the north-south Aegean coastal zones (Ionia and Aeolis) and the roads coming/leading from/to interior regions (Lydia) (Kayan & Öner, 2016, 8).

The actual form of the Hermos Delta Plain has developed as a result of neotectonics during the third geological period, especially the Neogene (24-2.5 million years ago). Severe and long-term volcanic actions occurred as a result of these tectonic events (Kayan & Öner, 2016, 11). Landforms have developed on these volcanic formations, and as a result, the whole area now has a volcanic character. During the Neogene, the territory was covered by pyroclastic material at first, then it was covered with andesitic lava (Kayan & Öner, 2016, 11). Dumanlı mountain, where the city was founded, is a part of these formations and the resources for the Larisaean buildings were obtained from these andesitic forms.

Andesite is an extrusive igneous (magmatic) rock with porphyritic texture. Specific combination of minerals, chemical compositions and igneous textures generate different types of igneous rocks. (Erinç, 1982). Extrusive igneous rocks usually form from a volcano (in Larisa's case it is the Dumanlı Mountain), therefore they are called volcanic rocks. Andesite is hard and resistant to deterioration, and so it is considerably difficult to be processed. However, it is also suitable for architectural purposes. Just as in Larisa, in some other neighboring ancient settlements (e.g. Neonteichos, Kyme, Phokaia and Gryneion) andesite was preferred in the construction of various edifices.

Figure 3. *Multi-colored andesite block application from Larisa West.*

Andesite is composed of several minerals, predominantly hornblende and plagioclase. The minerals Fe- and Mg-rich silicates give andesite its color in accordance with their concentration (Erinç, 1982). The regional andesite presents wide range of colours of bluish grey, reddish-brown, or deep violet and sometimes even different tones of pink, plus dark basaltic versions. On-site observations have shown that this diversity of colors does not refer to a distinction between quarries; stones with all primary color groups may appear at the one and same quarry in Larisa. In Larisa East, the reddish-brown variation is predominant. Multicolored stones were randomly used together within the masonry (Figure 3). Practical usage of quarries with a minimum loss of material was apparently the main concern and considered as being more important than decorative purposes.

4. Settlement plan and quarry areas

As mentioned above, quarry areas may differ, depending on the economic situation, scale, or necessities of construction activities of the city. Quarries (including minor stone sources) may exist close to the city and sometimes they are even located inside the city. Thus, the quarrymen could easily reach out and operate them. For instance, in the ancient sites such as Athens, Piraeus, Mycenae, Delos, Syracuse and Akrai, quarry areas existed inside the cities. In Demetrios, Piraeus, Aegina, Corinth, Paros, quarry areas lie along the defense walls (Dworakowska, 1975, 94-95). However sometimes, quarries were opened far from the city, and they thus became independent operations which could occasionally be used for commercial purpose as well. The stones of Parthenon were brought from the Pentelikon quarry located 17 km away

from the construction site. Although closer quarries existed, Pentelikon was chosen for its marble's high quality (Korres & Vierneisel, 1992). Similarly, in ancient Egypt, limestone and sandstone quarries located on either side of the Nile were preferred for the buildings; however, rather than their easy access, the character of the rocks was more important (Harrell & Storemyr, 2009, 29). Either way, the main purpose was to obtain suitable raw material for constructions.

Steep, rocky slopes of the settlement and free-standing rock clusters in and around the settled areas of Larisa were completely used for stone extraction purposes. They were apparently considered as the most convenient locations for transportation. Almost every convenient piece of rocky fields were used in constructions. Quarry areas existed inside the settlement of Larisa and they extended along the city walls. So far, a hundred and fifty traces of stone extraction activities have been identified and documented through photographs and drawings. The locations of most of these traces have been recorded by a handheld GPS in order to accomplish a detailed catalogue. The applied methods and the entire quarrying process are apt to be clearly identified through these traces.

Quarrying activities form four major groups in accordance with their areas: Larisa East, Larisa West, Koca Tepe-Küçük Tepe and the area between Larisa East and West –some areas present sub-groups. Each area has a specific code that simplifies to determine the extraction marks which form the catalogue[7]. Determination and classification of quarry areas in Larisa facilitate correlating quarry areas to buildings. In addition, it eases understanding the details of quarrying and construction operations from extracting to transporting, fine dressing and positioning/placing.

4.1. Larisa West

As previously described, acropolis, necropolis and the urban areas altogether form Larisa West, the main settlement of the wider city organization. The acropolis was surrounded by archaic and classical defense walls. Old and new palaces, buildings such as the Megaron, temple with altar, propylon, as well as the Northwest Building are to be found inside the walls, along with storages and wells. The southern and northern slopes of Larisa West were occupied by urban areas (Saner, 2018, 242). The steep northern slope was furnished with the theater and fortification walls (Külekçi & Saner, 2021). North-eastern and eastern slopes of the hill are dominated by an extensive necropolis with different types of grave units, predominantly tumuli. Quarrying activities in Larisa West have been identified in four different areas, northern quarry area, southern quarry area, acropolis and necropolis.

4.1.1. Northern quarry area

Starting from Tower F, anti-clockwise through western slopes of the acropolis, northern, north-western and western slopes of Larisa West all are considered part of the northern quarry area. On the east of tower F, which faces the abandoned village of Buruncuk and necropolis, massive rock clusters present numerous extraction marks. Above the northern quarries (with leftovers of now abandoned 20th century quarrying) on higher levels, there are traces of ancient quarrying activities on the surfaces of rock bundles. Twenty-eight extraction

Figure 4. *A column shaft which is prepared for extraction but left in situ.*

marks have been identified on the northern quarry area and, additionally, there is a column shaft lying in situ on a bedrock, prepared for extraction but left unfinished (Figure 4).

4.1.2. Southern quarry area

The second group of extraction marks defined as southern quarry area stretches along the southern and southeastern slopes of Larisa West; it marks one of the major quarrying areas of the entire settlement. Generally, small or large free standing rock clusters in and around the settlement have been used for extracting blocks. Only in the southern quarry area existed a true quarry façade overlooking the old Buruncuk village (Figure 5). Besides, there are many free-standing rock bundles which still show traces of ancient quarrying activity. Traces extend all along the city walls of the settlement, and this area must have been used to provide building material for both the outer ward and the course of the fortifications. Fifty-one different well preserved extraction marks have been identified here.

4.1.3. Acropolis and the urban area

Inside the acropolis walls and in the urban area in the south, twenty-two different exploiting marks have been documented. Some traces are found on the rock surfaces, whereas others have been identified on the blocks inside the building remains. The latter observation is important not only to understand particular extraction techniques but also to date these applications that were commonly used in Larisa. Accordingly, the earliest practice with wedge-holes has been noted at the early 5th century BCE circuit of the acropolis.

Figure 5. *A quarry detail of the long quarry wall in the southern quarry area in Larisa West which is facing through old Buruncuk village.*

4.1.4. Necropolis

Eighteen different extraction marks have been identified in the necropolis area. The quarrying activities carried out in the necropolis were rather limited to free standing rock clusters. Along the slopes below the monumental tumuli (on which the ruins of modern windmills rest), bordering the northern part of old Buruncuk, there are many rock clumps that carry traces of various extractions. The area around the Great Tumulus, which was built on a steep cliff that overlooks the Hermos valley, bears extraction traces apparently related to the construction of the tumulus. One is found next to the probable grave chamber of the grave mound. Besides, the traces along the circle of the tumulus show that the bedrock was smoothed to hold the architectural blocks of the krepis wall.

4.2. Larisa East

At the top of the eastern hill, a triangular shaped fort with cisterns inside and a housing area on the southeastern terraces define the eastern settlement. The Lesbian masonry of the fort with distinct similarities to the fort of Larisa West (early 5th century BCE) suggests that the former was built during the extensive construction project applied onto the western acropolis. The whole eastern area presents a steep topography which divides each housing terrace with big rock clusters that were used as a resource for building material both for the dwellings and the fort. Building blocks of the fort were obtained from higher levels, especially from the rock clusters in its north-northeastern parts, as exemplified by numerous quarrying traces. The dwellings' blocks have been exploited from the rock clusters nearby, on the same level as the dwellings. Twenty quarrying marks have been identified so far in Larisa

East, but it is evident that there should be many more.

4.3. The area between Larisa East and West

Today, the area between Larisa East and West is divided by a railroad (İZBAN) connecting Izmir to northern towns. The southern part of the railroad close to the level of the plain was part of the necropolis, while the northern part is occupied by the ruins of ancient agricultural establishments. Three enormous bulks of rocks with numerous extraction marks have been identified near this area. One of them is close to Building Y, while the other two are located around Building R. These rock clusters were probably used as a resource material for the construction of agricultural buildings and grave mounds here.

4.4. Koca Tepe and Küçük Tepe

The hills, called Koca Tepe (Big Hill) and Küçük Tepe (Small Hill) on the level of Hermos Plain, are considered as part of the Larisaean territory. Ruins of a monumental farmstead (5th or 4th c. BCE) are to be found on Koca Tepe, where seven groups of quarrying traces have been identified. Rock clusters here were obviously used for the construction of the farmstead and related buildings. On Küçük Tepe, no traces of buildings exist. However, there are many extraction traces identified on the rock surfaces suggesting that this area served the construction process on Koca Tepe.

5. Quarrying and construction process in Larisa

The remains of Larisaean constructions are mostly preserved up to a modest height. Foundations, retaining walls and independently rising wall sectors are all made of andesite obtained from nearby quarries or rock clusters. Upper parts of the walls were constructed of mud brick and timber and they disappeared throughout the centuries. Many different tones of local andesite are to be seen in the foundations, at the wall bases, walls and also at moulded architectural elements. In addition to andesite, a local tuff called "Phocaea stone" was also used primarily for the production of architectural elements, such as column capitals and frieze blocks. Additionally, a somewhat shiny white flat limestone can be seen inserted into the masonry as well. The majority of these stone building materials consists of andesite, and quarrying and construction processes can be traced via andesite quarries which exist in the vicinity of the settlement. Stone extraction marks are scattered all over the rock clusters, therefore it is very easy to understand the extraction methods applied for the Larisaean constructions.

Studies have shown that there were basically three types of block extraction methods in the ancient world: levering, splitting or channeling. Levering

Figure 6. *Different type of stone extraction marks on the quarry wall. Upper part of the rock, a single wedge mark was left on the surface for splitting (S); on the bottom-front of the rock, possible lever/crowbar mark was left for levering (L).*

refers to inserting levers, crowbars or stone tools into the stones to expand open fractures, splitting means creating fractures by strokes with a sledge-hammer and wedging, channeling (carving) points out opening channels on the rock by carving with hammer and chisel, pickaxe or stone tools, heating with fire, sawing or drilling[8]. Either of these methods or a combination of them were used in the ancient world for extraction purposes (For detailed information please see Quarryscapes project fact sheet nr.5, URL-1). At Larisa, the traces indicate that levering and splitting techniques were used to exploit the natural andesite (Figure 6). Numerous wedge marks and grooves have been identified on the surfaces of rock clusters (and worked stones).

Figure 7. *Wedge marks showing before the splitting process.*

Figure 8. *Wedge marks showing after the splitting process.*

Markings left by wedge holes and grooves reveal different dimensions, positions and numbers.

Depending on the quarrying method, two types of splitting holes can be identified: narrow-linear and wider regularly carved channels (or grooves). The narrow-linear channels are divided lengthwise into two sub-groups. These marks obviously served for the splitting of small or middle-sized blocks from the natural rock. In several cases, a single line 20-30 cm in length (occasionally even longer), 1-2 cm in width, and of 3 cm in depth can be observed on the surfaces. The other group is a series of wedge holes with each one much shorter than the previous type. These wedge-holes are about 8-12 cm long, 1 or 2 cm wide and 3-5 cm deep –the dimensions change occasionally. The distances between the wedge holes are generally 3-4 cm and each row comprises an average of 3-5 or 8-10 holes. Some of them were directly set on the surface, while the others were carved slightly deepened on the surface of the rock to form a channel. These channels can be considered as the preliminary stage of opening smaller holes on the surface. Apart from the longer or smaller/shorter wedge-holes, there are also a few cases with larger openings, which are arranged in a right angle to each other. These are 70-90 cm long, around 10 cm wide and 10 cm deep. This method seems to differ from the widespread method of splitting through other types of wedge-holes. The significant distinction is the regularity of placing of the openings/channels. The quarrying marks identified in Larisa refer either to the preparation for block extraction or to the current state after the extraction from the bedrock (Figure 7 & Figure 8).

In contrast to the considerable number of examples of block extracting marks, later processes such as transportation and lifting, can only be scarcely followed. However, there are a few examples of bosses left on the front surface of the blocks, which refer to transportation and lifting. Transportation methods depended on material or scale of the building elements or distance of the quarry site (Wright, 2000; Orlandos, 1966; Martin, 1965). Architectural

elements were transported via water or land, using ropes, sledges, wheeled systems, levers etc., including animal and manpower (Wright, 2000; Orlandos, 1966; Martin, 1965). It is unclear how the Larisaean quarrymen and workers transported building blocks from the quarry area to the building site. However, regarding the distance of the andesite quarries to the construction sites and regarding the block sizes, only a modest number of workers for each block must have been involved into the process. Cranes or pulleys must have been used for lifting as well. Architectural elements made of Phokaia stone, which was extracted quite far from the settlement, must have been transported via water (Hermos River) and land route. Finally, limestone should be brought from Yamanlar Dağ area.

There are also traces of stem-holes that were opened on the upper surfaces of the blocks, which was meant for fine placement of the blocks with the help of metal levers or crowbars. Finally, there are traces of metal clamps which were used for attaching and securing building blocks. Regarding the general knowledge on quarrying activities and construction processes in ancient times (Wright, 2000; Orlandos, 1966; Martin, 1965) and the traces of the tools remained on the surface of the blocks and rocks, it can be said that hammer, pick, pointed and flat chisels made of iron must have been used for quarrying and carving in Larisa. Other than these fine dressing tools; ropes, levers, crowbars, pulleys, cranes and measurement tools must have been used for transportation, lifting and positioning of the blocks and other architectural elements as well.

