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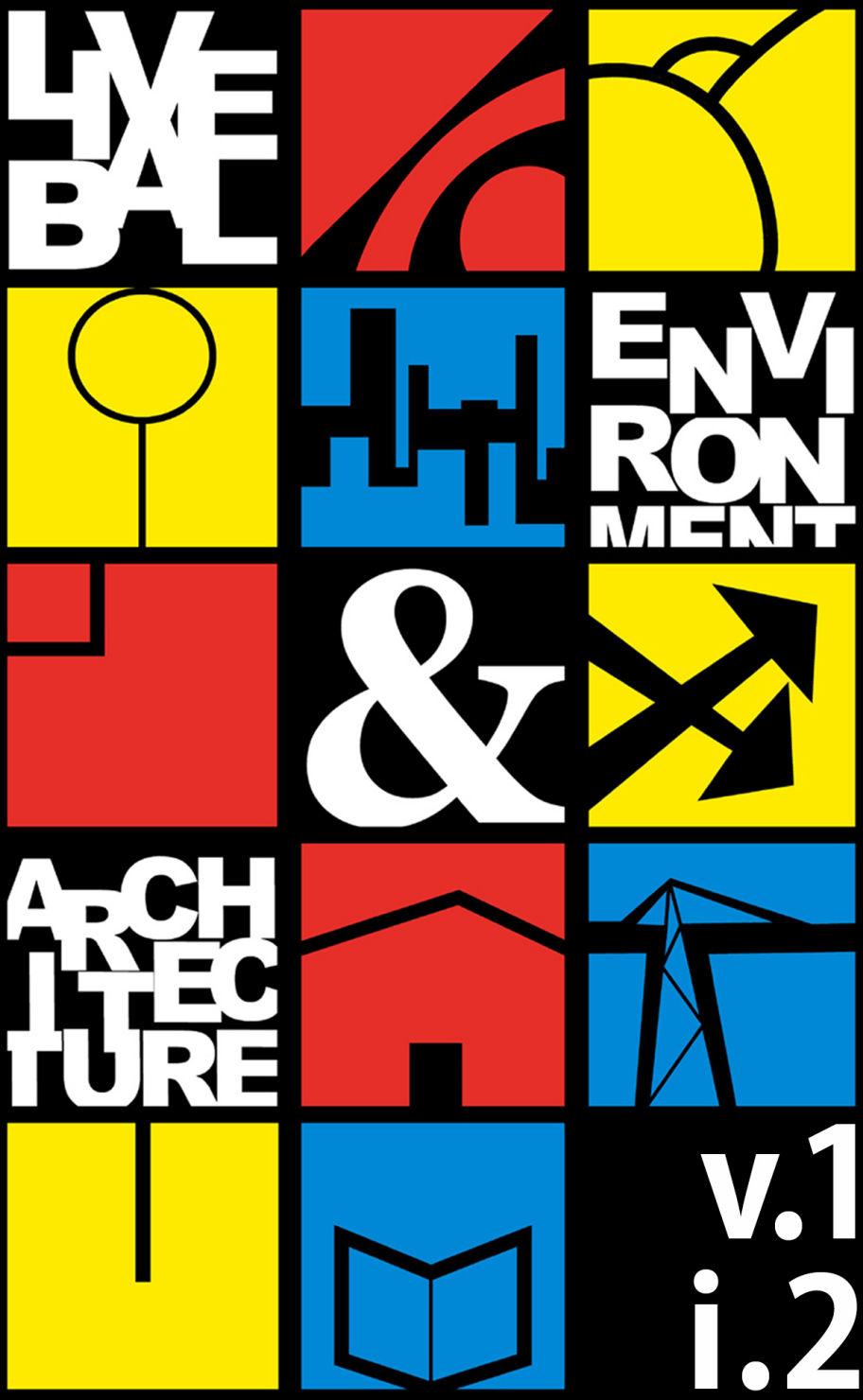

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Address: Karadeniz Technical University, Faculty of Architecture, Department of Architecture, Trabzon, Türkiye
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Discussion

"Blind Pickaxe": How Meaningful Is It to Read City Histories Reverse?

Ömer İskender TULUK

Department of Architecture, Karadeniz Technical University, Trabzon, Türkiye, otuluk@ktu.edu.tr

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"Zoning is possible by demolishing. If there is no demolition in a country, there is no zoning. If we don't undermine this city, we can't do anything",

Şevki Savaşçı, 1939.

For the question that interrogates how possible and meaningful it is to read city histories in terms of "blind pickaxe", in other words, in the context of "destructions", the words of the councillor, Şevki Savaşçı, at the Trabzon Municipal Council session in 1939 indicate a remarkable mental background. It is because, in the histories of urbanism in Türkiye, there are many actions that strengthen the perception that almost the only condition for "building" is "demolishing", and another striking example of this is about to happen in Trabzon.[1]

The main topic of the session is the Cinema Building (Pilosyan Cinema), which must be demolished urgently according to the Lambert plan, according to which an Atatürk statue was proposed to be placed in the park known as the "National Garden" in those years, and, as in many places, the surroundings of the monument need to be opened. According to the zoning plan preliminary project and Lambert's report, the work was to start from this square, one side of which was found the Cinema Building (Figure 1).[2]

*Corresponding author.
E-mail address: otuluk@ktu.edu.tr (KTU).

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[1] For detailed evaluations on this issue please see: Ö. İ. Tuluk, "İmâret-i Hatuniye'den Atapark'a: Trabzon'da Kamusal Alan Dönüşümüne Erken Bir Tanıklık" and "Harap Şehrin Kayıp Mekânları: 20. Yüzyılın İlk Çeyreğinde Trabzon'un Tarihsel Topoğrafyası"; Ö. İ. Tuluk & D. Bayrak, "Yıkarak İnşa Etmek: Trabzon Şehrinin Fiziksel Gelişimi Üzerine Bir Tersten Okuma Denemesi".

[2] Trabzon Municipal Council Minutes, Session on April 12, 1939.

Bahri Doğanay, the vice president of the period, was in favour of the immediate demolition of the building, including its outbuildings, regardless of cost. In fact, he was of the opinion that even 3000 Liras of rental income could be given up. Tevfik Yunusoğlu,[3] on the other hand, was not of the same mind as the municipality, which was already in financial difficulty, on giving up this income with a hasty decision and thought that the final zoning plan should be waited. Burhan Oğuzlu[4] had the same opinions. However, Şevki Savaşçı's following words, which contain a search for legitimacy in the demolition of Cinema Building through the spiritual existence of Atatürk, removed the issue from its main topic and moved it to another ground: "A person emerged who saved this country. He was alone. Twenty people joined him. They saved the country. It doesn't matter that the municipality loses 3000 Liras for a statue of him that we will place here".[5]

The minutes revealed that the main issue in the discussions was authority. However, for a group including Savaşçı, placing the Atatürk statue as soon as possible was a matter of honour, and there was no tolerance for any situation that would prevent this. It is clear that the core of the discussion lies in an effort regarding the zoning of the city. However, it is also clear that this issue is not only a simple zoning application. The influence of ideological atmosphere during this period cannot be ignored.

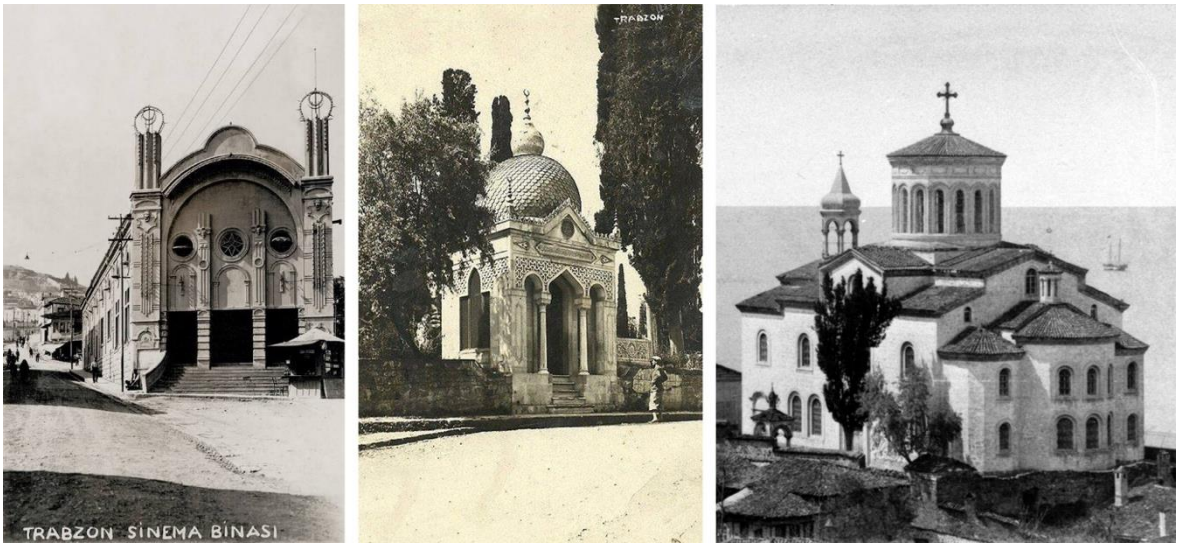

Figure 1. Cinema Building, Hamdi Pasha Tomb and St. Gregoire Greek Cathedral (Detail from Yıldız Album Ö. İ. Tuluk Private Collection).

On the other hand, it is also understood that the Cinema Building, which has a remarkable architectural language and host many ensembles including Darülbedayi, is already insufficient to meet the needs shortly after its construction.[6] The first complaints about this were from 1925 onwards (Fevzi, 1925, p.1). The first discussions on its demolition, which were reflected in the minutes of the Municipal Council after a series of renovation attempts, date back to 1939.[7] This was also the session in which Şevki Savaşçı uttered the motto "building the city by undermining

[3] Municipal councillor of the period and mayor of Trabzon between 1946-1950.
[4] Municipal councillor of the period.
[5] Trabzon Municipal Council Minutes, Session on April 12, 1939.
[6] For detailed evaluations on this issue please see: V. Usta & Ö. İ. Tuluk, "Başlangıçtan Halkevleri'ne Trabzon'da Tiyatro" and Ö. İ. Tuluk, "Spectacle in Trabzon During the Late Ottoman and Early Republican Period: Kostaki Theatre and Pilosyan Cinema".
[7] Trabzon Municipal Council Minutes, Session on April 12, 1939.

it" in response to the opposition to the demolition of the building. On the other hand, the minutes of the Municipal Council and local newspapers of the period prove that this not only reflects Savaşçı's personal view of the issue, but also proves that it was a widespread "mental pattern" for the period. It clearly reveals that in those years, the act of "demolishing" was imagined as the basic condition for "building".

Another story of a demolished building that has left deep traces in the memory of the city is related to the İmaret Cemetery (today Atapark), which is the treasury of the city's prince complex İmâret-i Hatuniye. By 1938, the ancient cemetery, where the gentry and governors of the last period were buried, had completely disappeared, except for its mosque and mausoleum (Tuluk, 2010, p.125). In those days, according to the law enacted in 1931, which enabled the transfer of abandoned cemeteries to municipalities, and the Regulation on Cemeteries, the cemetery was on the agenda to be moved out of the city. This process gained momentum with Atatürk's last visit to the city in 1937. With the special interest of General Inspector Tahsin Uzer, it was moved to the new cemetery in Sülüklü district in a short time. The three tombs of the governors in the cemetery were demolished at this time (Tuluk, 2010, p.132-138).

However, some documents and newspapers of the period also reveal that this cemetery, which was imagined as a relic of ancestors by at least a part of the society, was not treated sensitively enough and was seen as "bones" that needed to be disposed of as soon as possible for the sake of the city and its inhabitants. Moreover, Tahsin Uzer's reckoning with Abdülhamid II and the mentality of that period by having the Kadri and Hamdi Pasha Tombs in the cemetery demolished is also interesting in terms of showing that ideological reactions as well as legal obligations were effective in the transformation of the cemetery into a park (Tuluk&Bayrak, p.785) (Figure 1).

For some churches, too, nothing has changed. The fate was the same. However, for them, the process leading to the inevitable end was more traumatic. For example, what is written and drawn about the Armenian Church, which is referred to as "the big church on Maraş Street" in the minutes of the Assembly and in local newspapers, and which today occupies the site of the Ziraat Bank building, and the "big church in Kemerkaya" (St. Gregoire Greek Cathedral) are interesting in terms of expressing the socio-psychological dilemmas of the city residents who did not yet overcome the trauma of occupation and betrayal, under the influence of the ideological atmosphere of the period (Figure 1).

Abandoned churches began to be reported in local newspapers in the early periods. However, it is only in 1939 that we came across an article in which the discomfort with their existence and views on their urgent demolition were expressed in such a sharp style. In a corner post titled "Destruction is also sometimes a work" in *Yeniyol Newspaper* dated July 29, 1939, the author mentioned the church in Kemerkaya, destroying the traces left behind by the minorities to the duties of the People's Houses (Halkevi). The language he used to do so is remarkable. In the article, the intolerance of the nauseating presence of the church, which is described as a "dirt" and "stain" on the city's forehead, and which competes with minarets, is clearly expressed (Çınar, 1939, p.1).