So far, technical details of the construction processes were discussed, starting from the quarrying stage to the erection of the buildings based on the surviving wall fragments, architectural elements and blocks or the traces which were left on quarries. In contrast to the technical part of the construction process (building technology), direct data for the building economy perspective are inadequate due to the lack of epigraphical and other written sources. A number of examples from well-known sites such as Erechtheion at Athens, the Temple of the Olympian Zeus at Akragas, the Temple of Apollo at Didyma give detailed information on opening quarries for a specific construction project, construction operations, labor costs and raw material costs, workshops, even the names of the benefactors, members of building commissions, architects and stonemasons. Hence, the data enable the quantification of the expenditure on money, quantification of working hours, and energy consumption for building activities (Bingöl, 2012; Wesenberg, 1985; Gruben 2001; Tuchelt, 1992). In Larisa's case, these calculations are hard to indicate. Nevertheless, the results of the architectural field surveys and excavations enable to estimate at least the dynamics of the socio-economic aspects of Larisaean building operations. An overall idea can be given about the parties involved in these projects, as well as the decision-makers and benefactors.

Technical aspects of the Larisaean constructions can be well understood based on the traces of quarrying actions. The lack of written sources prevents the calculation of labor force, labor costs and resource material costs, which actually constitute an important part of the economic aspects, from the planning to the finalization of the projects[9] [10]. It is unclear how many workers, stonemasons and craft workers were in charge of these operations. The blocks prepared for constructions at the southeastern quarry were generally "middle-sized", i.e. 70x70 cm., which two or three trained workers possibly detached, roughly processed and moved on short distances. This must have occurred so during the construction of the 4th century BCE city walls along the east slope, where a considerable part of the southeastern quarry existed. Workers who had completed the first stage must have handed over the blocks to the skilled masons for further treatment. The more or less identical, rectangular blocks must have been accurately placed into the wall immediately after the fine workmanship. The front side of these blocks are rusticated, whereas the rear sides were left uncarved. The entire course of the eastern wall is ca. 79,5m., it consisted

of an outer and an inner shell, however, the height is unknown, thus it remains hard to estimate the total number of quarry workers and skilled masons who were involved.

The overall operations of quarrying and construction in Larisa must have been organized under the supervision of a small commission consisting of the ruler of Larisa and "specialists" among the elite inhabitants of the city. A chief architecton must have been in charge of the projects and coordinated the quarrymen, stonemasons and craftsmen (including producers of mud brick and carpenters according to the nature of the construction). The necessary labor force for all stages must have been provided by the inhabitants of Larisa East considered as actors of logistics. As for the skilled masters and stone carvers; it is not easy to reconstruct the share of the locals and of foreign workers. The locals might have worked side by side with craftsmen invited from outside the city as it was the case with the architectural terracotta plates and other roofing elements[11].

Depending on the scale of quarries and the amount of exploited material, it seems that Larisaean quarries fulfilled the demands of the city, and the quarrying operations seem to have been small-scale but well-organized and they were not meant to be part of a wider commercial undertaking. Stones were exploited from the most convenient areas nearby, they were divided into sizes that were asked, and were practically (easily) transported to the construction site, a process, which aimed at cutting down the expenditures.

The entire area of the ancient settlement is full of extraction marks, especially wedges, and it is very likely to increase the number of these examples. However, the variety of extraction techniques would not differ that much. Levering and splitting techniques have been applied by the entire Mediterranean & Mesopotamian civilizations throughout the centuries, and these were practiced as principal stone exploiting methods in Larisa too. In Larisa, these techniques were used since the late 6th or early 5th century BCE for extracting andesite blocks from parent rock and dividing them into smaller pieces. Picks or pickaxes, wedges, hammers, chisels, levers and crowbars must have been used for these purposes.

Many unanswered questions still remain on the economic and technical aspects of the Larisaean quarrying and constructing operations. To develop a full picture of construction operations in Larisa, especially the progress of quarrying and the later stages after quarrying, such as transportation, fine dressing, etc., additional studies are needed. Quantification of the expenditure on money, working hours, and energy consumption for building activities need to be discussed and calculated at least hypothetically on the basis of the already gained data.

Endnotes

[1] For detailed results and reports of the Larisaean architectural surveys, see: Saner, T., Külekçi, I., & Öncü, Ö. E., 2018; Saner, T., Külekçi, I., & Mater, G., 2017; Saner, 2016

[2] Ilgın Külekçi studied the settlement structures of Larisa in her doctoral dissertation (Istanbul Technical University Graduate School, Architectural History Program).

[3] Excavation and research history of Larisa were examined by Gizem Mater in her Master Thesis (Istanbul Technical University Graduate School, Art History Program)

[4] The results of the 20th century excavations of Larisa were published under the name "Larisa am Hermos" in three volumes. The first volume gives general information about the geography and history of the city and gives detailed discussions on the architectural remains which were unearthed during the campaigns. A comprehensive list of the architectural stone pieces is also included. The second volume displays the architectural terracotta plates and other small terracotta finds studied by Lennart Kjellberg. The third volume provides a complete catalogue of the small finds of Larisa, including the descriptions and historical dating of each object. For more information, see: Boehlau & Schefold 1940; Åkerström & Kjellberg 1940; Boehlau & Schefold 1942.

[5] Quarrying operations in Larisa are

being examined in Mater's doctoral dissertation.

[6] For more information on paleogeography and geoarchaeology of Larisa see Kayan & Öner 2016.

[7] Stone extraction marks which were documented during field surveys were gathered altogether in a catalogue which was discussed in detail as a part of the Mater's doctoral dissertation.

[8] "The QuarryScapes Project: conservation of ancient stone quarry landscapes in the Eastern Mediterranean" gives detailed examples on quarrying activities and quarry areas through selected settlements around Eastern Mediterranean. Several factsheets, case studies and proceedings have been published by the contributors of the project. For more information, see their website: http://www.quarryscapes.no/index.php

[9] However, it is possible to undertake rough calculations about the average size of the blocks, the amount of stones invested for buildings. In addition, the distance and operations between the quarry, the construction site and buildings can also be hypothetically suggested.

[10] On the other hand, the majority of the building materials of Larisaean constructions are mudbrick. To estimate the economic aspects, such as the quantification of material and labor costs of the upper parts of the buildings, it is necessary to prepare proper restitution proposals for constructions.

[11] Emre Öncü points out the involvement of mobile/travelling terracotta workshops in the 6th century BCE in Aeolis, who had commissions in Larisa and Phokaia as proven by the archaeological finds displaying the same production techniques and forms. (Öncü, 2013, 254-255).

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A studio exercise designed to question the concept of originality: An approach to research in architectural education

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Abstract
What are the possible grounds for practicing 'research' in design studio? Design studios have a tendency to assume that the 'research' and 'design' happen independently and they complement each other intuitively. In this paper, this assumption will be challenged through presenting and discussing a year-long studio exercise for a house design in the second-year level, where 'researching others' design work' is defined as the fundamental component of the given design problem, as dominant over other usual ones such as program, scenario, function, context, etc. The objective is defined as a quest into the diverse and variable interrelations of practices of design and research, in which, not only the design process is defined in majorly research-based means, but research is also redefined as something designed in a highly individual and subjective act. In this frame, the paper will largely discuss the notion of 'originality' as a prominent topic in architectural design and design teaching, through questioning the varying means of referring as design actions; such as 'quoting', 'adapting' or 'appropriating'; or even generating a 'cover', a 'sample' or a 'variation' in design studios.

Keywords
Copy, Design research, Design studio, Reference, Originality.

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1. Research in undergraduate design studio

The term 'design research' defines a topic that has been a popular field of interest for decades. In its daily uses, the verb 'to design' is usually referred to an act of creation, boldly implying acts of doing rather than of knowing; nevertheless, scholars of architecture keep registering the discipline with a distinct and particular field of knowledge (Cross, 1999). There is comprehensive research and literature on design epistemology that argues the intrinsic dynamics and qualities of design in its association with research and knowledge. Following Cross, diverse ways and types of contextualizing research in 'design research' have appeared, differentiating research by, for, on or through design (Frayling, 1993). For example 'research through design', the terminology initially introduced by Frayling in his article on Research in Art and Design (1993), was later adopted and analyzed further by many scholars, including Jonas, W. (2007), Zimmerman, J. (2010), Fraser, M. (2013), Grand, S., Jonas, W. (2012), Bredies, K., Joost, G., Christensen, M., Conradi, F. and Unteidig, A. (2016).

Many of such studies and similar others celebrated the process of design and the design product as an emerging medium for the scholarly production of knowledge, increasingly –and inevitably in graduate levels. In many schools, the studio titled as 'research studio', often used for graduate design studios, entailed this new kind of specialized design research formations, which generally deals with specific topics such as digital technologies, structural and fabrication systems, new materials, and parametric or environmental design. They all regard research in a more scientific manner, where one can acquire and come up with new information on a particular subject (Furján, 2007; Fraser, 2013). In other cases, the emphasis is on contributing to the accumulated knowledge on architecture through Ph.D. studies. In both, one can discern a shift from the medium of text to the medium of the artifact, as the most prominent tool for the communication and distribution of new knowledge. Within this upward-trending model, the research object and method started to merge (Mareis, 2016, 35), leading to an increase in the number of graduate studies in the field of architecture, guided by design. Ph.D. by design, the most prevailing topic that stemmed from this flow, started to have an academic validity in many universities as well as an expansion in the literature that discusses the possible means of 'design as research, or 'design research,' where the major question is how we position and justify the product or the artifact as an outcome of a Ph.D. degree. As the nature of graduate studies dictates, the notion of originality stands as the leading quality of the required research and the resulting artifact in all such cases[1]. The senior design studios in architectural schools, particularly ones with the practices of a 'graduation project', follow such a trend as well, especially as an increasing number of schools now tend to define the graduation project as the required study for a master's degree.

This paper, however, aims to approach the design and research pair from another end; the question here is how design studios engage with research at the undergraduate level. The paper will attempt to discuss the practices of research predominantly at the level of earlier design studios of the first couple of years, where any act of both design and research is outlined through purposes of pedagogical cultivation rather than manifest goals aligning with the production of new and original knowledge. One can observe that such discussion is not as common as the broad literature cited above. Research, in design studios at the undergraduate level, is hardly subject to critical questioning but rather regarded as something that exists inherently. The EAAE Charter on Architectural Research, for instance, defines not only the architectural school as a whole but especially the design studio in particular as a "place for research practice par excellence", where students are trained to "establish basic premises, perform critical analysis, conduct intensive research and propose syntheses independently (EAAE, 2012)." Donald L.

Bates problematizes this very account regarding research as a natural component of the undergraduate studio, especially on the ground that now it is a rather indispensable practice of graduate design. In his argument, this casual assumption that regards design studios as necessarily part of a research culture, especially in light of the conflicting allegiance with the profession and its required competencies, is already a problematic expectation (Bates, 2015, 101-102).

The means and ends that research practices emerge at the undergraduate studio in its most usual and conventional way are also open to critical questioning. Most conventionally, and especially in the earlier studios up to the senior level, research appears in the form of 'case studies' or 'precedent analysis', where the semester's studies begin with the analysis of assigned cases that are somewhat relevant to the semester's project. The case study is regarded as an initiator, coinciding with the earlier stages of a design project, i.e., before the "real work of designing begins" (Lawrence, 2015). Its efficiency is reduced to solely establishing a ground or a context for the possible future design propositions, which should not continue to exist once the real design phase starts. As was also problematized by Bates, research as; "interrogative, iterative working through of a specific line of inquiry in pursuit of testable design qualities and architectural effects throughout the duration of a project are seldom enacted (Bates, 2015, 102)." This common perception translates as a long-standing pedagogical split in architectural education between design studio production and advanced intellectual production, which is to be acquired either in history and theory courses of the curriculum or in research at the graduate level; Ph.D. by design, as discussed above.

Such critique of research practices in the undergraduate design studio reveals that, although the recent development of the idea of 'design research' facilitated an enhanced legitimization where the design product could be defined as research, it did not similarly ease the way that practices of undergraduate research could actually be defined as "real work of designing." Anyone involved in the design studio would acknowledge that design practices seldom develop ex novo, but almost always are based on an existing body of knowledge (as students are constantly told that they do not need to discover the Americas again). Yet, the relationship of the studio with research and particularly with research on what has been done before, is rather an uneasy one, as there has always been a disciplinary anxiety with the act of making manifest references to the design work of others' in the design process. Lawrence places the source of this anxiety in fear of losing the most prioritized quality assigned to the artifact, which is accustomed to being defined as 'originality' (Lawrence, 2015)[2]. The value attained to the architectural artifact can seldom be thought independent of its distinctive and peculiar qualities, which is, on another level, intrinsically related to the idea of creativity. Being influenced by another work or making particular references to others' work can hardly be part of the valuing process as it is destined to fall outside the territory of personal creativity. Lawrence's approach regards this as the crisis of modern architecture (Lawrence, 2015).

The discussion on the concepts of originality and influence on accounts of modern architecture and modern architectural historiography well exceeds the scope of this paper; nonetheless, the notion of 'anxiety' attributed to the architectural discipline above resonates with the primary set of observations carried out by the authors of this paper, which bases the central problem definition on originality. The widespread myth on architectural thinking and production, which claims that the design process begins in the creative mind of the architect, where original design ideas materialize out of thin air and end up in the architectural design as a unique work of art, has been observed to be strong with our new-coming students. It is not only that the freshmen students in architectural schools usually arrive there with an inferior mid-level education in the knowledge of design, but the professional community of architects all

around the world also feeds the myth as a part of their social agenda regarding their professional claims (Sarfatti-Larson, 1983). Not the successful ones, but students with mid to low success levels, who experience difficulty adapting their studies in the methodology of design thinking, reveal that what gets in their way can usually be the disciplinary 'anxiety' of original creation. Such students tend to misplace their search for originality not in the overall character of the product but in an 'initial idea', which is expected to shape the design in a unique and creative way right from the beginning. They understand that the design process involves some means of research, but they try to operate 'the research' only after the creative design idea has been 'found' and only to devise the practical agency that would assist the realization of the idea.

2. The studio exercise: Initial premises

In order to address such repeating problems, the authors of this paper undertook to design a semester-long studio task that was built on the practices of referring and on multiple systems of reference, which was intended as a deviation from the overrated search for originality. The task was presented to the studio as an integral undertaking of design and research, which in the end aimed to shift the emphasis from qualities of the product that pertain originality or lack of it to aspects of design methodology where diverse and varied means of making manifest references are positively internalized. Actually, the discussion on possible grounds of defining originality and alternative methods of referring in design is not new, as can also be found in an issue of Perspecta titled "Quote," which was devoted to the discussion of influence and reference in architectural research. (*49*, 2016) Most articles in the issue share a consensus that even though architectural production prizes originality, quotations, and associated operations, rather than being gestures to disciplinary anxiety, are vital as the most potent tools of cultural production (Artemel & LeStourgeon & De la Selle, 2016). Even though these discussions open new perspectives on the discussion of the subject, they mostly remain on a theoretical level rather than tested practically.

Before going into the details of this studio experience, it will be helpful to mention certain particular and intentional reservations for the sake of clarity in framing the discussion. One central assent was that possible references to specific connotations of the term 'design research' or 'research by/for/on/through design' were considered secondary for the studio exercise, if not completely irrelevant. The studio discussions were carefully steered at a safe distance to such discussions for the sake of clarity regarding the distinct contrasting qualities that emerge within the graduate and undergraduate levels of design research, as discussed earlier.

The concept of 'precedents', and chiefly what the discussion that Colin Rowe and his colleagues established in the late 70s on the concept, can entail a second path of working, which the studio instructors chose to avoid deliberately for this exercise. Emerged as an outcome of the controversial approach that he developed towards modernism, the 'historical precedent' in Rowe's argument was utilized as a source of formal invention, implying an emphasis on the idea of composition that is oftentimes regarded as an act of bricolage (Ockman, 1998, 450). It is true that Rowe utilized the term to discuss numerous issues that should not be reduced to a discussion on architectural composition; however, it was consciously excluded from the studio exercise that is presented in this paper because it would present the students with a specific way of looking at the historical work, where formal attributes of a building tend to dominate other possible references one can make to the historical work of architecture.

There are also particular contemporary examples in other architecture schools where the study of historical precedent was utilized as a basis for a more sophisticated analysis of the existing work rather than a cursory cut-and-paste. However, this is still believed to impede the questioning of the research process that the students were expected to contribute to the studio[3].

One studio exercise should also be mentioned here as having quite similar intentions to our case, where the problem was defined around the ways and which the content of history courses be taught and discussed within the design studio courses (Weddle, 2010, 753). In the studio conducted by Weddle, analysis of the historical precedent was regarded in its potential to act as a catalyst for a critical and interpretative design act, which may suppress any barriers between design knowledge and historical knowledge (Weddle, 2010). Although both studio works seem to dwell on common stresses at first glance, in the exercise subject to this article, the intention was not limited to a quest for historical knowledge and how it can be utilized to develop a critical position for architectural design, as stated before, but rather a further quest on how one can refer and organize multiple references.

Yet, a bolder distinction that was aimed to be at work with this work in comparison to works that emphasize the concept of the precedent was that, unlike the latter, the exercise was meant to prioritize a process-oriented study against a product-oriented one. The studio work aimed to implement a variety of exercises, as going to be detailed below, with the goal that students would research into an understanding of multiple references, including the multiplicity of references that the selected references include. In this system of inquiry, the references are based on something other than how the end product of the design process would end up referring to other architectural artifacts, but on how one architect individual would end up referring to others. In that respect, the primary expected product of the whole research process should neither be novel architectural knowledge (as in the design research within a Ph.D. study) nor a new architectural artifact (as in the usual goal of a precedent-oriented design study); but the student herself, as the architect in the process of making. In other words, research was defined as a process that builds up the means that the future architect communicates with the existing design culture and eventually builds up a new subjective position within it. This method of thinking historically is believed to be an essential precondition for operating a disciplinary consciousness and knowledge in design practices, where architectural knowledge would support not a second-rate copy-paste or a shallow understanding of history but a personal awareness in utilizing this knowledge (Miljački, 2011).

3. The studio exercise: Design problems defined as research problems

> "History teaches about the past, not in order to suggest formal solutions for the future but to make sense of the present (Keyvanian, 2011, 35)[4]"
>
> "…in other words, what would Hendrix sound like playing Bartok? (Covach & Boone, 1998)[5]"

The research methodology was introduced as a prelude to raising awareness of students' approach to the processes of design and research not as two distinct practices that influence each other but to highlight the nature of their immanent mutual relations from the very beginning. Therefore the major exercise was formulated to include research problems that were defined as design problems, as well as design problems that were defined through research problems. The semester focused on a single design task, "to design a house", rather than introducing multiple design projects; however, there were a few initial exercises introduced in the form of sketch problems to warm up the students to the expectations of research methodology. These exercises also aimed to initiate research on research methodologies by questioning the possible variety in examining, responding, and referring to the existing body of architectural works. The idea in all was to eliminate the differentiation as it has often been assumed (either by students or by instructors) where research is considered as a rather objective act and design is taken as a somewhat subjective one.

The practical reflections of such aspects of the design of the studio exercise started by informing the students at the beginning of the semester that they would be studying the design of a house and were asked to start building up a collective annotated bibliography

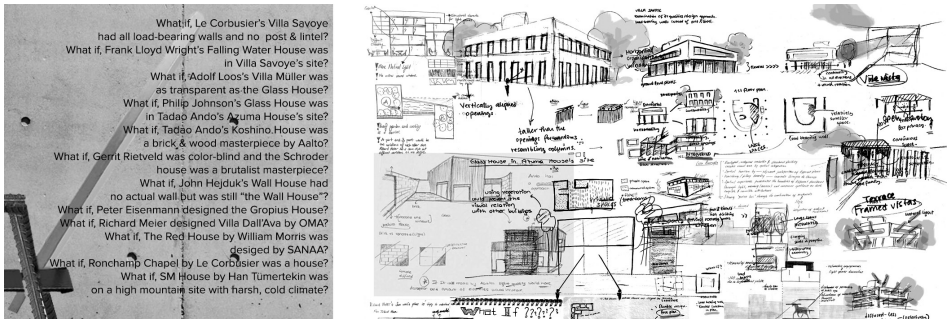

Figure 1. *Examples from student work on the sketch problem defined in a series of "What if" conditions (TED University, Department of Architecture Archive).*

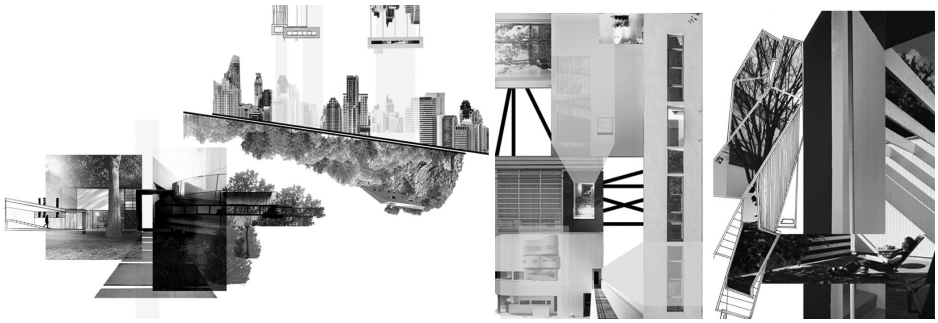

Figure 2. *Examples from collage work for case study houses (TED University, Department of Architecture Archive).*

on the subject, which they actually kept adding to and sharing through course's online Moodle page throughout the semester. This method was one of the initial attempts to overturn the conventional compartmentalization of the studio as analyses phase and project phase. The annotated bibliography ensured the continuity of the research activities throughout the semester. In the second stage, the students were given a number of 'what if' questions that expected highly personalized design interpretations as answers but were only possible to process by conducting well-informed research on the given cases and serious analytical reasoning.

The questions, which can be followed in Figure 1, were not composed to make sense in the historiographic sense but to provoke an ingenious answer. Yet, the ingenuity was not expected to be exhibited via creative and original answers but by sound, analytical research and a good understanding of the cases. One implicit assertion in the assignment was that the act of design, including any notion of creative action, began before research and not after it: by composing good research questions, one may include a very subjective opinion on what should be known. The question "What if Le Corbusier's Villa Savoye had all load-bearing walls and no post & lintel?" for instance, asks how one can take out the essential component in Villa Savoye while being able to claim that it is still Villa Savoye nevertheless. That will require a mature understanding of the 'five principles' and a design proposal to introduce a new take on them.

In another initial exercise, as shown in Figure 2, the students were given a larger group of house projects. They were asked to produce collages built upon their research of a series of cases accompanied by a couple of semi-random 'phrases', defined as spatial initiators. The case list was built to include as diverse examples as possible in terms of time, location, approach, etc., while all cases were picked so that none is particularly difficult to learn much about with quick research. On the other hand, the spatial initiator phrases were intentionally composed as very loose statements, all of which were generated randomly. Some of them can be listed here; "unfolded surface, spatial silence, assembled light, hiking verticality, leaking from edges, undecided..

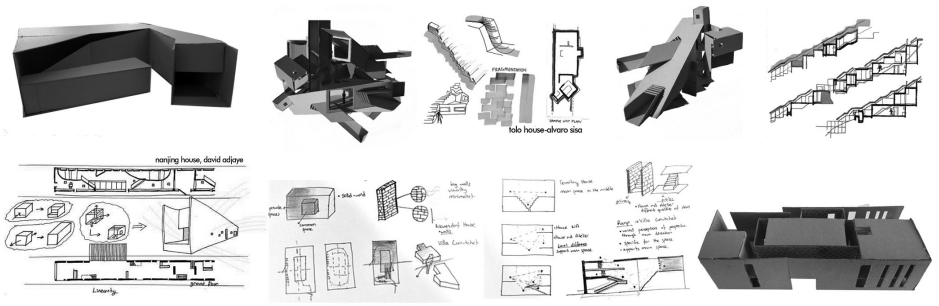

Figure 3. *Examples from sketch problem defined as; 'make a quote' (TED University, Department of Architecture Archive).*

etc". The case study list included several single dwelling/house projects, among which the students selected and coupled with the initiating phases to formulate their collage work. This week-long exercise required the students to shift accustomed terminologies of dis

cussing case studies in design studios. It also aimed to introduce alternative research methods, where personal interpretation of research findings was required to be prioritized above an accustomed objective case study research that is freed from the personal endeavor. All intended to function as initiators for flexible and open interpretation to structure the collages upon, a method which was picked again to facilitate such flexible and interpretative take on presenting research findings.

In the next assignment, the students were asked to produce a diagrammatic model, but this time with a 'quote' from a case study of their own choice, as shown in figure 3. The study of the quote proved to be extremely helpful in generating good discussion in the studio by combining the research on others' design work with the act of design with a series of thought-provoking questions: where and how does a quote begin or end in architecture; what makes a 'citation' a 'quotation' (set aside a good one); can one underquote or over-quote (as in: "As Abraham Lincoln once said, good afternoon"); what other forms are possible, if a specific reference is not a quote (such as translation, sample, cover, variation). All three preliminary exercises were regarded as initiating exercises that try to break the routines of research and presentation of research, especially in the first weeks of the design studio. They were finalized very quickly but were discussed at length in the studio, mostly pondering the fundamental question of the semester: "How do we look at others' design work, and what do we do with what we see to make something of our own out of them?" Therefore, all these relatively small exercises tried to trigger the initial discussion, which is expected to get more profound with the introduction of the final project, as to how one can develop the capability to position oneself and critically respond to the existing knowledge of architecture.

Before arriving at the final assignment, all the discussions tried to open up a different research methodology in studio processes, where the design process as a whole can have dynamic and rather not specific inner relations with research. In this scenario, what is named as research needs to be redefined constantly because, in reality, not only design but also research includes subjective decisions and choices. The relationship between the two is always an issue that needs to be reframed for each and every condition anew. So starting with the initial exercises, all the discussions tried to dwell on how research makes references to other existing bodies of research, how one selects the sets of references to be included (and therefore multiple other sets to be excluded) and picks among the wide variety of ways and means of 'referring' that can be manifested in the end as design decisions. As Hill also points out, "... one of the key things about research is that you have to be able to situate your own work in a wider context. It is not just about doing it (Hill, 2015, 116)." Before the final assignment, it was more evident for students that the expectation of the studio was a design

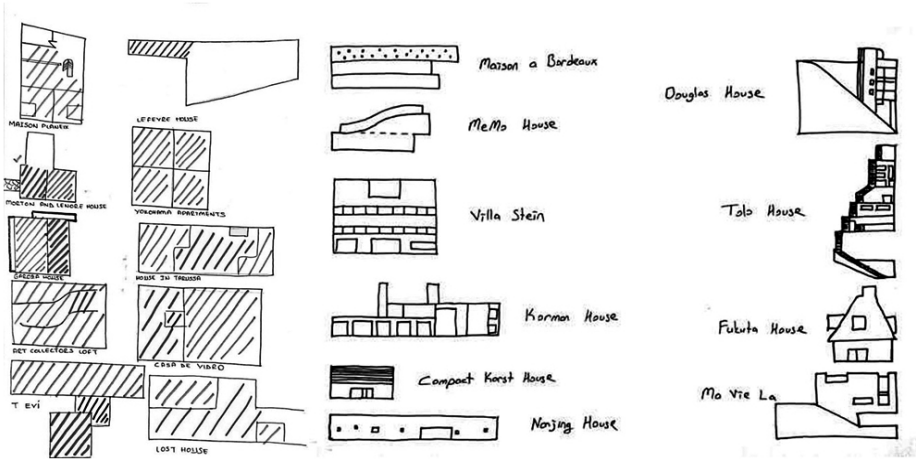

Figure 4. *Case study analysis & sketches (TED University, Department of Architecture Archive).*

experience in which the design process is not a set of design decisions in response to a design problem but is a set of references to other designers, who have processed similar design problems.