In the column post titled “Are churches entrusted or are they the property of the city of Trabzon?” in the *Yeniyol Newspaper* dated March 13, 1937, the author expressed his concerns about the possible negative effects of the church on Turkish youth on Maraş Street, directly opposite the People’s House, which was probably already being used or envisaged to be used for another purpose (Gündoğdu, 1937, p. 2). Compared to the text targeting the church in Kemerkaya, the language of the text surprisingly complies with the rules of courtesy. The reason for this is understood only six days later in another opinion piece, which is a reply to this one. In the article titled “Trabzon’s theatre and cinema building should only and only be the big church in front of the People’s House” in the newspaper column “Opinions and Hearings” on March 19, 1937, the author tried to prevent the pressure for the demolition of the church by reminding the new function proposed by Atatürk, whose signs were considered as an important command, for this church building during his first visit to the city. According to the story, Atatürk pointed to the big church in front of the People’s House and said, “Here is Trabzon’s cinema, theatre, and conference place.” (Alap, 1937, p. 1).

However, the reminder served no purpose other than delaying the end. Eleven years later, in the May 5, 1949 issue of *Yeniyol Newspaper*, the news of the ongoing demolition of the church, which was sold to Ziraat Bank, was announced as "The last sledgehammers are being raised and lowered. There is not much time left for it to be razed to the ground.” (Sa-Uğ., 1949, p. 1). Finally, a few months later, on July 25, 1949, it was announced that the foundation of the new building of the Ziraat Bank was laid “after the demolition of unnecessary buildings for some time”, also referring to the church (Anonymous, 1949, p. 1).

Despite everything, there are those who oppose “blind pickaxes”, so to speak. The article titled “Let’s not waste historical treasures” in the June 24, 1942 issue of *Yeniyol Newspaper* is like a message not only for those days but also for the future, even though it will not be of much use: “It is not necessary to demolish definitely in order to build. Even so, it will not be the historical buildings that will be demolished because they are the property of history and humanity.” (Çulha, 1942, p.4).

Undoubtedly, the ambition of “creating a modern city” through “blind pickaxes” is not limited to Trabzon. The most striking and dramatic examples of “demolition” as a means of “reconstruction” within the framework of expropriationist policies can be found in Istanbul of the 1930s, 40s and 50s, as well as in many Anatolian cities, and, although there are some characteristics specific to the place where the action takes place, these examples are the local footprints of the birth of modernity, which comes into existence by destroying the old (Tanyeli, 1998, p.109-110). Such urban interventions also contain an important potential for tracing these traces and analysing the codes of modernism and postmodernism regarding demolition and reconstruction.[8] On the other hand, Trabzon Municipality Assembly minutes and period newspapers, which are full of striking dialogues, heated debates and sometimes slang-like

[8] The following studies, which make various evaluations on this issue in the context of Istanbul, are noteworthy: İ. Akpınar, “Menderes İmar Hareketleri Türkleştirme Politikalarının Bir Parçası mıydı?”; in the file “Yıkarak Yapmak” edited by İ. Yada Akpınar: C. Bilsel, “İmparatorluk’tan Cumhuriyet’e İstanbul’u Modernleştirme Projesi ve Prost Planı”; B. Boysan, “Genişliğin Azameti, Sağlamın Heybeti, Hendesenin Güzelliği, Trafiğin Hâkimiyeti”; F. Uz Sönmez, “Kentin Genetik Şifresinde Kırık Bir Kod/Fragman: İstanbul Seksenler”; Ö. Ünsal, “(Yıkılarak) Yeniden Kurulan Kent: 2000’li Yılların İstanbul’u”; in the book “Üç Kuşak Cumhuriyet” U. Tanyeli, “Yıkarak Yapmak” and prepared as a master thesis P. Çetken, “Kentin Hafızasında Bir Travma: Sulukule Yıkımı”.

expressions, draw attention to much more data in terms of revealing what lies behind the expropriationist zoning policies. This also means that city histories can be read not only through “constructions” but also through “demolitions” (Tuluk & Bayrak, 2020, p.784-786), and in terms of understanding, decoding and tracing the periodic mentality behind the idea of creating a modern city, it can even be easily claimed that there is a much more functional and rich material related to "destruction" rather than "construction", provided that it is considered in the context of ideologies specific to modernism such as secularism and nationalism.

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Research Article

Umbra-Structure: Exploring the Psychosomatic Extension of Architecture

Özlem DEMİRKAN[1], Ayşenur DAĞ GÜRCAN[2], Büşra YILMAZ ERDOĞAN[3]

[1]Department of Interior Architecture, Karatay University, Konya, Türkiye, ozlem.demirkan@karatay.edu.tr
[2]Department of Architecture, Karatay University, Konya, Türkiye, aysenur.dag@karatay.edu.tr
[3]Department of Architecture, Karatay University, Konya, Türkiye, busra.erdogan@karatay.edu.tr

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Abstract

This study aims to understand context's role in architectural education and the potential of body-space interaction. This work centers around the body and its spatial arrangement, incorporating architectural extensions as limbs and portraying emotional expression by adding limbs. An experimental study was conducted with second-year architecture students to achieve this goal. The study involved altering the context and distorting the student's connection to a particular place. They were then tasked with creating a structure that could be incorporated into their body while conveying an emotional expression. The experimental study aimed to assess architecture students' sensory and artistic reflexes following trauma. On February 6, 2023, Türkiye experienced two significant earthquakes. Education resumed after a certain period. Trauma determined the project's criteria, focusing on the body, emotional state, and connection.

This paper consists of five sections. The first part consists of the problem statements and scope of the study, while the second part is about architecture and context. The third part delves into the evolution of the relationship between the body and space in the posthuman era. In the fourth part, a method of analysis is proposed by utilizing literature. The visuals, words, articulation, metaphors, analogies, and stylizations used to describe the projects are tabulated. Adjectives for analyzing the visual form were used in the evaluation. It was observed that the words evoking positive emotions were expressed in soft forms. When the context pressure on the place was reduced, the relationships the students established between form and their bodies were diversified. The words used to create context supported the formal and semantic richness of the designs. In architectural education, this study increases the awareness of the sensory aspect of architecture.

*Corresponding author.
E-mail address: ozlem.demirkan@karatay.edu.tr (KTO).

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1. Introduction

Space is an empty expanse that harbors existence, and its formation requires the presence of constituents. The floor, walls, and ceiling are the most fundamental elements that define the space. The designer also constructs the internal and external organization of the space. In addition, the designer defines relationships, creates unions, and presents them to the user. Building such systems and relationships requires structures and constructions that ultimately shape the architectural configuration. Lefebvre (2014, p.231), an urban sociologist, refers to the space in the designer's consciousness (the ultimate architectural combination described in the preceding paragraph) as the conceived space. The architectonic shape exists primarily in the designer's mind and depends on the user's ability to create the space. According to Lefebvre, space production occurs within the context of a triangular relationship. These are conceived, perceived, and lived spaces. He even positions the perceived space in front of the conceived space. In this context, space is a system created in the designer's mind and where life and user interaction occur. This study examines this space definition, incorporating Lefebvre's space production approach. Space embodies an imaginative expression of sensory perception and experience. What happens if it is a whole of architectural elements, which is life, not in space but where it is articulated? How is space defined if feeling becomes a structure composed of imaginatively expressive architectural elements? What if the architect's purpose is reversed, and the designer's emotions and body serve as the context? This study does not aim to resolve these problems. In contrast, it aims to challenge the conclusions and investigate what has been learned in depth. As a result, the contexts are reversed. What is the design itself? How does the emotional state of the designer affect the design? What if the location became the body's context? What happens if the architectural form completely defies gravity? In addition to the pandemic, two major earthquakes and hundreds of aftershocks that hit Türkiye on February 6 and 7 are the reasons for the alterations to the context within the scope of this study. Efforts in this study promote a critical and curious approach to architectural education and eliminate the barriers that prevent students from braving out, expressing their emotions plainly, and designing.

This paper presents the results of preliminary research carried out among the students of the Department of Architecture at KTO Karatay University, Faculty of Fine Arts and Design, in the aftermath of the earthquake. The research, commonly referred to as a kick-project, assesses the student's responsiveness to post-trauma architecture. Before conducting the study, a literature review was performed. A new experiment was designed. The novel experiment design considered the cultural codes and traumas specific to Türkiye and Turkish architecture students.

1.1. Why Does Architecture Need Context?

Context is one of the most essential characteristics that differentiate architecture from art. According to Hinton (2014, p. 25), it is the agent's knowledge of the relationships between the elements of the agent's environment. However, Koçyiğit (2022) provides a more inclusive definition, emphasizing the individual and the environment. According to Koçyiğit (2022), context is a concept that establishes the relationship of an element with other elements, refers to the integrity that makes sense of the coexistence of elements, determines the connection of

many unique situations with the general, enables the thought of individual entities (particulars) together, and can be the ontological basis of universals. Context also implicitly refers to regularity, pattern, and serialism. It is the determination of an architectural object's conditions in architecture.

According to Koçyiğit (2022), context is defined in two ways. Ontologically, it pertains to physical and social reality; epistemologically, it is normative and dogmatic. In the article, Koçyiğit (2022) classifies context as physical, cultural, phenomenological, and historical, and the paper attempts to unravel multiple contexts. The concept of context, a topic that has undergone historical changes and extensive discussions, holds significant importance in architectural discourse.

In their study, Alagöz and Güner (2022) present a diagram illustrating historical context transformation. This diagram depicts the concept of context as originating from CIAM in 1928. Notably, Lewis Mumford's (1947) "Skyline Article" delves into this subject. Furthermore, the Team10 works and the symposium organized by MoMA in 1948 also devotes their efforts to examine the trajectory of Modern Architecture. In architectural discourse, contextual influences hold significant importance. The works and ideas by Alvaro Size, Norberg Schulz, and Louis Kahn play a pivotal role in shaping this discourse. These influential figures have contributed valuable insights and perspectives that have significantly impacted the understanding and appreciation of context in architecture. By examining their discourses and studying their works, one can better understand the multifaceted nature of context and its profound influence on architectural design. In the Salk Institute, the setting sun plays a significant role in enhancing the visual appeal of the perfectly symmetrical courtyard. As the sun descends, its rays extend the lines within the courtyard, creating a sense of continuation and amplifying the overall context of the space. This natural phenomenon adds an extra layer of depth and aesthetic charm to the architectural design of the institute (Figure 1).

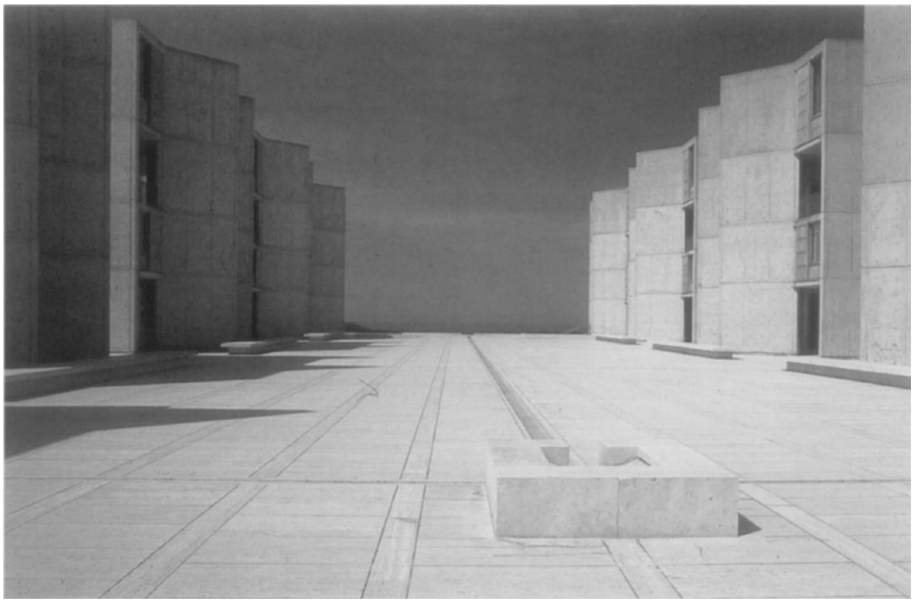


Figure 1. Salk Institute, Louis Kahn, Torrey Pines (La Jolla), California, 1965, Courtyard, View West (Treib, 2006).

Thomas Schumacher (1996), in his article “Contextualism: Urban Ideals plus Deformations,” defines context as emphasizing its role in bridging a city's old and new aspects while considering its future trajectory. The author references Colin Rowe's influential book, *Collage City*, to provide illustrative examples. The article by Schumacher, Colin Rowe, and Koetter (1996) was included in the book, *Theorizing A New Agenda for Architecture*, which was edited by Kate Nesbitt and published in 1996, with a specific title, *Urban Theory After Modernism: Contextualism Main Street and Beyond*. This book provides a comprehensive overview of architectural approaches that emerged between 1965 and 1995, following the era of modern architecture. It explores various historical perspectives and trends (Nesbitt, 1996).