The final project was assigned after the initial exercises, and it required students to start drafting their design proposals for a 'house,' but only 'in reference.' The students were not given any specific scenario or a specific site, as they were not expected to develop their design ideas with initial responses to given contextual issues. But instead, they were asked to draft a proposal that would be defined in reference to other house designs and could be verbalized with, and only with, variations of referring expressions. They were especially expected to consider the distinctions presented by such variations, such as 'to quote,' 'to translate,' 'to adopt,' 'to sample,' etc., as their own take on such variations would be a significant component of their design decisions. In the studio discussions, it was not the real issue if a particular reference was rightfully 'a translation or 'an adaptation,' but it was essential to challenge the student to explain why they see it that way rather than the other.

In order to subvert the linear and more accustomed processes of designing, issues related to the problem of context, like the site, users, or the scenario, were introduced to students gradually and not right at the beginning. That also aimed to sustain active involvement with research throughout the semester because every new input required a shuffling or fluctuation of many design decisions that were already set. While the initial input introduced a series of generic sites, which students select randomly and start working on, a few weeks later, they were all given additional random qualities for their generic sites. Propositions were raised again as 'what if' conditions, like; "what if your site was located in an urban context, neighboring a park, a road, and a semi-detached house on each of its sides, and in a cold climate". The introduction of new input required the revision of the existing design proposals –if not to return to the very beginning of the process- and the association of design and research got reactivated again because each student had to deal with a new set of problems, and therefore has to redefine the research criteria again, to be responded with design decisions, which were all produced only in reference.

Another significant advantage of this method was the contextual diversity achieved through the random combinations of different sets of site information, which is vital, especially in overcrowded studios. (Figure 4 presents a contextual quest for various projects) Specifications on-site and the scenario were only discussed in their relevance to the design ideas and approaches proposed. The critiques went on with the emphasis on 'referring' as design acts for most of the semester, and only after the second pre-jury were they asked to finalize their design

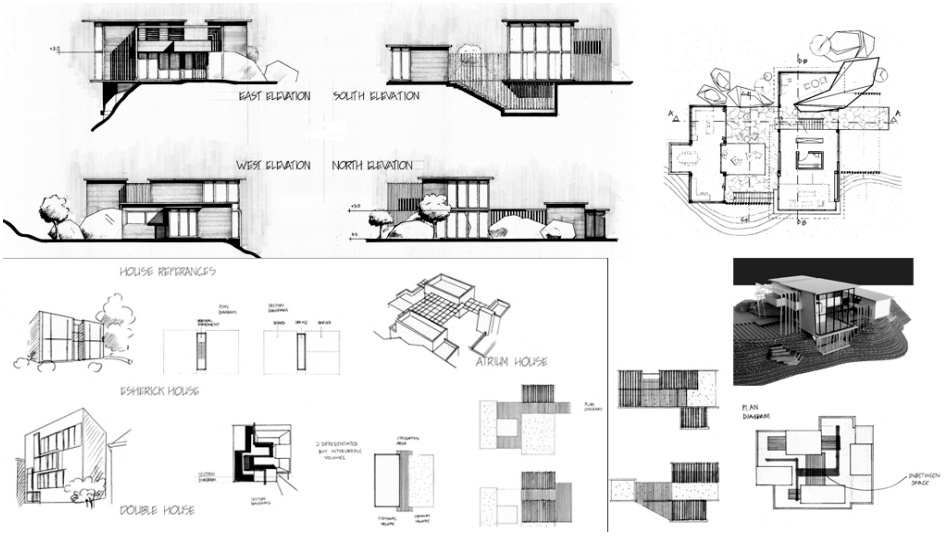

Figure 5. *Final presentation of a student work (TED University, Department of Architecture Archive).*

by articulating all aspects of the architectural proposal in a coherent design approach (which must have matured by then in reference) without the direct discussion on references. The final product to be presented in the final jury was expected to be a well-crafted design proposal for a single dwelling, though the design process did not follow conventional methods.

Architectural students in their second year are, by all means, still relatively novice within the discipline. So, they may come up with successful design proposals, but that does not guarantee their being conscious of why and how they have achieved it. Similarly, their understanding of research can easily result in form-oriented research, concluding an insensible copy-pastes or products of formal resemblance. Therefore, rather than repeating accustomed discussions on plagiarism, in most studio critics, the emphasis was put on the development of an individual search for understanding and testing the qualities of each design process with respect to the others' work. In a way, the studio constantly argued the students' ability to 'refer to' and 'translate' or even 'adopt' what is already written, projected, drawn, or built. All such design acts (to refer, to quote, to translate, to sample, etc.) were given to the students as a list from the very beginning in the studio and they all accommodate different levels of appropriations, which is often not a very easy task to differentiate. Yet all in all, they triggered intellectual discussions because even choosing among the verbs necessitated an acknowledgment on students' behalf; an acknowledgment that brings out not a formal categorization or labeling but a critical position that justify diversity and prevalence of scholar knowledge.

In the final presentations of the projects, there was a common intention for a particular emphasis on the lucid display of how the project referred to, translated from, or adapted specific key approaches within particular projects. The referencing system has been integrated into the overall presentation of each project, rather than standing apart, as it constituted the foundation for the discussion of the projects. In the case of this project in figure 5, the main discussion revolved around how a central architectural element like a staircase can be used not only to partition but to define the architectural space in all dimensions. The very orthogonal, monolithic, and central organization of the staircase in Escheric House by Louis Kahn clashed with the light and more dynamic articulation of architectural space in Double House, where the staircase enables the possibility of interlocking spaces. Specific representation techniques that are associated with certain architects, like, for example, the specific grid as quoted from Eisenman and its exploded axonometric representation, were acknowledged

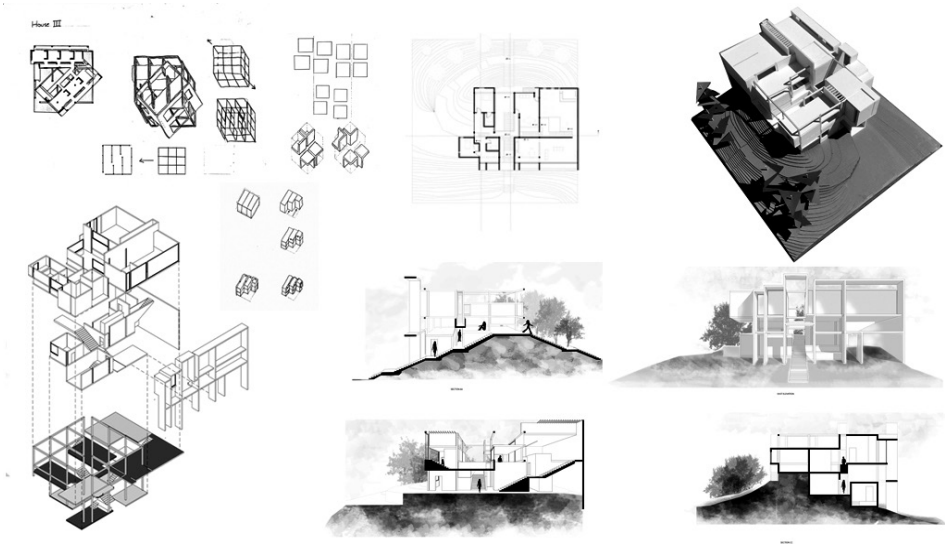

Figure 6. *Final presentation of a student work (TED University, Department of Architecture Archive).*

as an indispensable gesture to his declaration that "drawing (to me) is a form of writing and a form of reading what I write (Eisenman, 2013)." In this particular project displayed in figure 6, Eisenman's fragmented grid was reintroduced to discover the possibilities of a rhythmic formation in controlling the overall spatial configuration. The progression of the grid was a method of drawing as well as design, similar to how Eisenman utilizes the grid. The research context of the project, therefore, required an understanding of how Eisenman connects architectural drawing to architectural design in order to reinterpret his strategy but also to exploit how the introduction of the fragmented grid can be a strategy to arrive at a different interpretation of what Eisenman calls as; 'notational systems.'

The example projects mentioned above can be regarded as random examples that showed how the discussion on a certain project and its evaluation was conducted within the studio. Of course, the examples can be multiplied, yet the intention of this paper is not to present an all-encompassing account of the outcomes of this design studio process and how each student project responded to the required research component of the problem but rather to problematize the accustomed design and research interaction within the design studio.

4. Conclusion

Although they sound intriguing as practices of a design studio, all of those acts detailed above that guide the research process in the given studio exercise are familiar concepts, especially for the production of artwork. Many of them are conventional practices within branches of artistic production, such as 'adaptation' in cinema, 'sample' in music, or 'translation' in literature. Architecture's relation to these concepts is also not exactly a new topic. The discussion on translation, for example, has never been foreign to architectural design and practice: Architecture, by nature, is mainly about converting specific ideas produced in one medium to another; as in from drawing to building (Evans, 1997)[6]. The medium of production for architecture is first by drawing, and later the ideas in the drawing get translated into the built form. There is also a comprehensive literature that analyses this multi-layered and, at times, ambiguous course of this process, mainly because translation processes cannot simply be defined as the act of conveyance without much alteration. In such a case, one can talk about a level of royalty to the original document. However, royalty or fidelity in other stances works differently. As also elaborated by Akcan, "mistranslation is an oxymoron in architecture (Akcan, 2012)"[7]. Because in the visual medium, as in architecture, the fidelity to the

original is always open to manipulation and distortion, therefore its relation with the original is very different from what we are accustomed to in other non-visual fields, like in linguistics, for example[8].

The way the projects refer to or translate from other architectural works, therefore, does not enforce a discussion that is limited to its relation to the original work but the interpretation of the author, in this case, the student, and his/her level of awareness to the existing discussion. The ground for evaluating students' work in this case, therefore, should rest heavily on the communicability of the whole process, the unfolding of a series of reasoning, and each student's individual contribution rather than the simple comparison in the level of fidelity to the original. Again, as stated before, in this approach, the end product should fall behind the design process, and the evaluation should exceed what is seen to be replaced by what is understood, which also requires a conversation on an intellectual level for both parties. The studio exercise stepped out as an experience where judging the quality of the thing that meets the eye should be replaced with an intellectual perception and discussion. The knowledge of architectural history provided an advantage for reflective thinking, yet the studio tried to stretch the limits of the discussion to a broader intellectual position for each student rather than restraining the assessment inside a historical framework.

The documented results of the studio exercise, in the form of grades statistics, instructors' written reports and the oral evaluation and discussion by the guest jury members, as well as the oral commentary brought in by the students in the colloquium after the jury tend to agree to affirm the significant argument above. The relative success or failure of each student that presented their work in the final jury, especially in comparison to other semesters, where rather conventional design studies were exercised, was not manifest in the projects that were presented as design products but in the intellectual and disciplinary communication performed by the student in the act of presentation and design discussion. The overall grade average in the final jury and the number of projects that were graded to be successful or not did not significantly alter compared to other semesters. It is also quite difficult (and was also difficult during the jury) to evaluate what the method tested in this exercise has distinctively contributed to the products, which other methods would theoretically not be able to, just by looking at the visual presentations. However, it was the major observation of the instructors and jury members that students, especially those with successful results, performed significantly better oral presentations and much more confident, skillful, and intellectually broader discussions in comparison. All these findings seemed to be positive results of the methods applied. In that respect, the instructors concluded that the skills related to disciplinary language, scholarly communication, and performative discussion mainly reflected upon the studio exercise's impact.

It is interesting to find out that such questioning of the concept of originality has also taken place in how the very general concept of 'research' is defined, similarly to be replaced with an emphasis on communication. In the United Kingdom, for instance, the Research Excellence Framework document for 2008 defined research as an "original investigation that was undertaken to gain knowledge and understanding (Fraser, 2013, 1)." However, the definition changed for the document of 2014 to "a process of investigation leading to new insights, effectively shared (Fraser, 2013, 1)." The way that the word 'original' got out and the statement on being 'effectively shared' got in is very much parallel to how the concept of research was approached in this studio exercise; it involves the ultimate and inherent pedagogical message that the quality of being communicable always triumphs over originality, at least in the design studios in architectural schools, if not always in architectural practice. This does not mean to assert that there will never be any new ideas and all one can produce is an old idea in a new form; but is just proposing that design education, especially in the first couple of

years, should be about learning the language of design with all the collective set of meanings, norms, and values, more than the novelty of design ideas.

The emphasis on learning the language, not only as an operational tool but as a thing that has evolved through time, is an approach where learning how to position and communicate within that position is more essential than learning how to design. As Saussure once put that, "in language, there are only differences" we argue that one of the best ways a student of architecture can experience how to appropriate a designer's position when confronting an architectural problem is by investigating how to communicate that position in reference to other positions in similar problems, with all the varieties of referring expressions. In the end, there should be room for any level of originality that one requires, but without the premature formation of ideas on originality being on the way. All in all, the studio project subject to this article was simply about communication, where the student was first assigned to communicate with the existing architectural culture and then to communicate the results of that communication with the instructors and fellow students. The main aim in that was to establish the architectural design process as a thing that is not based on mystified forms of creative action but on rational and communicable forms of research methodology.

Endnotes

[1] Some recent works that discuss the issue of Ph.D. by design include Hauberg, J. (2011), Fraser, M. (2013), Moloney, J. (2015). For a much earlier discussion on the topic, see Patsavos, N. & Inan, D. (2005).

[2] The concept of 'originality,' as discussed in the design studio, does not directly relate to the possible discussions on the concept of 'authenticity,' which may be regarded as a similar concept; yet attains diverse connotations and theoretical positions. In the words of Benjamin, for example, Authenticity radically differs from the concept of originality as discussed in this paper, as it refers to a value of originality that is defined not only through the object itself but strictly bounded by the context and the history of the object. However, the discussion on originality in the paper is tried to be analyzed through its close associations with design research and its translation to the architectural artifact. Benjamin, W. (1935).

[3] There are only a few examples that define their educational strategies to question similar concerns in the scope of a design studio with what the authors of this paper try to question practically. Even though the problem definitions of such examples radically differ from the exercise subjected to this article, they can still be listed here as Miljački, A. (2011) "From Model to Mashup A Pedagogical Experiment in Thinking Historically about the Future"; Keyvanian, C. (2011). "Teaching History to Architects"; Goldschmidth, G. (1998) "Creative Architectural Design; Reference versus Precedence."

[4] "Beyond Precedent" was a recent issue of the Journal of Architectural Education, where a series of articles tried to discuss teaching and engaging with history in architecture and architectural education from different perspectives. The article of Keyvanian, "Teaching History to Architects," settles on possible methodologies for an operative history (Keyvanian, 2011, 35).

[5] "My interest is in how to take the energy and spirit of Rock music and extend it to the music drawing from my background as part of the European tonal harmonic tradition. In other words, what would Hendrix sound like playing Bartok?" Attributed to Robert Fripp of King Crimson (Covach & Boone, 1998).

[6] Robin Evans is one of the prominent figures, who argue this nature of translation in architecture, which is different from other visual arts as the architects never work directly with the object of their thought, but always work at it through some intervening medium, like drawing, modeling, etc. In his words, "recognition of the drawing's power as a medium turns out, unexpectedly, to be recognition of the drawing's distinctness from and unlikeness to the thing that is represent-

ed…. (Evans, 1997, 154-156)."

[7] As Akcan states, "the concept of translation in visual mediums works much differently than translation in literature. The transferability of the visual image is different from the translation of any linguistic text because one does not require another language to translate as in literature (Akcan, 2012, 8)."

[8] Another studio exercise from the authors also tests the methods of translation from music to architectural design and commonalities of creative processes in the studio (İmamoğlu, İnan & Uçar, 2013).

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An analytical approach to identify design criteria for reducing earthquake risks in residential interiors

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Abstract
A vital measure to prevent earthquake risks is to retrofit existing buildings or design and construct resistant structures. After increasing the earthquake resistance of buildings, measures taken in building interiors comes to the forefront. In the scope of this study, comprehensive analytical research is conducted to identify the criteria for reducing earthquake risks in the design of residential interior spaces. Reviewing the literature of both national and international publications using the keywords and phrases "Earthquake and Interior Design" "Earthquake and Furniture Design", "Earthquake and Architectural Design", "Earthquake and Materials", "Precautions for Earthquake Damages", "Earthquake Psychology" is employed as a method. In the next step, criteria extracted from the content analysis are categorized, analyzed and evaluated systematically. Together with this research, a set of measures to reduce earthquake risks for the interior design of residential interiors was presented. It also includes risks and strategies related to categorized interior elements, which designers can use in the design process. Many people could be inside residences, where most daily life is spent during an earthquake. This describes the study's widespread impact. The design criteria presented are expected to be a source that includes a set of categorized data with a holistic approach to reduce risks, leading to safe design, and ensuring up-to-date continuity of knowledge for future designs.

Keywords
Earthquake risk reduction, Interior architecture, Secure design, Housing interiors.

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1. Introduction

During history, earthquakes have always carried life-threatening risks. The loss of life and the destruction they have caused in the built environment have always been considered inevitable. Even though such natural disasters are unavoidable and unpredictable, it is possible to take precautions. In this context, studies on the detection and prevention/reduction of earthquake risks have gained significant importance.

Turkey is located in a region prone to earthquakes, but there are different levels of seismic zones. The city of Istanbul is a megacity where a major earthquake is expected in the near future. Besides, it is a fact that several other cities nearby will also be affected by seismic events. Previous experiences and future predictions show that it is of great importance to be aware of this fact and to take necessary precautions. Within the scope of studies aimed at detecting and preventing earthquake risks and reducing its hazards, the most important measures to be taken are the correct placement of buildings, their durability and the earthquake resistance of structures. Assuming that these measures are taken, as a next step, risks can be reduced with design measures in the interior spaces. The fact that a large number of the population would be inside residential buildings during an earthquake, emphasizes the study's importance. In this context, this study aims to identify the design criteria necessary for reducing earthquake risks in residential interiors. A holistic documentation approach to reduce earthquake risks is followed to attain a set of criteria for residential interior design.

Since Turkey is a country located in an earthquake zone, experiences from past events and future projections indicate that developing collective awareness is of great importance by taking all necessary measures to reduce risks. In the case of strong earthquakes, even if buildings do not collapse entirely, destruction in the interior spaces may occur. In circumstances like these, providing earthquake-safe interior design may greatly impact resident safety during such a calamity. With precautions taken indoors, lives may be saved.

In this article, the first phase of the research, which has been conducted as a TUBITAK 1001 (The Scientific and Technological Research Council of Turkey) project with the title "Determining Design Criteria for Reducing Earthquake Risks in Housing Interiors and Developing a Design Model Defining Reduced Risk Areas", is presented. The importance of interior design studies and the limited resources in the interior design discipline are emphasized, focusing on reducing earthquake risks. Following the introduction, we explain our research methodology, which comprises an extensive literature review, analysis and synthesis of the bibliographic resources. Lastly, the outcomes of the literature review are evaluated systematically. We conclude the paper by presenting the limitations and foresight of the research. This research is a holistic documentation study, presenting a set of criteria to reduce earthquake risks in residential interior design. The design criteria include risks and strategies related to categorized interior elements that designers could use in the design process.

2. Earthquake risks and approaches to reducing hazards in interior spaces

Technical indices, including structural strength, maximum story drifts and maximum response acceleration, generally evaluate the seismic safety of buildings. These indices are highly specialized and generally only understood by structural engineers, while there is an increase in the expectation from other professions to understand the seismic performance of the buildings (Hamaguchi et.al., 2013). When the literature is examined, it is seen that most studies are done in the field of civil engineering on the structural aspects. Even though the studies and publications in various fields investigating earthquake risks and effects could be considered bibliographic references for research on interior design, they do not directly explore interior spatial design. These studies, from where the necessary data can be collected, specifically focus on furniture design rather than

interior architecture or environmental design. Therefore, there are minimal resources for designing interiors taking earthquake hazards in account. It is observed that the existing studies examining earthquake risks in interior design and focusing on strategies to reduce the undesirable effects of seismic events in interior spaces are limited. It is thus crucial to identify the risks related to interior design decisions and to be able to take precautions in the design process for existing interior spaces to reduce the damage that might be created during an unexpected seismic movement or a greater disaster.

Furniture design studies (Aytöre, 2005; Ahmadnejad & Darbandi, 2015; Chen et.al. 2015; Kaya et.al. 2018; Sweet, 2018; Grimley & Love, 2018) mostly focus on furniture or combination-assembly details rather than holistic solutions regarding the furniture-space relationship recommendations. Studies that take into account earthquake effects within buildings investigate the effects on furniture or non-structural elements (Cimellaro et.al., 2020; Yeow et.al. 2018; Ipek et.al., 2015; Filiatrault & Sullivan, 2014).

Motion analysis of furniture under seismic load is investigated with specific research outcomes. For instance, as a method, within several studies, shake table experiments were revised (Furukawa et.al., 2013; Meguro et al., 2008). In such studies, according to the selected earthquake records, the effect of the vertical acceleration on the non-structural elements was examined with the accelerometers placed in specific places in the building.

Studies focusing on interior design to prevent earthquake risks have generally dealt with the subject within the scope of room scale, user behavior, interior ethics or general precautions to be taken indoors (Demiraslan, 2005; Karamanoğlu & Ulay, 2017; Kaya et.al., 2018; Doğan, 2020). In this context, it is seen that there are different approaches to the subject. Doğan (2020) proposed to adapt ergonomic interior and furniture design principles of mobile spaces, which are defined as places where the action of moving from one place to another for the purpose of transportation or travel, by vehicles such as caravans, boats, trains, and planes takes place, and used them as a reference for the interiors of buildings in earthquake-risk areas. In their study, Ahmadnejad and Darbandi (2015) examined how the earthquake-safe design of furniture could be made based on the idea of creating a life triangle in nurseries. Studies on the precautions to be taken in existing spaces (Alıcı, 2019; Albayrak, 2005; Bernardini et.al. 2016; Hürol, 2014) define the principal decisions as a whole. AFAD (Turkish Ministry of Interior Disaster and Emergency Management Presidency) has published a comprehensive statement on the precautions to be taken before an earthquake (AFAD, 2011-1; AFAD, 2011-2; AFAD, 2011-3; AFAD, 2019). Based on previous experiences, these measures provide critical information for the study of design criteria for reducing earthquake risks.

Within the scope of the study, sophisticated design approaches in countries such as Japan, which are located in earthquake-risk areas, also gain importance (Clancey, 2006; Borland, 2020; JASO, 2021). In Japan, a society that has learned to live with earthquakes, examining their traditional and contemporary houses reveals that a habit of using minimal space and furniture has developed over time (Demiraslan, 2016). It is seen that Japanese architecture has many features that can be examined as an example of interior spaces as well as architectural design.

3. Methodology

National and international publications on earthquake risks and approaches for reducing risks in interior spaces are reviewed. Qualitative data is collected to define the criteria using the content analysis method. Classifications related to the spatial components and component groups in residential interiors are determined and design criteria is researched according to these categories.

Books, theses, articles, papers, research, regulations, publications of institutions related to disaster and emergency management such as AFAD have been systematically examined. Using the content analysis method, the

data to define the criteria were collected under the headings of "risks" and "strategies" at this stage. The aim is to enable the designer to use the risks and strategies defined in the literature as a holistic data set within the scope of the determined categories while designing residential interiors. In the context of the evaluation made using the content analysis method, the categories of residential interior components were defined, and the data to be presented as the design criteria in the context of these categories were determined. In Figure 1, the methodology steps are presented.

3.1. Literature analysis

Content analysis is a method used to analyze the content of various data, such as visual and verbal data, allowing facts or events to be reduced to defined categories in order to analyze and interpret them systematically (Harword & Garry, 2003). White and Marsh (2006) describe the method as a very flexible research method that is widely used in library science and information science studies. This method uses a wide variety of analytical techniques to generate and contextualize qualitative, quantitative and sometimes, mixed findings.

In this study, the existing literature was reviewed by a group of six scholars. The literature review team consists of architects, interior designers and a civil engineer. The initial step was to decide on the scope of the literature review, therefore, an initial bibliographical scan was made. As a result of this step, the main categories and keywords were defined. Those keywords and phrases are listed as; "Earthquake and Interior Design" "Earthquake and Furniture Design", "Earthquake and Architectural Design", "Earthquake and Materials", "Precautions for Earthquake Damages", "Earthquake Psychology". This definition depends on the availability of the existing references in qualified indexes and databases, the context's relatability and, last but not least, the conformity of the publications and their benefit.

Consecutively, those keywords and phrases are scanned severally via Web of Science (WOS), Scopus and Google Scholar databases. As a result of this scan, over 200 related articles, proceedings, thesis and reports are obtained. Due to the necessity of a more refined review, another election has been made through this content. Consequently, 68 documents are chosen as the publications to be examined within the scope of the research (Figure 2).

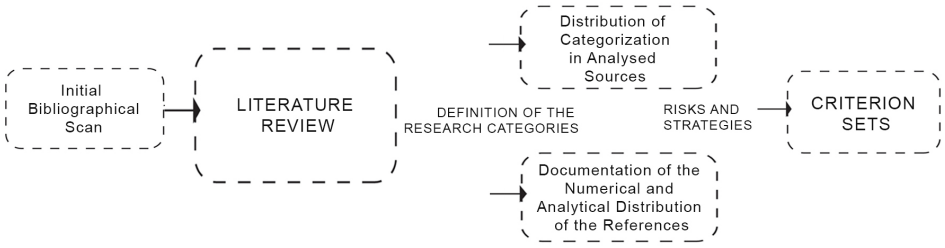

Figure 1. *Research methodology diagram.*

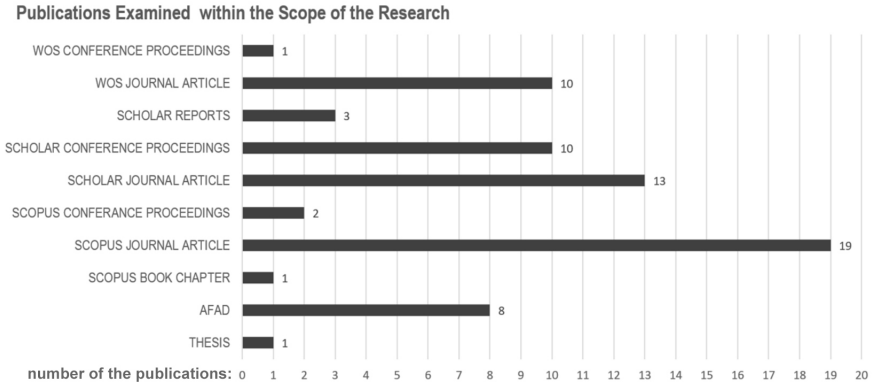

Figure 2. *Publications examined within the scope of the research.*

3.2. Categorization of the criteria

Following the initial bibliographical scan, in relation to the literature analysis, the components that can be used in the residential interior design process were categorized as, "fixed furniture", "mobile furniture", "objects", "non-structural elements", "electrical appliances", "technical equipment" and "lighting fixtures". Table 1 shows the numerical values showing the distribution of these categorization titles in the analyzed sources. Accordingly, it is seen that the studies mainly focus on "fixed furniture" and "non-structural elements" (Table 1).