In addition, in his book, *Image of the City*, Kevin Lynch (1964) presents a radical perspective on context by introducing his method of analyzing the semantic side of form. The method aims to map the user's mental image of the city after their experience and explores various contexts associated with the city. Researchers shift their focus from the physical context to imagism.

Furthermore, contextual interpretivism, also known as critical regionalism, emphasizes the significance of place. In their article titled "The Grid and the Road", Tzonis and Lefaivre (2016) introduce a concept further expanded upon in Frampton's (1983) article titled "Towards a Critical Regionalism: Six Points for an Architecture of Resistance". In their work, Tzonis and Lefaivre (2016) draw inspiration from the ideas put forth by Habermas and Shklovsky. Critical regionalism is characterized by rejecting repetitive architectural forms derived from historical references. The aim is to explore novel approaches in integrating the tangible and intangible aspects that shape a particular location. Critical regionalism is a concept that emphasizes the significance of place in design without imposing specific norms or standards. Frampton (1983) focuses on the development of contemporary place-oriented culture. However, he is against the repetition of local forms. Differentiation can be used in unity with architectural elements.

As stated above, Koçyiğit (2022) categorizes the context into four main categories: Physical, cultural, phenomenological, and historical. Additionally, the author includes the context of becoming a phenomenological evaluation. The foundations of the context of becoming here are laid by Heraclitus and developed ontologically by Whitehead, Bergson, Dewey, and Deleuze. According to Koçyiğit, the close connection of architecture to the past is broken in the context of becoming. Displacement initiates with the advancement of communication tools, and new contextual frameworks emerge.

Metaphors are one of the various contextual frameworks that emerge. Furthermore, they employ a semantic analysis of the context. According to Demirkaynak (2010), architects of the 20th century frequently employed metaphors as modes of thought. The author argues that the architectural object is a form of communication analyzed using symbols, signs, conceptual processes, and metaphorical context. Barnet (1999) reconsiders context and attempts to reconstitute it with Derrida's discourses in "Deconstructing Context: Exposing Derrida". The author views deconstruction as an instrument for reconstructing context and questions the context's norms. It utilizes the context-reproducing function of deconstruction at this juncture but does not formulate the context. Jakobsen (2012) considers physical and experiential context. The author uses Gilles Deleuze's concept of cinematic materiality to characterize the relationship of material to movement and image in cinema, which consists of two distinct

differentiation and specification processes. New Acropolis is a case study investigating the structure's allure in this context. Jakobsen (2012) demonstrates that context is not only a comprehension of the inputs of architectural form during the design phase but also a recurrent concept in the experience of architectural form.

Rem Koolhaas (1996, p. 502) presents one of the most radical perspectives on context. "Fuck the Context" is the quote sourced from the essay titled "Bigness, or the Problem of Large" in Rem Koolhaas' book, *S, M, L, XL*.

When considering the historical, definitive, ontological, and epistemological aspects, the concept of context arises as a defining factor in architecture. It shapes the form and is continuously shaped by the user experience. However, the question remains: Why do architects require context? What happens if the context is differentiated and inverted?

1.2. Body as an Alternative Unit of Context

Merleau Ponty (1962), in his book *Phenomenology of Perception*, provides a precise definition of sensation as a condition that is both influenced and personally encountered and is inherent to the one experiencing it. Furthermore, it is an integral component of the overall experience. Sensation highlights the physical form as an entity. Additionally, it explores the encounter of the physical body and its spatial dimensions and motion. In the chapter titled; *The Body as Object and Mechanistic Physiology,* he refers to a hypothetical limb. He illustrates an individual who experiences amputation of their limb. By substituting a stump for the leg, the individual has a sensation of having a non-existent limb. However, this reflection pertains to the cognitive representation of a limb with which the individual has already encountered and familiarized. The hypothetical appendage provides tangible encounters for the individual. Ponty (1962) contends that this dream may originate from the individual's past experiences, sensations, emotions, and intentions of the limb. Humans enlarge their organs using tools. Stiegler (2018) cites Georges Conguilhem in his work *The Neganthropecene*. Humans extend beyond the organism. The human body possesses several tools, such as organs, that enable it to perform a wide range of actions. Stiegler's idea primarily revolves around producing and utilizing synthetic organs and information generation.

The body becomes essential. According to Erkenez and Ciravoğlu (2020), the body has the possibility of shaping space. Recognizing/defining/understanding the body is essential for our predictions and determinations about space. While the body is shaped by bearing the traces of structures of domination, not only mind/body dualism but also culture/nature, women/male, and subject/object are at a critical point for the influence of hierarchical oppositions. The Industrial Revolution can be examined in anthropocentric, anti-anthropocentric, and post-human periods until the 2020s. They exemplify the concepts of organisms, disembodied organs, body without organs, cyborg body, and their relations with space. In this context, Stelarc's works are essential for Erkenez and Ciravoğlu (2020). Based on the idea that the human body is outdated, biologically no longer adequate, and obsolete, the artist argues that the body can be healed, developed, and strengthened by adding new limbs. For this reason, he argues that a third ear, a third hand, or a new leg can be added to the body (Kılıç Gündüz, 2023).

2. Material and Method

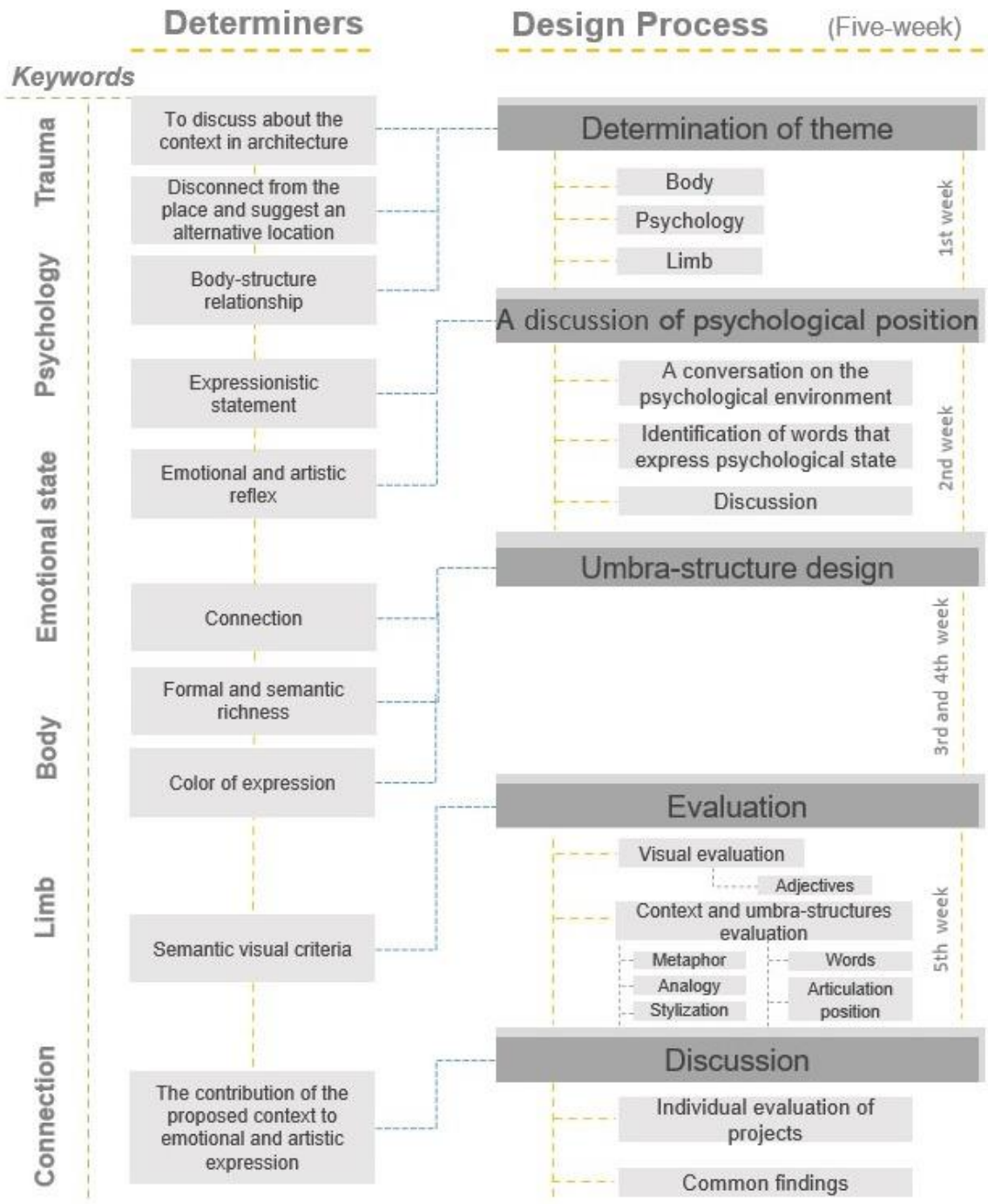


Figure 2. Design Process Schema (Created by author 1 and author 2).

The study was conducted for the 2nd year students of KTO Karatay University, Department of Architecture, in the spring semester of 2022-2023 within the scope of Architectural Design 2 course. The experiment required students to collaboratively design a model that represents their psychological state, incorporating their bodies as an integrated component, such as a limb, while considering basic design principles. Before commencing the design process, the project coordinator instructed participants to select words that expressed their psychological

moment. The formal counterparts of these words were the structures that assimilate into their bodies and synchronize with their movements. Architecture is a manifestation of the psyche within a given context. The task assigned was to simulate shadow or umbra structures. This research was part of an architectural studio experience. Students worked on concepts with words and phrases reflecting their psychology. In the following process, they worked with sketches and models to visualize their designs based on their concepts. They designed the concept, integration, structure, and material of a new limb added to their bodies. 1/1, 1/2, 1/5, and 1/10 scale used for the drawings, while 1/1 scale used for the models. Finally, the students physically exhibited their designs by carrying them on their bodies and moving with them. When examining context historically, definitively, ontologically, and epistemologically, it becomes evident that it is a concept that shapes the boundaries of architecture. The user experience reformed it. This study aims to investigate the potential changes in the visual impact of design when altering the fundamental criteria in architecture that are associated with the context. The user body is the location. Contexts are emotions (Figure 2).

In Çırakyılmaz and Aydın's (2021) article on the visual effect of form in architectural design, they utilize adjective pairs to determine the visual impact. Semantic evaluation adjectives are simple/complex, dynamic/stagnant, strong/weak, balanced/unbalanced, full/empty, hard/soft harmonious/harmonious, ornate/simple, animated/immobile, original/populist, free/restricted, ruleful/ruleless, emotional/rationalistic, dominant/reserved, and traceable/forgotten. In this context, the adjective pairs determined by Çırakyılmaz and Aydın (2021), which are about the visual effect of form in architectural design, are utilized. These adjectives, evaluated quantitatively in the article, are handled qualitatively in this research, and evaluated by the project instructors. Out of 19 adjective pairs, 13 are selected as appropriate within the scope of the project, and two adjectives suitable for the definition of umbra-structure are added. These pairs of adjectives and the reasons for their selection are given in Table 1. The authors prepare two tables to describe and evaluate the projects. The first table (Table 2) aims to introduce the projects, umbra structure, and context in detail. The ID information, photographs, sketches of the projects, and the words that the students started with while preparing the project are part of the table. Information about umbra-structures and articulation style are also parts. The study focuses on analyzing the utilization of metaphor, analogy, and stylization to assess these conceptual tools' role in conveying abstract thoughts and emotions inside design projects. The present analysis focuses on how students alter the visual impact of designs, specifically by exploring how they remove and reverse the conventional influence of context on location. The students made lexical choices, articulated their manner, and recorded the incorporation of metaphor, analogy, and stylization alongside these adjectives. Researchers attempt to analyze the relationships among lexical semantics, adjectival usage, and metaphorical expressions.

Table 1. Pairs of Adjectives and the Reasons for Their Selection.

	Types of Adjectives	Reasons for Choice
Adjectives of Çırakyılmaz and Aydın (2021)	Simple/Complex	Students can assess the design as a selectable, easily identifiable form or a hard-to-identify structure.
	Dynamic/Stagnant	Investigation of the liveliness and excitement or the calm and stable effect of the design in people with frontal and mass movements at first glance.
	Strong/Weak	Whether the design symbolizes its power by having a dominant feature around its surroundings.
	Balanced/Unbalanced	Whether the design has a balanced mass placement.
	Harmonious/Unharmonious	Compatibility of the parts that make up the design in terms of their relations with each other.
	Full/Empty	The effect of fullness due to the closed nature of the design form or the impact of emptiness due to its openness (connectivity of interior and exterior).
	Ornate/Simple	The state of being simple or ornate.
	Original/Populist	Whether the design has an ordinary formal expression or an original formal design.
	Free/Restricted	Whether the formal expression of the design makes people feel freedom or restraint.
	Ruleful/Ruleless	Does the design have an orderly and clear understanding?
	Emotional/Rationalistic	Whether the design creates an emotional effect with a lyrical and poetic expression or whether it displays a logical attitude with rational and rigid solutions.
	Dominant/Reserved	Does the design have leadership and freedom features or a recessive attitude according to its environment?
	Traceable/Forgotten	Whether the design is permanent and long-term in memory or is it short-term and temporary.
Added Adjectives	Animated/Immobile	Whether the design moves within itself.
	Hard/Soft	Whether the design has hard or soft lines in the expression.