The primary purpose of creating these category sets is to make a qualitative analysis and synthesis of the subject in the residential indoor areas and define the problems within this framework. The categorization of the criteria is defined regarding the interdisciplinary research analysis, within a range of fields such as architecture, interior design, furniture design, psychology, civil engineering and earthquake engineering.

3.3. Analysis and evaluation of data

As a result of the research analysis, a set of risks and strategies for earthquake hazards documented in the literature is created. "Risks" define situations that may cause damages or danger in interior spaces during an earthquake,

Table 1. *Distribution of categorization in analyzed sources.*

Category	Count of Involvement	Sources
FIXED FURNITURE	23	AFAD (2011-1), AFAD (2011-3), Alıcı (2019), Ayrılmış et.al. (2015), Aytöre (2005), Cimellaro et.al. (2020), Demirarslan (2016), Doğan (2020), ECA (2011), ECA (2016-1), FEMA (2020), Filiatraut & Sullivan (2014), Galloppo et.al. (2019), Karamanoğlu & Ulay (2017), Lewis et.al. (2018), Meguro et.al. (2008), Pietroni et.al. (2021), Spagnoli (2020), Sweet (2018), Taymaz & Sarı (2017), Ulay & Bekiroğlu (2016), Yeow et.al. (2020)
MOBILE FURNITURE	11	Akhand (2018), Ayrılmış et.al. (2015), Chen et.al. (2015), Galloppo et.al. (2019), Isobe et.al. (2018), Kaya et.al. (2018), Lewis et.al. (2018), Pietroni et.al. (2021), Spagnoli (2020), Sweet (2018), Yeow et.al. (2018)
OBJECTS	11	AFAD (2011-3), Akut (2009), Chen et.al. (2015), Demirarslan (2016), Doğan (2020), ECA (2011), ECA (2016-1), FEMA (2020), Karamanoğlu & Ulay (2017), Kaya et.al. (2018), Yeow et.al. (2020)
NON-STRUCTURAL ELEMENTS	14	AFAD (2011-1), AFAD (2011-3), Ertaş Beşir & Dereci (2021), FEMA (2006-2), FEMA (2020), Filiatraut & Sullivan (2014), Hurol (2013), Rodgers et.al. (2021), Sweet (2018), Yeow et.al. (2020), Yeow et.al. (2018), Zaryoun & Hosseini (2019), Zhang & Huang (2017)
ELECTRICAL APPLIANCES	6	AFAD (2011-1), AFAD (2011-3), ECA (2011), ECA (2016-1), Ertaş Beşir & Dereci(2021), FEMA (2020)
TECHNICAL EQUIPMENT	2	AFAD (2011-1), AFAD (2011-3)
LIGHTING FIXTURES	11	AFAD (2011-1), AFAD (2011-3), ECA (2011), ECA (2016-1), Ertaş Beşir & Dereci (2021), FEMA (2006-2), FEMA (2020), Kaya et.al. (2018), Rodgers et.al. (2021), Ulay & Bekiroğlu (2016)

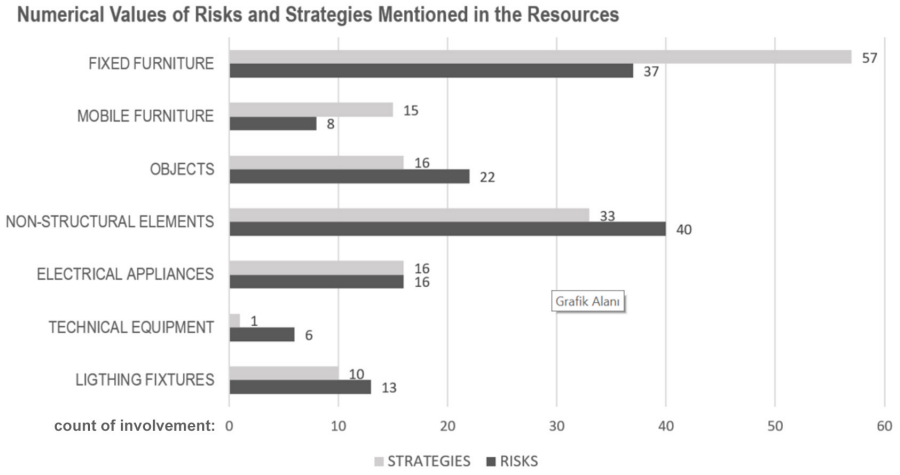

Figure 3. *Numerical values of risks and strategies mentioned in the resources.*

and "strategies" define proposed solutions to prevent these damages. All the risks and strategies mentioned in selected references are compiled in a chart. Figure 3 presents the numerical values of the defined risks and strategies. The analysis reveals that risks and strategies are mainly discussed within the scope of "fixed furniture", "non-structural elements", and "objects" categories. In addition, "electrical appliances" are discussed with an average amount. Lastly, the least discussed elements are the "lightning fixtures" and the "technical equipment" categories.

Some references address only one category specifically, while others consider more than one category. In the previous table (Table 1) the distribution of the categories was documented. Following the compilation of resources, further documentation is created by defining the criterion sets per each category. The data was evaluated with an analytical study, and a table was created that summarizes how risks and strategies are defined within the scope of the categorization (Table 2). Thus, the analysis has become a set of criteria for defining risks and strategies. Table 2 is the compilation of the literature reviews' outcomes that can guide the designer and the occupant through earthquake awareness.

3.4. Synthesis of category results derived from the literature review

In this section, the detailed documentation of each category is explained, and the results are discussed through graphical representations. The numerical values presented within the graphics give information about which criteria and how often they are considered in the references.

3.4.1. Fixed furniture

The literature review on fixed furniture category outcomes is summarized, and numerical values of the sources in which the criteria titles are mentioned are presented in Figure 4. The principal risks related to fixed furniture are defined as "tumbling", "breaking", "blocking the escape route" by falling and pulling the structural elements. The most frequently proposed strategy for reducing risks are "fixing" and related with the use of "material". Since one of the most discussed risks in kitchen cabinets is the spillage of objects they contain, it is often recommended to install a cabinet lock.

In the study by Meguro et. al. (2008) the effects of furniture tipping prevention devices were analyzed, and their effectiveness was evaluated by shaking table tests. It aims to increase people's awareness of dangers and risks through animations and visualizations produced from numerical simulations of the dynamic behavior of furniture at the living room scale when an earthquake occurs, using virtual reality tools. As a result of the study, based upon the results for a 20-story building case, three possible solutions were suggested: to decrease the structural response using building vibration control systems, to use more efficient overturning prevention systems, or to use only built-in type of storing spaces so that potential overturning objects are not used at all (Meguro et.al., 2008). Alıcı (2019) mentions that there are risks of tumbling or overturning of furniture in the event of an earthquake. Fixing and locking measures to be attached to different furniture types that may prevent loss of life are possible solutions (Alıcı 2019). Galloppo et.al. (2019), investigate the possibilities to innovate and transform, from a structural and functional perspective, the design of furniture and mobile equipment in intelligent safety systems that can contribute to the protection of life within their study. In this context, a series of data collection activities of patents and anti-seismic furniture products and interdisciplinary research is carried out. Three levels of project intervention have been identified for safety: Light: anticipates the use of anti-tip devices in common wall-mounted storage systems. Intermediate: includes the development of furniture and protection devices resistant to dynamic and static loads. Heavy: refers to the installation of systems able to collaborate and improve the anti-seismic capacity of the building through the realization of partially modular reinforcements and structures for the development of bunker type protection spaces (Galloppo et.al., 2019).

Aytöre (2005) defines furniture tumbling and breaking risks and suggests that the location, production methods and furniture placement in the face of a great earthquake have effects that can save, as much as they can harm people. Using lightweight materials, fixing, locking, and placing the center of gravity to the underside of the furniture will be beneficial in taking precautions against earthquakes (Aytöre, 2005; Filiatrault & Sullivan, 2014; Ayrılmış et.al., 2015). Karamanoğlu & Ulay (2017) describe the risks of furniture falling, opening and tipping over and they underline the necessity of using light materials for manufacturing furniture and fixing them to the building elements. Akhand (2018) proposes curvilinear finishes to decrease the risks of injuries in the case of crushing.

A study conducted in New Zealand (Sweet, 2018) under the title of "Earthquake Resilient Furniture", examines the psychological impact of furniture as well as its functionality in manufacturing. It demonstrates the necessity of creating new designs that prioritize and support not only the function but also the psychological resilience of the de-

Table 2. *Criterion sets and categorization.*

	RISKS	STRATEGIES
FIXED FURNITURE		
STORAGE ELEMENTS (Wardrobe, Closet, Dresser)	Tumbling	Fixing
	Breaking	Material
	Pulling	Placement
	Blocking the Escape Route	Modularity / Flexibility
		Height Limit
		Design that Provides Psychological Support Against Seismic Events
		Universal Design
		Linking / Locking
		Anti-seismic Design
SHELVES (Bookcase, Glass-door Cabinet, Open Shelves)	Tumbling	Material
	Discharge	Fixing
	Incorrect Arrangement	Modularity / Flexibility
	Causing Injuries	Height Limit
		Closing
		Design that Provides Psychological Support Against Seismic Events
		Linking / Locking
		Hiding Shelves and Drawers
		Load-bearing
KITCHEN CABINETS	Discharge	Lightweight Material
		Cabinet Locks
MOBILE FURNITURE		
CHAIRS	Crushing (Human)	Integrating Protective Structure
		Integration to Structural System
COFFEE TABLES, SIDE TABLES	Negative Psychological Effect on Seismic Events	Material
		Design that Provides Psychological Support Against Seismic Events
TABLES	Negative Psychological Effect on Seismic Events	Material
	Discharge	Design that Provides Psychological Support Against Seismic Events
	Tumbling	Load-bearing
	Breaking	Integration to Structural System
CHAIRS	Replacement	Material
BED	Crushing (Human)	Resistance
		Load-bearing
		Adding an integrated sheltering unit
OBJECTS		
DECORATION, ACCESSORIES, DANGEROUS GOODS	Falling	Fixing
	Slipping	Avoid the Usage
	Causing Injuries	Simplification
	Fire, Explosion etc.	
POTS	Falling	Fixing
	Causing Injuries	Avoid the Usage
MIRRORS / FRAMES / ARTWORK	Falling	Placement
		Hanging with Hooks

Table 2 (continued). *Criterion sets and categorization.*

NON-STRUCTURAL ELEMENTS		
WALL PARTITIONS	Fire-resistance	Material
	Negative Psychological Effect on Seismic Events	Design that Provides Psychological Support Against Seismic Events
	Bending	Fixing with Braces
	Breaking	Strong Construction
	Causing Injuries	Infill Wall
	Cracking	Integration to Structural System
		Flexibility
SUSPENDED CEILING	Downfall	Reinforcement
	Swinging	Swing and Crash
	Falling	Ceiling Support / Wall Distance
	Breaking	Fixing
	Causing Injuries	New Material Research
PLUMBING	Explosion	Correct Calculation
	Pipe Breaking	Material
DOORS	Bending	Seismic knuckle
	Blocking the Escape Route	Planning the Arrangement
	Breaking	
WINDOWS	Glass Breaking	Material
	Explosion	Mobile Windows
		Laminated / Double-glass
		Planning the Arrangement
FLOOR COVERINGS	Slippery - Shifting (Human)	Alternative Material Research
ELECTRICAL APPLIANCES		
TV	Tumbling	Fixing
REFRIGERATOR	Tumbling	Placement
		Fixing
COMPUTERS	Slipping	Fixing
		Non-slippery Material
OVEN - STOVE	Explosion	Flexible Joinery
TECHNICAL EQUIPMENT		
WATER BOILER	Falling	
	Fire	
GAS HEATER	Tumbling	Fixing
	Falling	
	Fire	
RADIATORS	Falling	
LIGHTING FIXTURES		
LAMPS	Falling	Material
	Breaking	Fixing

signs. Sweet (2018) suggests that while seismic design at the architectural scale targets the mitigation of physical hazards, furniture offers unique opportunities to address factors beyond physiological needs. With its human-scale and inherent relationship to the body, furniture invites meaningful tactile and emotional connections in the interactions elicited through its essential function as an interface (Sweet 2018).

3.4.2. Mobile furniture

The literature review on mobile furniture category outcomes is summarized, and numerical values of the sources in which the criteria titles are mentioned are presented in Figure 5. The risks of mobile furniture in residential spaces are documented as, crushing of the occupants, breaking, tumbling (Ayrılmış et.al., 2015; Kaya et.al., 2018; Chen et.al., 2015; Yeow et.al., 2018; Sweet, 2018; Akhand, 2018), replacement and wrong placement (Lewis et.al., 2018), discharge of the objects stored inside cabinets that might cause injuries, and negative psychological effects of seismic events (Galloppo, 2019). In general, the recommendation to avoid tumbling is mainly coined as fixing. Moreover, reconsidering the density of use, using light materials and using modular furniture can be considered as measures to prevent possible hazards of a seismic event. Also, mobile furniture could block the escape route and prevent the mobilization of the occupant, which is considered a significant risk factor.