3. Results

Fifteen practical projects are selected for the analysis study (Table 2 and Table 3). The individual projects are reviewed below:

- The starting point of project No.1 is that emotions inside the individual are like pearls. It is attached to the body with a belt and button. The shell in which the pearl is hidden is stylized. The metaphor used is that emotions are hidden deep inside. A simple design concept is chosen when the semantic evaluation table is examined. Contrary to the stagnant of the pearl, the student uses a dynamic design concept. The design is not dominant over the body. It has a weak character. Design elements have a harmonic feature when examining their relationship with the whole. Although the design is in three dimensions, no fullness or empty nature is formed. Form ornaments the design. The design resembles a folding fan, so its visual connection is marked as populist. It is free and regulated. It is determined that the student makes the design with an emotional approach. It is dominant. It is traceable. It is not mobile and has a soft character.

- The starting point of project No.2 is that small emotions can cause significant changes. The articulation is direct, and no element is used for attachment to the body. The metaphor used is the butterfly effect. Analogistic is the flight of the butterfly. The student stylized the butterfly. The design is simple, not complicated. It goes from the part to the whole. The stylized butterfly is reproduced, and a dynamic work is obtained. However, it has a weak character when the relationship between design and body is examined. It needs to be balanced. It has a harmonic structure. Elements follow each other in the same way in different colors. It has an empty sense of design. It is ornate, especially the colors and the stylization make the design ornate. It has a populist understanding because it tries to match the butterfly, one of the first animals that comes to mind, with emotions. It is a free design. No rules are used. Colors are randomly placed. It is an emotional approach. It is recessive; he is not forming a dominant character on the body. It does not have a catchy form. The student does not use movement as a design element. It has a soft character.
- The starting point of project No.3 is to have loads behind it but to maintain a positive outlook on the future. However, the student associates the future with the front of the body and the past with the back; the student hangs it directly on the neck. The design uses past and future as metaphors. The design is simple. It does not possess a deconstructive attitude. The design character remains static. Researchers determine that the design is a weak character, examining its relationship with the body. However, the student searches for balance. She tries to design the rear form with the previous form in similar size and density to prevent the body from tipping over. It does not harmonize because it exploits contrasts. The use of color gives it an ornate character. The student attempts to attribute different meanings to the word balance. This originality lies in its attempt to capture the balance of two different formats. However, the student limits the design concept and cannot move freely. It is irregular. She does not seek rhythmic balance. This work also evokes emotions. A dominant character does not cover the body. The forms are not catchy; they are formed randomly. She does not consider motion as a design input. The stern character portrays the back side using the past as a metaphor. On the other hand, positive emotions are referred by the front forms, and they have a soft character.
- The starting point of project No.4 is flowers and thorns. The student directly integrates this work into the body. Although the student stylizes flowers, she makes connections with realistic shapes. The design appears simple. The student creates a composition with flowers and places it from the shoulder down to the waist. The composition is static. It is weak when considering its arrangement with the body. There is no balance. The stylized flowers are randomly placed, which creates disharmony. The design has no gaps. The object is ornate. Populism is evident. Constructing the whole is free and unregulated. It evokes emotions. Its relationship with the body has a recessive character. It does not catch attention, partly because it appeals to the masses. The student does not use movement as a design element. The colors used in harmony with nature make it soft and versatile.
- The starting point of project No.5 is carrying the load on the shoulders. The student uses sadness as a metaphor and stylizes the clouds. Plastic clamps attach it to the body. Although sadness is one of the interesting features here, the language of the form is sharp and extroverted. There are two structural elements and one color. Different dimensions

place it in various parts of the arm, making it dynamic. It is weak, judging by its relationship with the body. The design does not search for balance. White creates a series in color and rhythm, making it harmonic. The room is empty. The design does not have a complete character. Its direct use of clouds makes it particularly fancy and leads to a populist approach. Since it uses the same articulation style in a single-arm placement, its understanding of design is limited. Creating a particular order makes it regular. It evokes emotions. When viewed visually, it dominates. The mind retains it permanently. The system moves with the movement of the arm, even though it does not use movement as a design element. Therefore, it operates on mobile devices. The clouds have a soft character, but the dominant character is harsh.

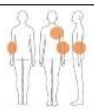
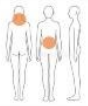
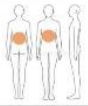
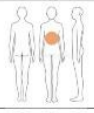
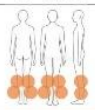
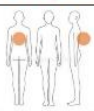
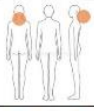
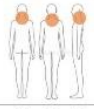
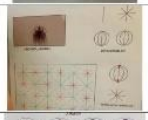
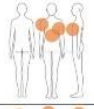
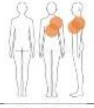
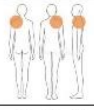
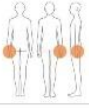
- The starting point of project No.6 is an unstoppable chaos and hubbub. The headband and wire are integrated into the body and become a part of it. The student does not use any metaphor or stylization here. Design is a complex concept. It has dynamism. Examining its relationship with the body, we find that it is vital. The balance is off. It lacks harmony; it does not have a rhythmic sequence; it does not attempt to be harmonious. The student uses filled forms. The hubbub originates as an embellishment. The design is original. It is free and has no rules. It does not stylize or use metaphors, making it rational. The form dominates the body. The design leaves a mark on the mind. We do not find movement as a design element. The design language is strict.
- The starting point of project No.7 is reluctance and dragging feet, using a root metaphor and stylization. The reason for its inactivity is its rooting. This root, however, inhibits movement. Using aluminum foil, he wraps the design around his legs. It has a straightforward design concept. Although using a single color slows the foot's movement, it is active and dynamic. Examining its relationship with the body reveals that its personality is feeble. It is well-balanced because it stands on two legs and moves towards the earth. It lacks harmony. It is vacant. There is no complete form. It is intricate because of the nature of aluminum foil. Rooting is populist due to its direct application. It has limited knowledge of design. It is visceral and disorderly. Regarding hue and texture, it is subordinate to the body. It is not an attractive layout. The design now includes leg-movement functionality. It is soft.
- The starting point of project No.8 is the knives on the back. The student wears it by integrating the design into a t-shirt and stylizing the knife. It has a simple design language. It is stationery. When its relationship with the body is examined, it has a weak character regarding height and design language. There is no search for balance. Despite the color transition, it is anharmonic. There is no empty or filled character. It is plain. It is populist because it is designed like a shield. It is limited. There is no rule for the design. The elements that make up the whole are arranged randomly. It is emotional. It is recessive in its relationship with the body; it has remained regional. It has a forgotten character. The movement is not used as a design element. It is hard to understand.
- The starting point of project No.9 is a stress cube. It is attached to the neck with a hair band. Stress and emotions are used as metaphors. The student mentions that her neck hurt when she is in challenging situations. This pain stress cube, which she experiences daily, becomes the starting point of her project with the synonym of a stress ball. It is complex. It is formed by combining the cube and two design elements with different characters. It is

dynamic. Considering its relationship with the body, it is weak. It needs to be more balanced. There is no search for balance. It is incompatible because two different elements are used. Due to the cube shape, a void is formed. It is ornate due to the elements inside the cube and the use of color. It is original. It is not popular. It needs a greater understanding of design. Although the shape of the cube is regular, an irregular design has been formed. It is emotional, primarily based on neck pain. It is recessive. It is memorable because of its location. Movement is not included as a design element. It has a soft character.

- The starting point of project No.10 is carrying the weight of emotions on the neck. It is attached to the neck like a necklace. The weight of emotions is used as a metaphor. The design is simple and dynamic. Its relationship with the body is strong and balanced. It is compatible. It is full. It is decorated due to the use of color. It is an original work. It does not resemble a form that has existed before. It is a free design. It is regular. It is a rational work. It is located predominantly on the neck. It is traceable. Motion is included in the project as a design element. Rigid forms are used.
- The starting point of project No.11 is the mind spheres. These spheres move within a specific structure. The T-shirt is used as a form of articulation. A simple systematic is followed. It is dynamic as different sizes are used. When its relationship with the body is examined, it is weak. It is balanced and harmonious. Black and white colors are used. It is an empty character with spheres and moving balls. It is simple. It is original. It has a free design concept. While design is free, it is normative. All spheres and balls are placed in the same way. It is rational and recessive. It has movement. It is soft.
- The starting point of project No.12 is the expression of the colors in the mind. The form of attachment is the hair band. It flows from the back of the head like hair. The student chooses the colors of emotions as metaphors. It has a simple design concept. The elements are formed with the same system. It is dynamic and strong in location due to its use of color and mobility. However, it is of an unbalanced character, which is compatible with the body. It is full and intense. It is ornate. It is not populist; it has a free design concept. It is ruleless because desired colors are used. It is emotional. Considering its position in the body, it is dominant and has a design that leaves an impression and remains in the memory. The parts are movable when walking, but where they are attached, they are stationary. It is soft.
- The starting point of project No.13 is the sharpness of the loads. These words are used as slogans. Emotional loads are used as metaphors. The form of articulation is direct. Fullness and space are used together. It has a simple design language. It is stationery. It is weak. There is no balance. Considering its relationship with the body, it is harmonious because it is formed in the same way as the body's movement. It is simple. It is a populist approach because only triangles are used. It is recessive. It does not leave a trace in the mind. It is motionless and rigid.
- The starting point of project No.14 pain. It is placed on his shoulder with triangles. It is directly connected to the body. It has a simple design language. It is stationery. It has a weak character. Although any search for balance is not visible from the front, balance emerges as the design spreads to the back. There is no harmony. It has created fullness. It is plain because of the use of color and form. It is populist because specific formats are used. It is limited, regular, and rational. It has a dominant character in the body area where

it is placed. However, it is not a design that leaves a mark. Movement is not used as a design element. The language is rigid.

Table 2. The Projects, Umbra Structure and Context.

PROJECT				UMBRA-STRUCTURE			CONTEXT		
					Way of Articulation				
ID	Photograph	Sketch	Words	Articulation Position	Direct	Using Attachment Element	Metaphor	Analogy	Stylization
NO 1 D.E.K.			Our emotions are hidden deep inside us like pearls.			Belt, Button	The feelings hiding the deepest		Mussel shell
NO 2 T.T.			The butterfly effect. (big consequences of small feelings) Butterflies in the stomach		D		Butterfly effect.	Butterfly flaying	Butterfly
NO 3 H.N.E.			Getting rid of the burdens on the back, think positive about the future		D		Load on the back and being postive		
NO 4 R.U.			Garden of emotion: flowers and thorns		D				Flowers and thorns
NO 5 B.D.			Carrying sadness on the shoulder, Cloud of sadness			Plastic handcuffs.	sadness		Cloud
NO 6 S.B.			Hubbub and insuppressible chaos			Wire, hairband			
NO 7 E.S.			Drag one's feet			Aluminium foil	Unable to move		tree root
NO 8 E.I.E.			Stab in the back			T-shirt			stab
NO 9 E.A.K.			Stress cube			hairband	Stress and feelings		
NO 10 M.B.K.			feeling the weight of emotions on your neck		D		weight of emotions		
NO 11 M.F.K.			Mind sphere			T-shirt		Brain-sphere	
NO 12 S.M.A.			The colors of emotions in my mind		D	hairband	The colors of emotions		
NO 13 S.T.			Sharp Load		D		Emotional load		
NO 14 T.S.			Shoulder pain		D		Pain		
NO 15 T.I.S.			Anger glove			glove	anger		

- The starting point of project No.15 is anger. The glove is cut from certain parts and integrates with the hand shape. Its metaphor is anger; it can be identified with a fist. It is a simple design. It is dynamic because of the needle's shape and direction of movement. When the relationship with the hand is examined, it is strong and dominant. It is unbalanced. It is compatible with the body. However, there is no harmony. It has a complete and empty balance. It has created fullness in form. It is plain because of the use of one color and form. It is original because of the articulation and the use of metaphor. It is free to place the form but limited in space. It is ruleless; it is emotional. Considering its relationship with the hand, it is dominant and is a work that leaves a trace. It is immobile, and its form language is rigid.

Table 3. Evaluation of Projects According to Adjectives.