Sarı & Aktar (2017) state the importance of implementing universal design principles to prevent escape route

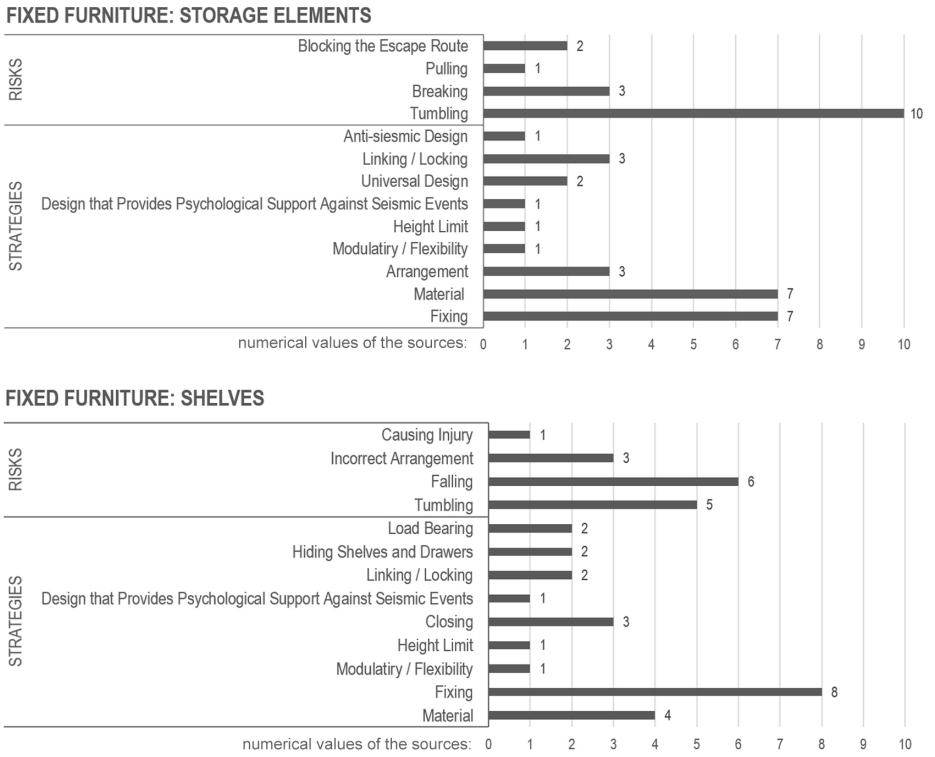

Figure 4. *Fixed furniture: numerical values of the sources in which the titles of the criteria are mentioned.*

blockages. Therefore, mobile furniture that may fall and block the escape routes must be secured, locked or fixed to the walls. If the furniture has shelves or doors, they must be fixed to prevent the spilage of items which could clock escape routes or cause injuries. Likewise, Karamanoğlu & Ulay (2017) state the importance of material selection strategies, using light materials for mobile furniture manufacturing and fixing the furniture to the building elements. Additionally, providing flexible and ergonomic solutions for mobile furniture should be considered (Spagnoli, 2020). Doğan (2020) proposed concealing shelves and drawers and integrating with the structure to reduce risks.

Ulay & Bekiroğlu (2016) conducted a survey to investigate the effects of specific furniture in a seismic event. This study confirms that the overturning and tumbling of cabinets, the spilling of shelves, the opening of kitchen cabinets, damage to furniture, the obstruction of escape routes, and the falling and breaking of lamps can be prevented. This can be done by fixing shelves, locking and securing cabinets, using light materials, and choosing lamps with light materials (Ulay & Bekiroğlu (2016).

The risks of injury and crushing caused by large moving furniture such as beds are mainly the injuries caused by the falling of other elements on the beds' occupants. Therefore, a protective system proposal has been developed by Zhang & Huang (2018) that has a bedside table with earthquake self-rescue function of 12 seconds. In the same study, the fixing of furniture and objects are proposed. Similarly; Pietroni et. al. (2021) discuss the low strength of the tables under load; therefore, they do not offer a protective function in case of earthquake (in case of using the table as a protective surface or a hiding area). They also study innovative furniture design proposals in horizontal and vertical planes that will provide protection during earthquakes, which could increase the material strength and can carry loads. Also, Kaya et. al. (2018) state integrating protective structures into furniture as a strategy.

On the other hand, Demiraslan (2005) investigates the cultural effects on the usage of furniture and examines the habits of interior arrangements from a cultural perspective. In

this study, minimalizing the amount of furniture and the hazards caused by overdesign is discussed in line with earthquake awareness creation.

Due to the fact that mobile furniture, by their function, cannot be fixed to a structural element on a daily basis, the optimal proposals for hazard prevention strategies could be summarized as using appropriate, lightweight materials, minimal details and oval corner solutions are suggested for furniture design (Doğan, 2020).

In a study by Isobe et. al. (2018), the movement of furniture is modeled with DEM (Discrete Element Method). However, furniture is considered a rigid element in modeling with DEM, and furniture's effect on the environment (stresses and deformations) is not modeled. Modeling with FEM (Finite Element Modeling) was used in this study; therefore, friction between the contact surfaces was also considered in the model. According to the experiment's results, they defined the movement of the furniture. Three different placements with office furniture were considered: the furniture's motion should change depending on the input wave, friction coefficient of the contact face, and furniture configuration (Isobe et.al., 2018). A single item of furniture would make rocking or translational motions and eventually tumble. Overlaid furniture such as separated cabinets, would exhibit very complex behavior; the whole cabinet could fall in one piece, or the upper cabinet may tumble after making rocking and translational motions on the lower cabinet. Furniture with casters would generally slide along the floor (Isobe et a 2018).

3.4.3. Objects

During an earthquake, objects such as books, files, medicines in hospitals or pharmacies, laboratory materials in schools and workplaces, various chemicals, products for sale or storage in commercial units, and museum artifacts may fall. Financial losses and injuries, as well as the risk of fire, may occur as a result of falling objects (AFAD, 2011-3). The literature review on object category outcomes is summarized and numerical values of the sources in which the headings of the criteria mentioned are presented in Figure 6. Many researchers emphasize the importance of placing storage systems (cabinets, shelves, etc.) in appropriate parts of buildings and connecting them to structural elements such as walls and/or slabs in this context (ECA, 2011; ECA, 2016; Chen et al., 2015; Doğan, 2020; Karamanolu & Ulay, 2017). The type of precaution varies according to the size of the object. For large books, a wooden mechanism at the bottom of the shelf and durable straps in the middle are recommended (AFAD, 2011-3).

The primary precaution to reduce the risks of non-structural damaging earthquakes is to reduce the number of movable objects (Demirarslan, 2016). Another critical precaution for this type of earthquake is to organize and place moving objects from the heaviest to the lightest, from the bottom to the top (ECA, 2011; FEMA, 2020).

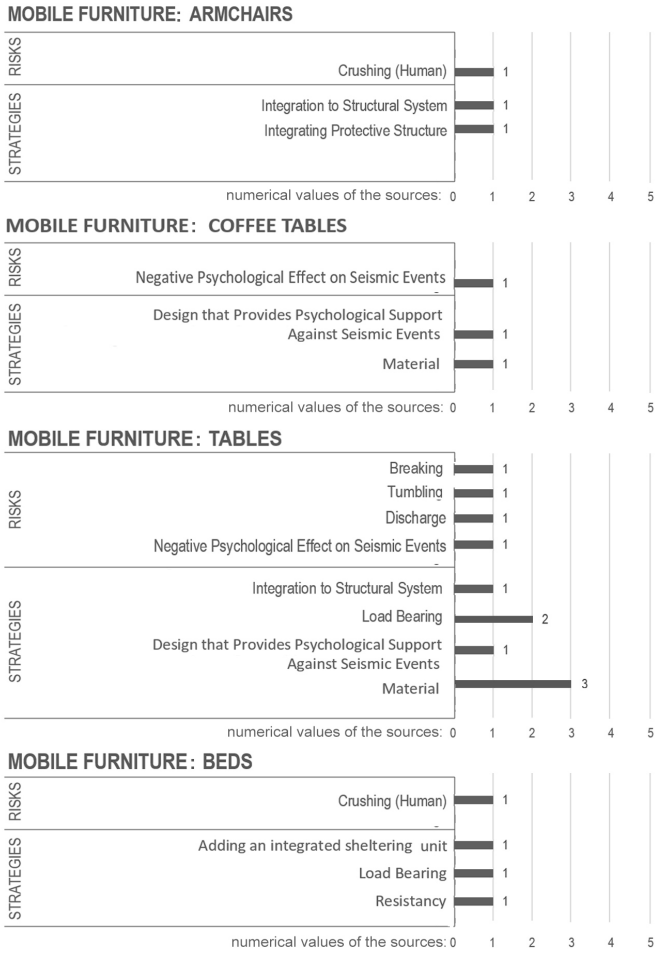

Figure 5. *Mobile furniture: numerical values of the sources in which the titles of the criteria are mentioned.*

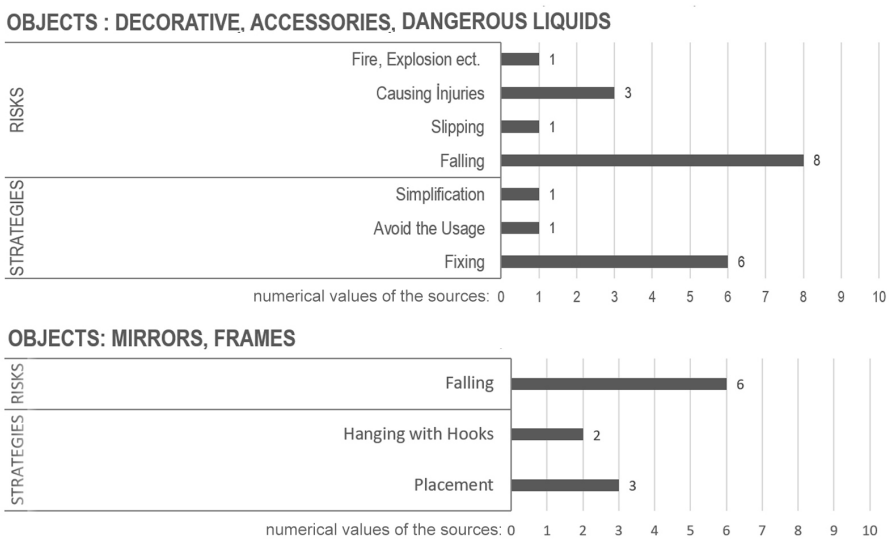

Figure 6. *Objects: numerical values of the sources in which the titles of the criteria are mentioned.*

Lock elements must be installed on the doors of cabinets where fragile objects are stored, and these objects should be stored in cabinets that are fixed to the building elements (ECA, 2011). It is recommended to apply putty, clear quake gel, or microcrystalline wax to the base parts of objects that rest on shelves to prevent slippage and breakage of objects of high value (vases, bottles, etc.). Another precaution is to fix such objects or to place them on non-slip pads (AFAD, 2011-3; Chen et. al. 2015; ECA, 2011; FEMA, 2020).

Other strategies for reducing earthquake risks in kitchen cabinets include installing lock systems on cabinet doors and creating slots in shelves for individual objects (Doğan, 2020; ECA, 2011). Toxic and flammable materials used in laboratories and residential units should be removed from the main circulation routes, and to ensure safety, their quantities should be limited (FEMA, 2020).

It is recommended to use hanging hook screws suitable for the object's weight when hanging objects (chandeliers, flowerpots, frames, mirrors, etc.) (AFAD, 2011-3; ECA, 2011; ECA, 2016). When hanging objects such as picture frames on a wall, it is recommended to use soft materials (rubber, felt, etc.) on the back surfaces of the objects; frames can be attached to walls with adhesives such as putty, clear quake gel, or microcrystalline wax (AFAD, 2011; ECA, 2011). Furthermore, objects placed on the walls near beds should be light and soft to prevent them falling and causing injury during an earthquake (ECA, 2011).

According to research done by AFAD (AFAD, 2011-3) tempered glass should be used for interior design elements and objects made of glass in residential areas. Materials such as transparent plexiglass with a negligible shattering risk should be used instead of regular glass in framed pictures/paintings (AKUT, 2008; Doğan, 2020). It is also advised to avoid objects and materials that might fall or break and to practice the "Drop, Cover, And Hold" movement in previously determined safe places (AKUT, 2008). A general recommendation against the risks posed by all objects: is "L+I+", and is explained as following; "L": Limit; do not keep more than you need, "I" Isolate; keep in a place where everyone can easily access and control, "D": Dispose; give excess potentially dangerous materials to others in need or dispose of them properly, do not accumulate unnecessarily, "S": Separate; Store hazardous substances in separate places (ex, saline and bleach) that would pose a risk if together (AKUT, 2008).

3.4.4. Non-structural elements

The literature review on the category of non-structural element outcomes is summarized, and the numerical values of the sources in which the headings of the criteria are mentioned are presented

in Figure 7. The risks caused by non-structural elements were primarily defined as "breaking" and "cracking" of interior wall partitions and "downfall" and "swinging" of suspended ceilings. Studies mainly focus on the risk of glass breaking while examining windows of residential interiors. The most frequently proposed strategies are related with "strong construction", "flexibility" and "materials" for wall partitions, "reinforcement" for suspended ceilings and "materials" for windows.

Ertaş Beşir & Dereci (2021) examined the breaking of interior walls and surfaces or the deformation and collapse of suspended ceilings in their study. Although heavy interior walls are advantageous in fire and sound insulation, they do not have vertical steel reinforcement; their strength is thus low. According to Ertaş Beşir & Dereci (2021), heavy interior walls must have horizontal and vertical steel reinforcing.

Filialtraut & Sullivan (2014) researched and collected information on the seismic design, analyzing and investigating the seismic performance of non-structural building components in actual earthquakes (the 2010 Maule Earthquake in Chile and the 2001 Nisqually-Seattle Earthquake in the United States). In their study, Filiatrault & Sullivan (2014) note that the failure of non-structural components can become a safety hazard or hamper the safe movement of occupants evacuating buildings or rescue workers entering buildings. The most common non-structural component failures observed following the Nisqually earthquake were related to suspended ceiling systems, the cracking of interior partition walls, and the breaking of glass windows (Filiatraut & Sullivan 2014).

For Ertaş Beşir & Dereci (2021), to ensure rigidity and to prevent risks that may occur because of suspended ceilings used in residential interiors, putting cross elements between the brackets could be one of the solutions. The use of tempered or laminated glass, which is known as safety glass, essentially prevents seismic hazards. Furthermore, safety or solar heat plastic films used for other purposes help reinforce existing glass sheets by holding them together (Ertaş Beşir & Dereci 2021).

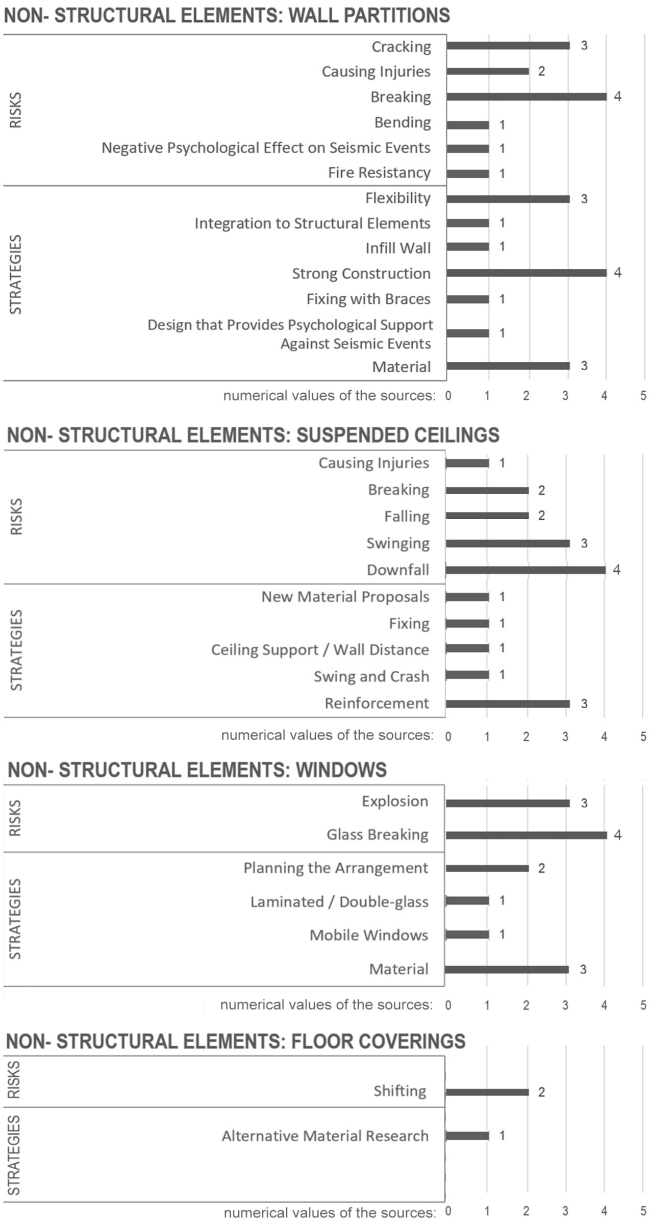

Figure 7. *Non-Structural elements: numerical values of the sources in which the titles of the criteria are mentioned.*

Static and kinetic friction tests, and shake-table tests using sinusoidal floor motions of office-type furniture on carpet and vinyl flooring were performed in the study of Yeow et al. (2018). It was found that there were differences in the sliding of furniture on different floor materials (Yeow et.al., 2018). Zaryoun & Hosseini (2019) proposed new material alternatives for non-structural elements and investigated sustainable architecture's role in increasing

buildings' resilience against disastrous events. A new natural-based, low-cost, eco-friendly and lightweight fiber-reinforced clay (LFRC) material with high heat, sound and moisture insulation capabilities is introduced. Its employment can remarkably increase the resilience of buildings against earthquakes. A series of tests to measure the bending, shear and compressive strengths was done to discover the mechanical properties of the proposed LFRC material. Test results showed that the proposed material has much higher strengths than plain clay. This material can be used to create movable partitions or floors/ceilings as well as smart furniture to achieve flexible architecture or as the main body of masonry elements, such as load bearing walls in small rural houses (Zaryoun & Hosseini, 2019).

3.4.5. Electrical appliances, technical equipment and lighting fixtures

Since electrical appliances can overturn or slide during an earthquake, they should be the first to be fixed (AFAD, 2011-3). One method for avoiding possible threats is to remove or lock the wheels of heavy domestic appliances such as refrigerators with wheels (ECA, 2011; ECA, 2016). Another method used to reduce the risk during an earthquake is to place objects that are sensitive to overturning or moving, such as refrigerators and copy machines, in an area surrounded by partitions (Ertaş Beşir & Dereci, 2021). During an earthquake, electronic devices such as televisions, computers, stereos, and printers slide and fall, causing significant damage (AFAD, 2011-3). Fixing lightweight electrical appliances with L fasteners, straps, plastic clip strips, double-sided tapes, or non-slip pads helps prevent earthquake damage (AFAD, 2011-3; ECA, 2011; ECA, 2016; FEMA, 2020; FEMA, 2016) (Figure 8).

Heating boilers and water heaters, which are non-structural objects, can fall during an earthquake and injure nearby individuals. Such technical equipment should be of adequate size to prevent it from collapsing during an earthquake. To avoid fires, they must have a circuit that disconnects from the power supply when it falls (AFAD, 2011-3). Small electric heaters that can be displaced during an earthquake should not be placed on high levels such as tabletops, but rather on the ground to reduce the risk (AFAD, 2011-3). It is critical to keep heaters away from flammable objects such as curtains, armchairs, and carpets (AFAD, 2011-3). Furthermore, smoke detectors, fire extinguishers, avoiding connecting multiple electrical appliances to a single electrical socket, and turning off technical equipment that works with gas when not in use are all critical (AFAD, 2011-1). Securing tanks used for heating water to the wall with metal strips or placing them in the gaps created between building elements helps to prevent the risks such as overturning or fire during an earthquake (ECA, 2011; ECA, 2016; FEMA, 2020; FEMA, 2016). Technical equipment that uses solid fuel, such as stoves, should be placed near chimneys, and the flue connection pipes should be secured to the building's ceiling/slabs with hanging clamps. The stove doors should be closed and placed inside the space so that they do not obstruct escape routes in the case of an earthquake (AFAD, 2011-3; FEMA, 2016). During an earthquake, residential-type gas cylinders used for heating and cooking, oxygen cylinders used as healthcare equipment in hospitals, and industrial-type gas cylinders used in workplaces may fall or slide. These cylinders can potentially cause gas leaks, fires, and poisoning (AFAD, 2011-3). Thus, cylinders should be strapped to the nearest surface with two straps (AFAD, 2011-3) (Figure 8).

Lighting fixtures, which are defined as non-structural immovable items (glass chandeliers, fluorescent lamps, surface mounted and recessed spots, lampshades, floor lamps, etc.), can cause physical damage, injury, and fire during an earthquake by falling, detaching, or overturning (Figure 8). Precautions vary depending on the type of lighting element to reduce the risks caused by lighting fixtures. Securing lighting systems to the ceiling or steel structures in the slabs with special hooks or closed chain systems can

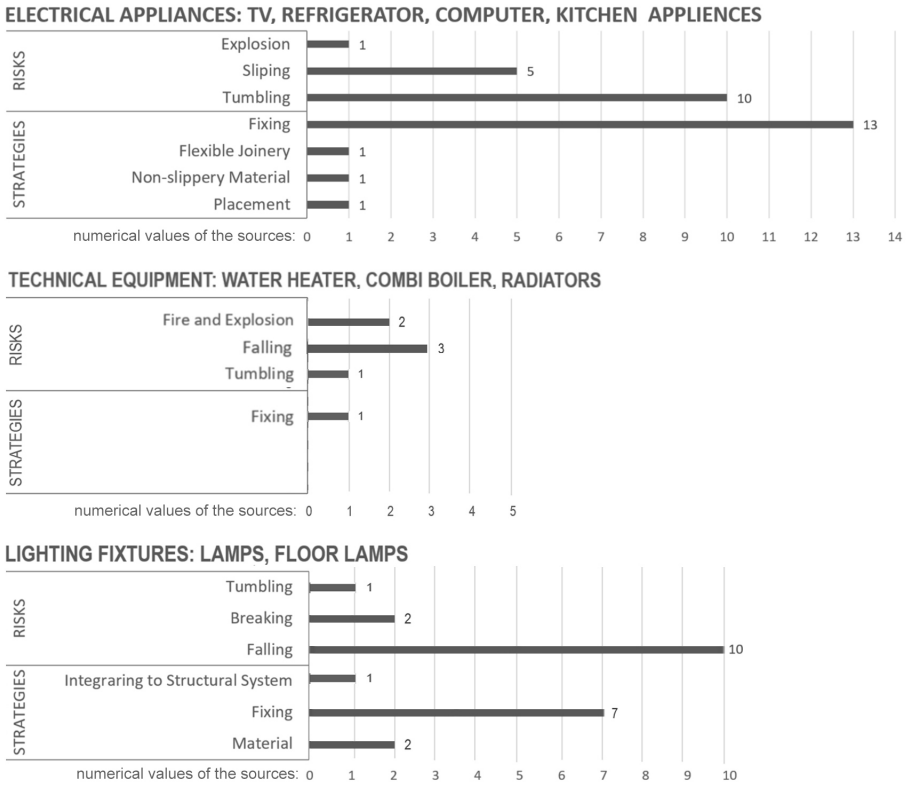

Figure 8. *Electrical appliances, Technical equipment and Lighting fixtures: numerical values of the sources in which the titles of the criteria are mentioned.*

help to avoid injuries (AFAD, 2011-3; ECA, 2011; ECA, 2016; FEMA, 2020).

There should be enough space between heavy and side-by-side hanging lighting elements to prevent them from colliding. It is critical to secure the fluorescent lamps in linear lighting fixtures used in schools, offices, and hospitals. Because these lamps have the potential to fall out of their sockets during an earthquake and cause injuries (AFAD, 2011-3; Rodgers et al., 2021). High-energy bulbs in floor lamps and lampshades should be placed away from flammable materials, as they can cause fires due to high temperatures on the bulbs. These lighting fixtures should be attached to a nearby wall or table with metal elements to reduce fire risk (AFAD, 2011-3). Moreover, movable lighting fixtures should not be placed on or near earthquake escape routes (Ertaş Beşir & Dereci, 2021). Lighting elements are treated with different precautions according to their location in interior spaces. When suspended from the ceiling, they must be connected to the carrier system of the ceiling; if embedded in the suspended ceiling, they must be secured with links (Ertaş Beşir & Dereci, 2021).

4. Results and discussion

As a result of research analysis, the definition of strategies and risks documented in literature according to the categorization has revealed a set of criteria for reducing earthquake risks in the design of residential interior spaces (Table 2). The synthesis of results derived from the literature review is presented through numerical values of the sources in which the criteria headings are mentioned for each category. The analyzes made within the scope of the defined categorization present that risks and strategies are mostly handled within the scope of "fixed furniture", "non-structural elements" and "objects" categories. The most defined risk for "fixed furniture" (store elements, shelves) was "tumbling"; and the most defined strategies were related with "material" and "fixing". "Falling" was the most underlined risk for "kitchen cabinets" while "locking" was the most proposed strategy.

In scope of the studies which focused on "non-structural elements", the most defined risks for "wall partitions" were "breaking" and the studies proposed "strong construction" as a

design strategy. The most important risk that is defined for "suspended ceilings" was "downfall" and the strategies related with the defined risks were on "reinforcement".

"Objects" such as books and decorative accessories mostly define a risk of falling, and the most proposed strategies are related with "fixing" and "placement".

As further research of this comprehensive literature review, the derived results will be compiled by an interior design point of view. Therefore, a design guide containing all data supported by visual scenarios will be created. This guide has created a holistic directory for reducing earthquake hazards by design, for the use of both interior architects and designers, as well as the wider community. The fact that large numbers of people use residential interiors during earthquakes and that daily life takes place on a large scale in residential interiors defines the widespread impact of the study. The residential interior design criteria to be determined within the scope of the study is expected to be a source for raising social awareness. Furthermore, as a "Design Guide for Reducing Earthquake Risks in Residential Interiors", it can be used in different design phases, as well as for taking individual measures by residential users. However, even though this guide will focus on residential interiors, the measures and directories could be applied to other interiors, such as schools, offices and hospitals. This study can further impact and promote earthquake awareness for future studies in the interior design discipline.

5. Conclusion

It is clear that an earthquake is unpredictable, and its damage is unmeasurable beforehand. Therefore, it is difficult to predict the exact extent of the hazards or outcomes of accidents related to seismic events. It is a fact that even if buildings do not collapse, damage within the interior spaces may occur. In this context, the precautions to be taken in the interiors might be life-saving. Consequently, in the interior design process, taking appropriate measures to combat earthquake damage is essential for users' safety.

This research is a documentation study that comprise a profound literature review, analysis and synthesis of the bibliographic resources. The study's primary outcome is compiling a set of design criteria with a holistic approach for residential interior design in earthquake zones. It is crucial to prevent the damage caused by earthquakes by taking measures in the interiors of buildings, and it is of great importance to develop collective awareness of this fact. The presented residential interior design criteria set is expected to be a source that includes a holistic set of categorized data to reduce risks, lead to safe design, and ensure up-to-date continuity of knowledge for future designs.

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