ID	Simple	Complex	Dynamic	Stagnant	Strong	Weak	Balanced	Unbalanced	Harmonic	Unharmonic	Full	Empty	Ornate	Simple	Original	Populist	Free	Restricted	Ruleful	Ruleless	Emotional	Rationalistic	Dominant	Reserved	Traceable	Forgotten	Animated	İmmobile	Hard	Soft
NO 1 D.E.K.	✓		✓			✓		✓	✓				✓			✓	✓		✓		✓		✓		✓			✓		✓
NO 2 T.T.	✓		✓			✓		✓	✓			✓	✓			✓	✓			✓	✓			✓		✓		✓		✓
NO 3 H.N.E.	✓			✓		✓	✓			✓	✓		✓		✓			✓		✓	✓			✓		✓		✓	✓	✓
NO 4 R.U.	✓			✓		✓		✓		✓	✓		✓			✓	✓			✓	✓			✓		✓		✓		✓
NO 5 B.D.	✓		✓			✓		✓	✓			✓	✓			✓		✓	✓		✓		✓		✓		✓		✓	
NO 6 S.B.		✓	✓		✓			✓		✓	✓		✓		✓		✓			✓		✓	✓		✓			✓	✓	
NO 7 E.S.		✓	✓			✓	✓			✓		✓	✓			✓		✓		✓	✓			✓		✓	✓			✓
NO 8 E.I.E.	✓			✓		✓		✓		✓				✓		✓		✓		✓	✓			✓		✓		✓	✓	
NO 9 E.A.K.		✓	✓			✓		✓		✓		✓	✓		✓			✓		✓	✓			✓	✓			✓		✓
NO 10 M.B.K.	✓		✓		✓		✓		✓		✓		✓		✓		✓		✓			✓	✓		✓		✓		✓	
NO 11 M.F.K.	✓		✓			✓		✓	✓			✓		✓	✓		✓		✓			✓		✓	✓		✓			✓
NO 12 S.M.A.	✓		✓		✓			✓	✓		✓		✓		✓		✓			✓	✓		✓		✓		✓			✓
NO 13 S.T.	✓			✓		✓		✓	✓		✓	✓		✓		✓	✓		✓			✓		✓		✓		✓	✓	
NO 14 T.S.	✓			✓		✓	✓			✓	✓			✓		✓		✓	✓			✓	✓			✓		✓	✓	
NO 15 T.I.S.	✓		✓		✓			✓		✓	✓			✓	✓		✓			✓	✓		✓		✓			✓	✓	

The network map (Figure 3) shows the connections between the adjectives and the words chosen by the students. When Figure 3 is examined, it is seen that the adjectives ‘unbalanced, emotional, simple, and weak’ are prominent. Students use situations such as sharp load, chaos, sadness, getting rid of burdens, anger gloves, and feeling the weight of emotions on their bodies while designing their structures integrated into their bodies as limbs.

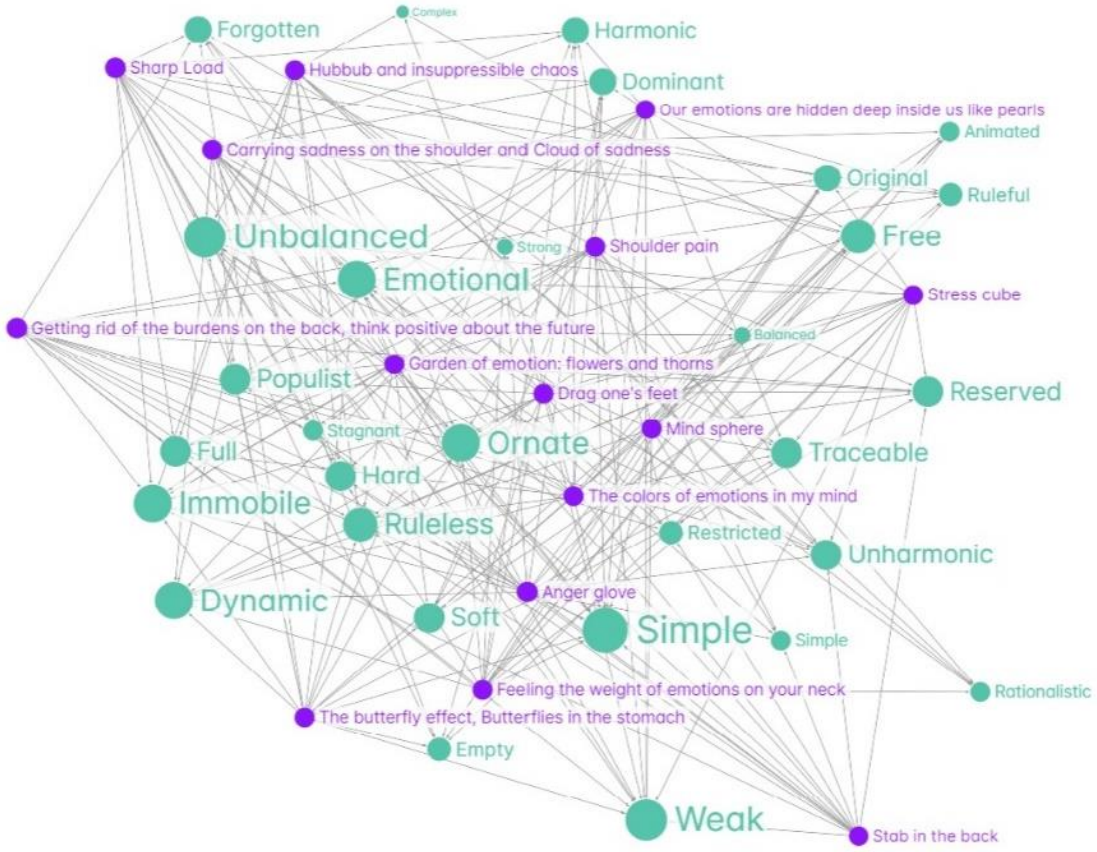


Figure 3. Network Map (Created by author 2 via Graph Commons).

4. Conclusion

This study aims to improve architecture students' design reflexes following trauma. Instead of seeking definitive and unchangeable results, the study wants to start a discussion about the context in architecture and body architecture relation in the posthuman era. In this context, the formal reflexes of the students that correspond to their emotional reflexes are evaluated. The emotions identified by the research are negative. However, they attempt to mix these negative emotions with positive ones. They articulate using all body parts (shoulder, head, back, foot, hand, and midsection). They tend to stylize the object they employ as a metaphor. They attempt to convey their emotions through color. Darker colors represent negative emotions, while a range of hues represents positive emotions. Ten or more is considered a dominant score for adjectives. Simple, dynamic, feeble, unbalanced, ornate, emotional, and immobile describe these adjectives. Negative emotions, such as anguish and burden, are evoked by rigid forms, whereas words with soft forms evoke positive emotions.

Furthermore, the design of the sharp uniforms emphasizes the body. The students project their negative emotions onto the organs where they experience discomfort. When the burden of the context on the ground is reduced, students' relationships with form and body form diversify. The words adopted as context and chosen by the students contribute to the formal and semantic depth of the visual meaning. This study heightens awareness of the sensory aspect of architecture.

Declaration of Ethical Standards

The article complies with national and international research and publication ethics.

Ethics Committee Approval was not required for the study.

Conflict of Interest

There was no conflict of interest between the authors during the research process.

Authors' Contributions

Özlem Demirkan (Author 1): (%60) Data collection, design of the study, interpretations of results, article writing and publishing process.

Ayşenur Dağ Gürcan (Author 2): (%30) Data collection, design of the study, interpretation of results, article writing process.

Büşra Yılmaz Erdoğan (Author 3): (%10) Data collection, tables

Declarations

The authors take full responsibility for the content and any modifications made during this process.

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Originality Report

According to the originality report obtained from the iThenticate software, this article's similarity rate is 5%.

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Research Article

A Sustainable Building Model for Emergency Settlements

Müjde ALTIN

Department of Architecture, Dokuz Eylül University, İzmir, Türkiye, mujde.altin@deu.edu.tr

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Sustainability, Sustainable Architecture, Emergency Settlements, Emergency Shelter Model.

Abstract

There are many emergency situations on earth nowadays which are caused by various reasons like wars, floods, storms, and earthquakes as has been lived in the eastern part of Türkiye on the 6th of February 2023, in which many shelters become necessary to be built as quickly as possible. But in this kind of places, after the necessity disappears, what happens to those shelters is a big and important question of efficient use of resources, energy and money, besides getting many of these shelters ready to be used in a very short time. Therefore, the aim of this study is to examine the accommodation problem of emergency shelters from the viewpoint of sustainability, and to propose a method to solve this accommodation problem which comes from a vernacular model of building use in Türkiye, which will lead us to create sustainable architecture products of shelters that will not waste our resources, energy and money. In order to do this, sustainability and Village Room terms are described, six case studies are examined and from this examination “City Rooms Model” is proposed. This model would be used in anywhere in the world and after the residents move out, these buildings would still be being used efficiently. Therefore, the proposed model in this study would lead the world to a circular economy and a more sustainable future providing better accommodation possibility and opportunity. With the use of this model, sustainable architecture, sustainable world and sustainable future would be achieved.

*Corresponding author.
E-mail address: mujde.altin@deu.edu.tr (DEU).

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1. Introduction

“Learn from yesterday, live for today, hope for tomorrow. The important thing is not to stop questioning” was said by Einstein (Brainy Quote, 2001). As Einstein stated, we should learn from our past, use it as modernized by adapting to our life today and hope that we will have a sustainable future. This study proposes a model for today by adapting an old model to have a more sustainable future.

Migration is an important fact of our daily life nowadays. Many people have migrated on our earth with different reasons until today and the number of people forced from their homes with different reasons is increasing day by day (Mercader-Moyano, Porras-Pereira & Levinton, 2021, pp. 1-35). According to UNHCR, “108.4 million people worldwide were forcibly displaced at the end of 2022 as a result of persecution, conflict, violence, human rights violations or events seriously disturbing public order” (UNHCR, 2024). This situation brings many problems to the whole world concerning social, cultural, legal situations, physical conditions and health issues. One of these problem areas is the accommodation problem. Since many people move from one place to another place in a very short time and mostly without taking not much property with them, accommodation becomes a very big problem. They need many shelters in a very short time.

Therefore, there is a huge requirement of shelters that should be constructed in a very short time lately all around the world because of wars, floods, storms, and earthquakes as recently (on the 6th of February 2023) happened in the eastern part of Türkiye. Many people lose their homes because of the reasons mentioned above; consequently, they have to migrate from where they live to a place safer than they live and they need shelters which should be constructed as quickly as possible (Crawford, Manfield & McRobie, 2005, pp. 471-483). This is a somehow temporary shelter, and when these people move to their permanent homes after a while, what happens to these temporary shelters is an important question which should be considered and handled with great importance and care since these shelters become a waste of resources, energy and money.

After a big disaster followed by a migration, many people leave their homes in a very short time and mostly without any property; therefore, the shelters they are in need should be constructed in a very short time. Generally, the first solution to this problem is using tents, but they are not very comfortable and most of them may not provide enough safety and necessary thermal comfort conditions in extreme weather conditions. After the tents, prefabricated units like containers or concrete homes are constructed and mounted in an area. But since people’s permanent homes are constructed in a very long time, these “temporary” structures are generally not that much “temporary” and they mostly stay empty in their place after the people finally move to their permanent homes. Such temporary structures for Syrians have been constructed in some countries including Türkiye and most of them are still being used today.

For example, temporary container shelters in Kilis Accommodation Facilities contain shelters in well-designed streets, and even small shopping units exist in these streets. But after Syrians leave this facility and move to their permanent homes, these shelters and all the facility remain empty, unemployed, inactive and un-used, but they shouldn’t be left un-used because this is a waste of resources, energy and money, thus leading to an unsustainable architecture and

an unsustainable world. In order to maintain a more sustainable architecture and a more sustainable future, these containers should be used in another area. But there are too many containers to be used somewhere else and this will be a real environment problem after the containers are abandoned.

There are many instances and disasters all over the world after which temporary shelters should be needed immediately; but these shelters should be designed so carefully that they will not be a waste after their use. There is a solution for that problem in a small scale in Turkish vernacular architecture which is called as “Village Rooms”. This is a very good solution which has been used very efficiently and it has to be adapted to our daily lives by updating. This study proposes a new model of temporary emergency shelter use which is similar to and a modernized model of the Turkish Village Room model. Therefore, the aim of this study is to examine the temporary emergency shelter problem from the viewpoint of sustainability and circular economy and to propose a model which is based on the “Village Room” use of traditional Turkish architecture. This proposed model can be used in any part of the world and lead the world to create a more sustainable architecture and a more sustainable future since they can be used for other purposes efficiently after they are abandoned while providing better comfort conditions and opportunities to the people who need them in an emergency situation.

2. Sustainability and Sustainable Architecture

Sustainability has many different descriptions worldwide. But there is just one description which is accepted anywhere in the world in general in which the word sustainability was first mentioned. It is the description of “Sustainable Development”. It was described by the World Commission on Environment and Development in 1987, which is known as the Brundlandt Report, as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987). After this description, many terms have been developed like sustainable architecture, sustainable future, sustainable tourism, etc. Sustainable Architecture aims to create a healthy built environment depending on resource efficiency and ecological design principles keeping comfort conditions in mind (Altın, 2016). Sustainable designs and buildings are the ones that are responsible to their environment by using resources efficiently and that give the minimum harm possible to their environment while maintaining healthy and comfortable spaces for the people.

Sustainable architecture principles can be summarized as follows (Altın, 2016, pp.601-611):

- Efficient use of construction site,
- Energy efficiency and use of renewable energy resources,
- Water efficiency,
- Material efficiency and use of local material and local manpower,
- Indoor comfort and human health,
- Waste management,
- Recycling.

It can be said that sustainable architecture helps to minimize the amount of resources used and the harm caused to the environment so that future generations can also use the resources necessary for them to survive and have a better life. The proposed model here helps to

minimize the resources used and prevents the abandoned shelters from becoming waste. Therefore, it helps to have a sustainable architecture and a sustainable future.

The proposed model containing emergency shelters should have these properties in order to have a sustainable architecture and a sustainable future. They should use the construction site efficiently. The site itself should be chosen carefully considering the safety and comfort conditions of the future possible residents.

The emergency shelters should be energy efficient and if possible renewable energy resources and especially solar energy should be used in order to provide a safe and reliable energy source to the building.

The emergency shelters should be water efficient. They may have rainwater collecting system and use this water in the WC systems. Another way of water efficiency is using water efficient appliances in the construction of these units. R.B. Fuller has designed prefabricated WC + bath units for his Dymaxion House design which is water efficient (Altın, 2013).

The materials used to construct the emergency shelters should be used efficiently. They should preferably be local materials constructed with local manpower.

The emergency shelters should provide thermal, visual, acoustic comfort conditions for their future residents. They should be warm in winter and cool in summer. They should have enough window openings for the visual contact with the environment and for the natural ventilation. They should keep the noise where it is and not transmit it. They should be fire resistant, so they should be constructed with fire resistant construction materials.

The wastes of these shelters should be processed with care due to the fact that the wastes may be the source of infectious diseases. This waste also consists of the waste after these shelters are abandoned. The plan to use these shelters when they are abandoned is a way to achieve sustainability. This is also the subject of recycling which should be taken in consideration to achieve sustainability. In addition, the recycling of the materials should be taken into consideration as well as the use of recycled materials in the design of the units.

3. A Village Room/Chamber

A “Village Room” or a “Village Chamber” is a traditional Turkish building used in vernacular architecture in villages. It is a house for guests which is constructed in a village sometimes by all the village people and sometimes by wealthy families of the village. Sometimes there may be more than one village room in a village if there are many wealthy families, as seen in Erzincan Çayırlı Başköy. Only two of these village rooms in Başköy are chosen and examined in this study.

All of these village rooms are used by guests who come to the village for accommodation since there isn’t a hotel or a motel or a bed-and-breakfast accommodation in the village. Apart from this, these rooms are generally used to get together in the village on special occasions such as celebrating or mourning, and other times to discuss important issues about the village, like a social getting together place. If guests arrive in the village, they are welcomed in that room and they are provided to stay in that room as a sign of hospitality. These rooms actually belong

to the society. Therefore, it is used efficiently most of the year, either as a hotel for the guests or as a meeting hall for the villagers.

Because of the migration from villages to the cities in Türkiye, this tradition of Village Rooms has mostly disappeared nowadays. Most of them are not being used, thus having damages and not being maintained. But there are many good examples. In this study, six of these village rooms / chambers in different locations were examined to describe what a village room is, how it is constructed and used. It aims to show the hospitality culture of Turkish people and how the new model buildings can be designed. These village rooms which meet today's needs should be taken as a model and restructured in order to be able to use today. Therefore, they shouldn't be permanent structures as it is in the existing case studies so that they can be moved to wherever they are needed. As a result, they should also show the hospitality culture of Türkiye.

3.1. Yozgat Village Room/Chamber

The Yozgat Village Room as seen in Figure 1 and Figure 2 represents traditional Yozgat houses. It has one storey and is constructed with traditional local materials. It has a compact form. Especially timber elements take place in both the construction and the decoration of the room. It is heated with a stove which is placed in the middle of the house. It is designed and constructed to be used by many people to sit down together and have conversation as a group (Köktürk, 2019a), (Köktürk, 2021b).

Figure 1. Yozgat Village Room/Chamber, Left: Interior of the Room/Chamber, Right: Entrance of the Room/Chamber as Seen from Outside (Köktürk, 2019a), (Köktürk, 2021b).

Figure 2. Different Views from the Interior of the Room/Chamber (Köktürk, 2019a) (Köktürk, 2021b).

3.2. Sivas İlbeyli Çallı Village Ümmet Ağa's Room

Sivas İlbeyli Çallı Village Ümmet Ağa's village room as seen in Figure 3 and Figure 4 was constructed in around 1851-1852. It is constructed with traditional and local stone. The thickness of the walls of the room is 1 meter, which helps to provide thermal comfort conditions. Local timber elements are used in the construction of interior design elements. The roof of the village room is terrace earth roof. The building has a compact shape; it is rectangular. It has one storey. The building is still being used in some special occasions (Bulut, 2017).

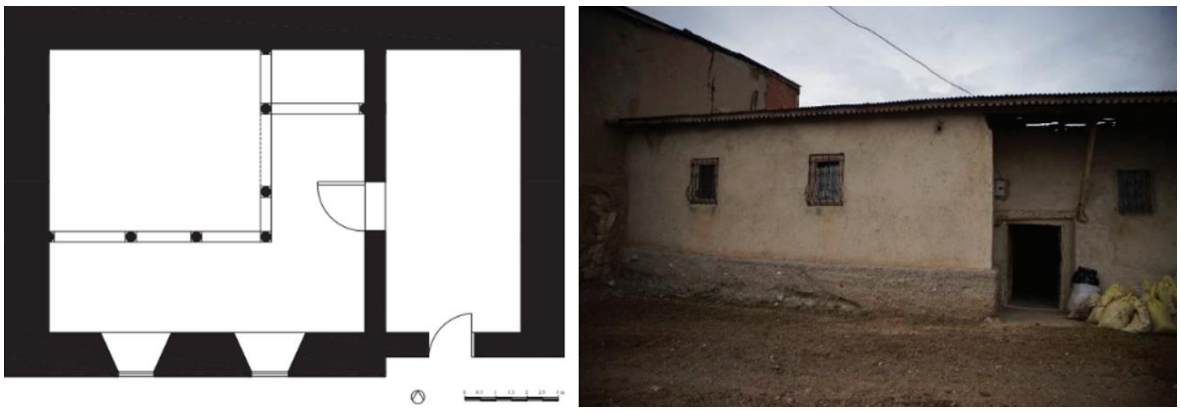

Figure 3. Sivas İlbeyli Çallı Village Ümmet Ağa's Room Left: Plan of the Room, Right: Entrance of the Room Seen from Outside (Bulut, 2017, pp. 13-31).

Figure 4. View of the Interior of the Room (Bulut, 2017, pp. 13-31).

3.3. Konya Göktürk (Kilistra) Village Room

Konya Göktürk Kilistra Village Room as seen in Figure 5 and Figure 6 is one of the oldest village rooms. Its construction goes back as far as 150 years. The building is constructed using local stone and timber. It is a two-storey building whose first floor is being used as the village room. Its plan is rectangular and it has a compact shape. It is constructed on an inclined area.

The roof is constructed as a terrace roof with earth filling. It is not being used nowadays since it has a serious damage (Bozkurt, 2016).

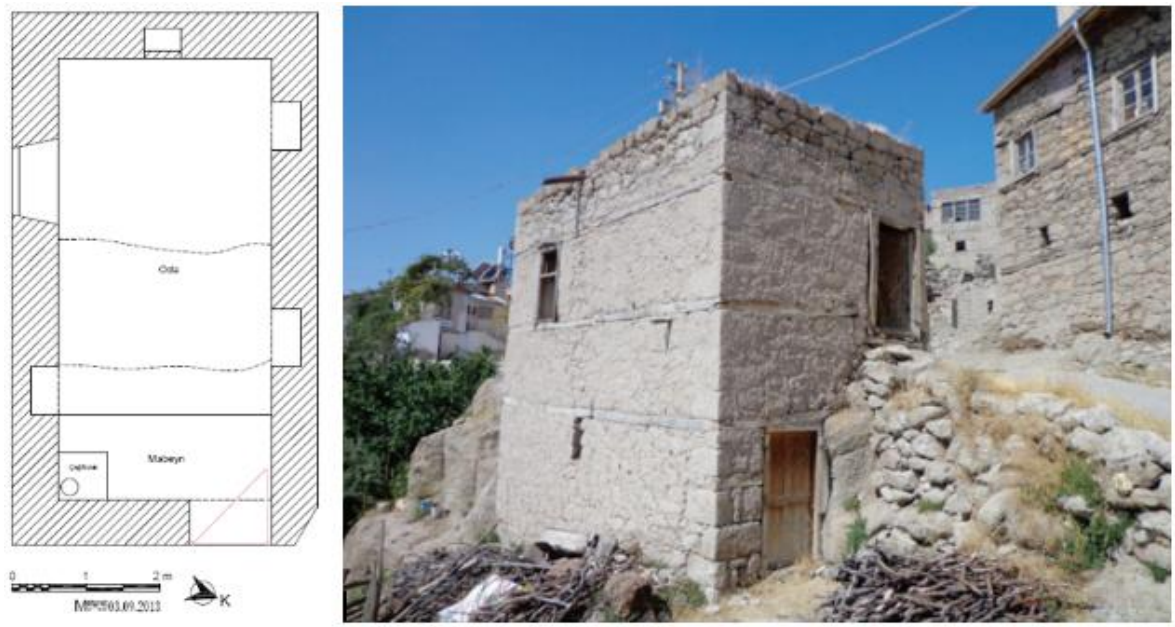

Figure 5. Konya Göktürk (Kilistra) Village Room, Left: Plan of the Room, Right: General View of the Room (Bozkurt, 2016).

Figure 6. An Illustration on the Seating Organization of the Room (Bozkurt, 2016).

3.4. Erzincan-Çayırlı-Başköy Dursun Koçgil's Village Room

Erzincan Çayırlı Başköy Dursun Koçgil's Village Room as seen in Figure 7 is one of the oldest village rooms of the village. It is constructed on an inclined area. It has a compact form. Its plan is rectangle. It has one storey. It is constructed by using local stone and timber (Naldan, 2020).

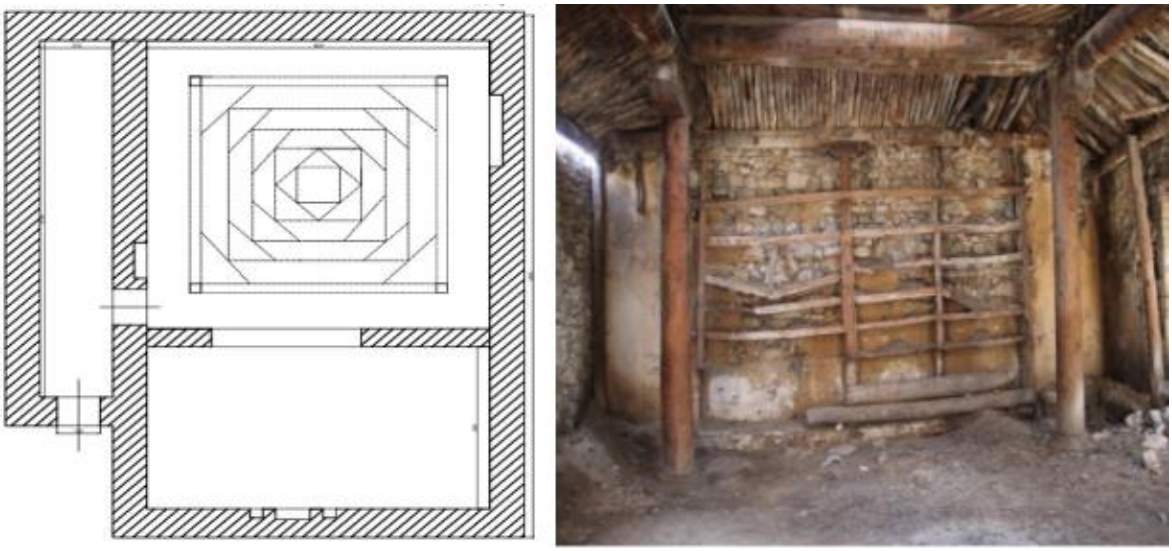

Figure 7. Erzincan-Çayırlı-Başköy Dursun Koçgil's Village Room, Left: Plan of the Room, Right: Interior of the Room (Naldan, 2020, pp. 249-263).

3.5. Erzincan-Çayırlı-Başköy Kaya Koçgil's Village Room

Erzincan Çayırlı Başköy Kaya Koçgil's Village Room as seen in Figure 8 is one of the oldest village rooms of the village. Its plan is rectangle. It has only one storey. It is constructed by using local stone and timber (Naldan, 2020).

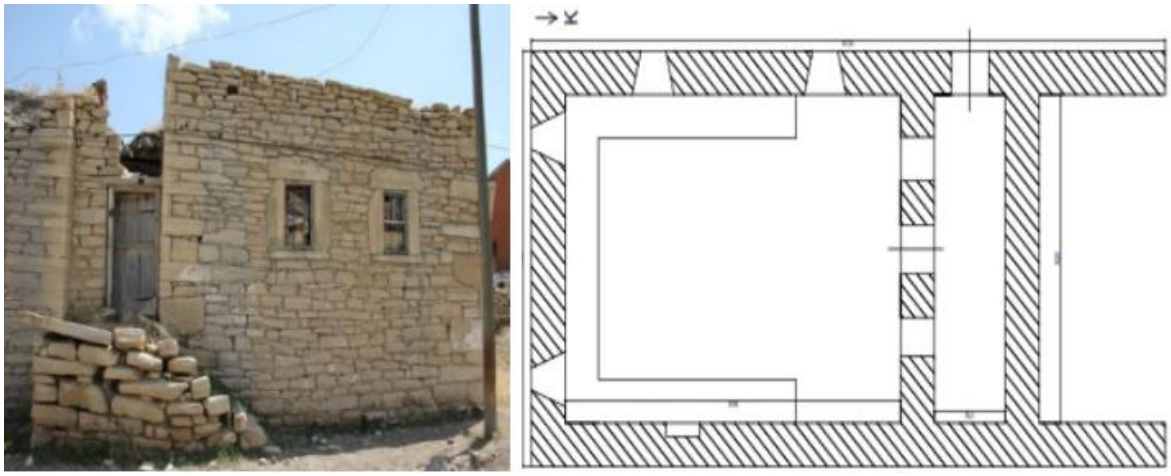

Figure 8. Erzincan-Çayırlı-Başköy Kaya Koçgil's Village Room, Left: General View of the Room, Right: Plan of the Room (Naldan, 2020).

3.6. Sivas-Söğütcük Village Room

Sivas Söğütcük Village Room was constructed in 1883. It is constructed on a slightly inclined area. Its plan is rectangle, which is very near to square as seen in Figure 9. It is constructed by using local stone and timber (Figure 10), (Yazar & Çelemoğlu, 2022, pp. 905-945).

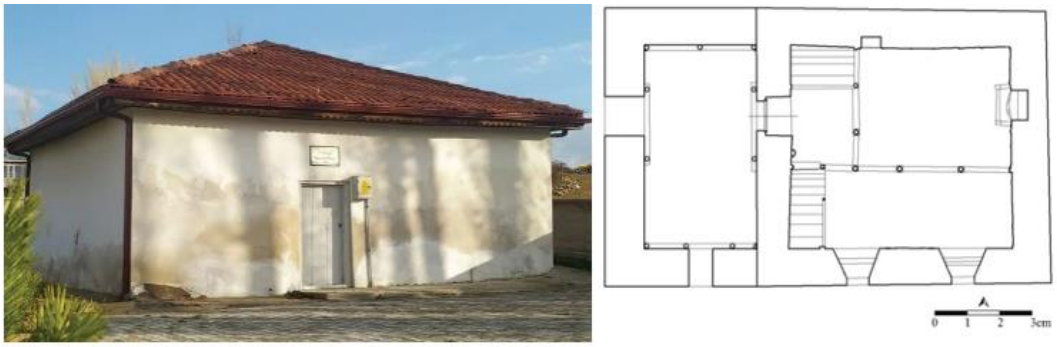

Figure 9. Sivas-Söğütcük Village Room, Left: General View of the Room, Right: Plan of the Room (Yazar & Çelemoğlu, 2022).

Figure 10. View of the Interior of the Room (Yazar & Çelemoğlu, 2022).

4. Evaluation of the Examined Village Rooms

As seen in case studies of Village Rooms, in the past, the room was a permanent building for the use of everyone in the village and every guest who came to the village. The rooms could accommodate people for different purposes for different occasions. Because of the change in requirements, most of them are not being used today but they are a good model for use today.

There are a number of properties of the Village Rooms which can be used in the design of the proposed method of “City Rooms Model” either in the same way or by adapting to our daily life-styles as seen in Table 1. They are discussed in this section.

The shelters in the proposed model should be mobile in order to use them wherever needed by carrying them instead of constructing units which will be unnecessary when abandoned. This is a more sustainable way of providing emergency shelters. Some of the Village Rooms are abandoned and not being used today and this is not what is desired in the proposed model.

All of the Village Rooms examined in this study have compact forms. This is very suitable for a prefabricated unit to be transported. And it also helps to provide stable comfort conditions inside of the building. Therefore, this property can be used when designing emergency shelter units. Although these rooms are constructed with heavy construction material of stone, in order

to design a mobile and a de-mounted – re-mounted emergency shelter, lighter construction materials should be chosen.

Table 1. Evaluation of Villages Rooms Examined.

Village Room Name	Location	Construction Material	Number of Storey	Plan Shape
Yozgat Village Room / Chamber	Yozgat	-	One	Compact form
Sivas Ilbeyli Callı Village Ummet Aga's Room	Sivas	Stone and Timber	One	Rectangle
Konya Göktürk (Kilistra) Village Room	Konya	Stone and Timber	One	Rectangle
Erzincan-Çayırlı-Başköy Dursun Koçgil's Village Room	Erzincan	Stone and Timber	One	Rectangle
Erzincan-Çayırlı-Başköy Kaya Koçgil's Village Room	Erzincan	Stone and Timber	One	Rectangle
Sivas-Söğütcük Village Room	Sivas	Stone and Timber	One	Rectangle

The Village Rooms except Konya Göktürk Kilistra Village Room have only one storey. But although it is a two-storey building, its only first floor is being used as the Village Room. Therefore, it can be accepted as a one-storey building. This is a suitable property for a prefabricated unit. Therefore, mobile units of emergency shelters would have one storey. This requires a big area to construct many emergency shelters, but it also overcomes some construction issues like staircase construction. The units should just be transported to the area and mounted on its place.

The Village Rooms examined in this study are constructed with local materials. Therefore, the units of the proposed model can be constructed with local materials which are suitable for prefabrication. By this way, the construction of the units occurs in a more sustainable, faster and economical manner.

The comfort conditions of people are taken into consideration while constructing these Village Rooms. Making people feel comfortable is an important design criterion. For example, a heating stove is used in the middle of Sivas İlbeyli Çallı Village Ümmet Ağa's Village Room and Yozgat Village Room. Therefore, comfort conditions of the future residents should be taken into consideration while designing the emergency units. But of course, this should be updated; maybe air conditioners can be used instead of stoves.

The village rooms are generally constructed with stone. Since the main structural element is stone, they are resistant to fire. Stone cannot be used in the design and construction of the emergency shelter units, but the materials that are to be used should be resistant to fire, and they should be fire proof materials. By this way, the units will be safer.

5. A Sustainable Building Model for Emergency Settlements: A City Room

The proposed model consists of units which can be used in the smaller areas, neighbourhoods of the city. When there is a necessity, they should either be demounted and moved to the place of the necessity or be moved to the place of the necessity by trucks or helicopters without demounting.

The proposed units are a little bit different than the village rooms, but they have similar functions. The difference is that the proposed units should be temporary and/or demountable. They should be composed of small, but comfortable and mobile units. These units should provide thermal comfort conditions; they should be warm in winter and cool in summer. These units should provide acoustic comfort conditions, and they should keep the sound where it is and not transfer. They should be resistant to weather conditions like wind, rain, snow, heat, cold, etc. In short, they must be strong and safe, and must provide comfort conditions inside them. They should be fire proof since electricity can be a big problem in this type of constructions. They should be constructed by fire-resisting materials.

There should be more than one unit. Maybe there should also be some social facility rooms to meet the needs like cooking, cleaning, washing, etc. so that they can meet the needs of the people when necessary.

The proposed units may be used as a quarantine unit in a pandemic situation as we just lived. They may be used as an extension to a health facility to be used as small healthcare units for emergency situations in a pandemic.

They might be used as shelters and for other functions necessary (like kitchen, toilet, bath, washing units, childcare centre, school, library, etc.) because of the collapse of thousands of buildings after a big earthquake as in the case we just lived after the big earthquakes in the eastern part of Türkiye on the 6th of February, 2023. Therefore, they need to be flexible to be changed into another function.

They should be mobile and moveable to neighbour towns or cities in an emergency when necessary. For this reason, there may not be necessarily a lot of units in a city, and there may be some smaller number of units in the smaller areas like neighbourhoods. Maybe, there might be smaller number of units in each “district” or “smaller towns” of a city. Then, in an emergency situation they might be transported to the place where they are needed and be used immediately. This makes the model easier to adapt to our everyday lives.

They shouldn’t be private or belong to anybody; they should belong to the municipality or the city, the local government. They should be the property of the society; everyone should be able to use them. For example, there are Public Education Centres in nearly each of the municipalities which give courses to the public in Türkiye. Also, some green building rating tools require education of the users of the building. They all need a space to receive these trainings. These units maybe used for these purposes, and in emergency situations they may be turned into necessary units in a very short time.

They should be prefabricated modular construction units since they have to be de-mounted and re-constructed. They can have a design like Buckminster Fuller’s Dymaxion House. He has designed these houses to be sold from the catalogue and to be constructed modular and be transported when necessary.

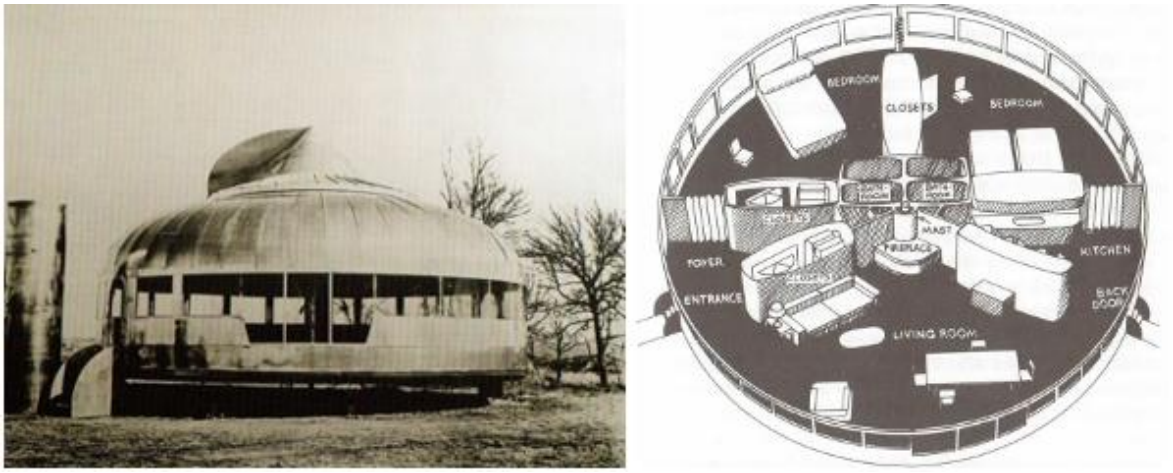

Figure 11. Left: The View of the Constructed Dymaxion House, Right: The Plan of Dymaxion House (Altın, 2013).

All the materials needed to construct the house fits in only one metal barrel which is seen near the house on the left side of the photograph in Figure 11 (Left). After the purchase, the barrel is opened, then the materials are taken out and the house is constructed as seen in Figure 12. The house can be constructed easily (Altın, 2013).

Figure 12. Construction Steps of the Dymaxion House (Altın, 2013).

Another advantage of the design is that once you complete the construction of the house, you can move the house with you anywhere like a caravan (or a trailer) or you can move it with the help of a helicopter and mount it to its new foundation in its new location.

The plan is flexible. You can move the walls in the circular plan and change the area of the spaces in the house as seen in Figure 11 (Right). This helps to make the house more sustainable. In addition, the dome shape helps to decrease the heat lost or gained because it provides the maximum space with the minimum surface area. This lowers the loads of the building and leads to less energy resource use as in sustainable architecture.

The WC part of the house which is in the middle of the plan as seen in Figure 11 (Right) is also prefabricated and helps to lower the use of water by using special design techniques.

Dymaxion House is not mass produced (because of Fuller's perfectionism, the design was not finished and therefore not mass produced) and it has only one prototype today in Ford Museum. But the design principles may be used for the design of the units of the proposed model.

There may be other design ideas which we can inspire from like the “Sugar/Candy Domes” as the writer calls them because they look like sugar/candy for real. They are composed of heat-resistant materials like polystyrene foam. They can be constructed in a very short time; therefore, they are suitable to be constructed after an emergency situation. They are weatherproof. The structural material of polystyrene foam is used as an insulation material, so it is suitable for nearly every environment as providing thermal comfort or can be made suitable by increasing or decreasing the thickness of the walls. In addition, here again the dome shape is used generally, and it helps to decrease the heat lost or gained because it provides the maximum space with the minimum surface area. They can also be constructed in a vault shape making the interior space larger if it is necessary.

Inside of the domes can be designed and decorated as necessary or desired. They can be used as service units as restaurants, kitchens, marketplaces, laundry, classrooms of a school, library, etc. One example to this kind of shelter domes is the Prefab Styrofoam Dome House which is a Futuristic Japanese design as seen in Figure 13 (Trendir, 2016).

The only disadvantage of these domes may be fire proofing. Therefore, they should be constructed with special fire-proofing detail solutions. Another disadvantage of this type of construction is be their weight. Since they are very light, the wind can be an important problem. Therefore, the building should be mounted to the ground very carefully if this material is used in the design of the emergency shelters.

These two examples are examined here just to give an idea of what could be done. More than one unit of these may be used in each district and the units in a district can provide support to the other districts. Creativity of the architects may design better units to be used in the model proposed in the study which can be called as “City Room Model” as inspired from the “Village Room Model”.

Figure 13. View of a Prefab Styrofoam Dome House; There are More Units Behind the Dome House (Trendir, 2016).

6. Conclusion

There have been many immigrants in the world lately. People have to migrate because of many different reasons like wars, floods, storms, earthquakes, etc. When they migrate, they need shelters immediately, so the shelters should be constructed in a very short time. Especially when many people have to move, a huge amount of emergency shelters have to be constructed immediately. Moreover, after the residents move to their permanent homes and abandon these shelters, they become an environmental problem. They become a waste in the nature and turn into dangerous places. Therefore, a model should be proposed to solve this problem. Therefore, the aim of this study is to propose a model for emergency shelters both to have necessary emergency shelters in a very short time when they are needed and to solve the problem of their use after they are abandoned. They should still be used in various ways and areas in other way, yet still efficiently.

The proposed model in this study is to have many small units in every or most of the neighbourhoods who have their own usage area as a common usage (for public use); transport them to the place where they are needed in an emergency; then after the necessity ends, to transport them back to their first place and usage area. These units should belong to the community; they should not be private or they should not belong to the individuals. By this way, they can be used efficiently by anyone who needs them, which means that there are no unused shelters at any time and as a result sustainability is achieved easily.

As Einstein stated (Brainy Quote, 2001), we should learn from our past, use it as modernized by adapting to our life today and hope that we will have a sustainable future. The proposed model in this study was being used in a little different way in our villages in the past as “Village Rooms”. This model is taken in consideration, modernized, and adapted to our daily lives as having these rooms as “prefabricated and mobile units which have an anonymous usage area.” This model requires to have many of these units to use them all together in an emergency by moving them, and taking back these units when the necessity ends. Thus, the proposed model of “City Room Model” as inspired from the “Village Room Model” enables us to use resources efficiently, and consequently to achieve sustainable architecture and sustainable future.

A model like the one proposed and described in this study can be useful, sustainable, and also work for circular development and circular economy. It can help us be ready when the emergency arises while providing space for our everyday life experiences. We should always be helpful to the people who are in need of help. This model is a good way of sustainable construction in this respect. We should also use our creativity to produce this model. This model might be a chance to have sustainable architecture, sustainable cities and a sustainable future.

Declaration of Ethical Standards

The article complies with national and international research and publication ethics.

Ethics Committee Approval was not required for the study.

Conflict of Interest

There was no conflict of interest during the research process.

Author's Contribution

The author contributed alone to the article and takes full responsibility for the content and any modifications made during this process.

Declarations

This study was conducted for the "International Conference on Migration: Projecting the next Twenty Years", which was held in February 22-24, 2021 in İzmir. It is an improved version of the paper presented orally only.

Originality Report

According to the originality report obtained from the iThenticate software, this article's similarity rate is 2%.

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Research Article

An Assessment Approach for Affordable Housing: The Case of Trabzon, Türkiye

Ceren ÜNLÜ ÖZTÜRK[1], Beyza KARADENİZ[2], Cenap SANCAR[3]

[1]Department of City and Regional Planning, Karadeniz Technical University, Trabzon, Türkiye, ceren.unlu@ktu.edu.tr
[2]Department of City and Regional Planning, Karadeniz Technical University, Trabzon, Türkiye, bsen@ktu.edu.tr
[3]Department of City and Regional Planning, Karadeniz Technical University, Trabzon, Türkiye, csancar@ktu.edu.tr

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Affordable Housing, Low-Income Households, Housing Policies, Urban Planning, Accessibility.

Abstract

Affordable Housing for low-income households has been considered an important issue in many countries' policy agendas across the world in the past two decades. However, the debate on affordable housing is still very new in Türkiye, and there have not been any official definitions and policies regarding this issue. TOKI (Housing Development Administration of Türkiye), the most active actor in Türkiye in house production for low-income families since 2000, has produced projects in this scope. Discussing these projects in terms of affordable housing is important in revealing the current state of Türkiye and directing the projects to be made in the future.

Within this context, the present study aims to question the affordability of the houses stated to be produced by TOKI for low-income households. The study was employed a two stage methodology consisting of a content analysis that obtained data by the semi-structured interview technique and affordability analysis. Initially parameters were defined to make an affordable housing query, and the affordability states of the houses in a sample area were questioned with the defined parameters.

Based on these findings, it can be concluded that affordability has a positive effect on satisfaction with housing. Increased transportation costs, which is one of the expenses that indirectly affect affordability. Residential areas where low-income households presently live and proximity to the city center and business areas should be considered determinant factors in location selection for affordable housing. Housing production for low-income households should not be considered solely to meet housing needs. Choosing a place for housing construction should be made by considering other living needs of individuals.

*Corresponding author.
E-mail address: ceren.unlu@ktu.edu.tr (KTU).

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1. Introduction

Homes are places where people's basic needs such as sleeping, nutrition, and protection required for their lives are met (Keleş, 1998). Within this context, the home has been recognized as a fundamental right both nationally and internationally. Universal Declaration of Human Rights, the European Union Charter of Fundamental Rights, the European Social Charter, and the International Covenant on Economic, Social, and Cultural Rights include the right to housing at the international level, while the 1982 Constitution defines housing as a right at national level (Balkır, 2010). Article 57 of the 1982 Constitution of the Republic of Türkiye deals with the state's approach in this field and provides that the state take the necessary measures to meet the housing need within the confines of a planning that takes into consideration the characteristics of the cities and environmental conditions and support mass housing enterprises. To this end, the housing needs of low-income households have been tried to be met with the policies developed by both national and local governments. It can be said that some solutions developed only to meet the need for sheltering are often independent of socio-economic factors required by social justice and social peace (Knapp, Bento&Lowe, 2008; Zhang, 2020).

The housing need of low-income households was first considered as a problem after the Industrial Revolution. During the industrialization process, which started in England and spread to Europe, the old liberal understanding in the economic sense primarily was influential. This understanding supported the development of an uncontrolled market system. In line with this understanding that was common in England in the late 18th and early 19th century, residential areas developed entirely outside the state control (Hayes, 2012). Housing production was mainly carried out by factory owners and investors. Capital owners created low-standard living environments for workers for maximum profit targets. The unhealthy living environments created during this period became a problem as they negatively affected the social order and physical life. From the end of the 19th century on, legal regulations were introduced by the central government regarding infrastructure systems for the unfavourable living conditions of workers. Constructing rental public houses/council houses, under the ownership of the local governments, at physical standards in the city peripheries for low-income households was subsidized (Lowe, 2011; Lund, 2011).

With the Great Depression experienced after the First World War (in 1929), the idea of government control of the money supply was accepted (Hayes, 2012). This idea was also implemented in the housing market. For example, in the United States, regulations called the "New Deal" consisted of innovative programs aimed at supporting low-income and disadvantaged groups. These programs included financial assistance in housing production for low-income families. In addition, in 1937, the central government authorized the local governments to build and operate public housing (Lund, 2011; Hayes, 2012).

After World War II, a period in which cities were rebuilt began especially in countries that joined the war. In this period, there were two different approaches to the housing market in Germany, where there were two different management styles (East and West). Housing was considered a priority issue in the post-war plans made in East Germany. The aim was to build houses for the accommodation of a dense population as quickly as possible. To this end, the state

constructed residential units that consisted of low square meter apartments. On the other hand, in West Germany, the view that the state should intervene in the housing sector due to the imbalance of supply and demand was accepted. Non-profit housing associations and cooperatives were supported by subsidies when they produced housing for low-income families to encourage house construction in the post-war period. House units constructed with these supports were named “public houses” (Lund, 2011). In the United States, house production during this period was mainly carried out by the market. The government supported low-income house acquisition with long-term and low-interest mortgage applications (Bardhan, Edelstein&Kroll, 2012; Hayes, 2012).

On the other hand, in this period, with the transition to mechanization in agriculture in Türkiye, an intense rural-to-urban migration started. As a result of migration, the housing problem came to the fore in cities. Aru (1970) stated that Türkiye did not have a social housing policy until the planned period (It started with the establishment of the State Planning Organization in the early 1960s). However, in the 1950s, constructing cheap houses for low-income households became a mandatory task of the municipalities. At the same time, municipalities were given the authority to allocate land to families with no homes. The Land Office, which was established in 1969 with Law No. 1164, was given the task of providing lands for housing. In terms of financial support, the state provided credit support to both individuals and cooperatives through public institutions that it established. With the introduction of the condominium act, houses for all segments were produced with both build-and-sell and cooperative practices. In the 5-Year Development Plans made between 1960 and 1980, although the construction of social houses and the state’s need to intervene in this issue were clearly stated, priority was given to infrastructure and industrial investments.

From the late 1940s to the 1980s, financial support policies were carried out by the public institutions of the central government for the housing needs of low-income households. In addition, land allocation policies were developed by both the public institutions of the central government and local governments.

The houses produced through credit and cooperatives were intended to be social houses, and previously, loans were given for cheap and social houses with low square meter, but this has changed over time. With this change, the middle and upper class have benefited more from loan opportunities. This shows that policies have been insufficient in solving the housing problem of low-income households. As a result, low-income households tried to meet their housing needs through shanty settlements (Keleş, 2009; Çoban, 2012). The adoption of neo-liberal policies after the 1970s eliminated the direct intervention of the state. In addition, a period that also limited the indirect intervention of the state started. Following the United States, owning homes through the mortgage system was also encouraged in the United Kingdom. The social houses (council houses) produced in the previous periods were privatized in this period. By promoting private ownership, houses were also supported as an investment tool (Lund, 2011). Before 1980, in the mortgage system in the United States, the loans were provided by local units (local banks and savings); however, after 1980, loans were de-localized and standardized at the national level (Hayes, 2012). After the unification of East and West Germany, social residences and cooperative residences in East Germany started to be sold

to private investors and tenants in the 1990s. In West Germany, house construction in the private sector was encouraged by subsidies in the cities whose population density increased due to the immigration from the east. Following the dissolution of Czechoslovakia in the 1990s, the houses owned by the communist regime were transferred to local governments. Local governments adopted the policy of selling these houses to private real estate companies (Lund, 2011).

In Türkiye, parallel to the developments in the world in general, the foundations of the neo-liberal economy were laid with the decisions dated January 24, 1980, which were outward-oriented and foresaw the integration with capitalist economies. With the National Housing Policy adopted in this period, the aim was to make citizens from all strata own a house. To do this, the governments of the time aimed to prioritize mass housing construction and produce land for mass housing. The period between 1980 and 2000 was shaped by housing policies developed around this framework. The housing sector has been seen as a critical sector in the economy regarding both the employment opportunities it creates and its effects on the manufacturing industry that produces inputs for house construction. For this reason, legal regulations have been made to boost the housing market. With Mass Housing Law No. 2985 enacted in the early 1980s, a mass housing fund and a mass housing administration were established under the central government, especially for low-income households. Institutions, cooperatives, and builders, who would make investments, including the second house, were provided with loans. Until the 1990s, when the Mass Housing Fund was interrupted, housing cooperatives, municipalities, and their partnerships benefited from the fund to a large extent. With the interruption of the fund and the start of TOKI's (Housing Development Administration of the Republic of Türkiye) own house production, the loans given to the cooperatives were reduced, and the Mass Housing Fund support for the municipalities to acquire land was abolished. However, like in the previous period, the houses produced were not for low-income households but the middle and upper classes (Keleş, 2009; Çoban, 2012; Arsan, 2014).

From the 1980s on, the disruption of loan repayments in the functioning of the mortgage system spread throughout the world, affected various geographies, especially the USA, and caused economic crises. Low-income families, whose homes were seized in such developed countries as the United Kingdom and the USA, were provided with easy payment terms (subsidies, tax deductions, etc.) after the problem (Hayes, 2012; Lund, 2011; Springler& Wagner, 2010). In the recent period, states are not directly involved in house production. The production policies such as public housing and council housing for low-income families in the past periods have been replaced by policies that support and guide the private sector regarding "affordable housing." Apart from the current housing market, "affordable housing," a concept that envisages supplying houses to low-income and middle-income families according to the relationship between household income and house cost, has emerged as an essential housing policy and has been adopted by many countries. In countries such as Australia, the United States of America, England, and Portugal, the state has been encouraging the private sector to produce affordable houses for low-income and middle-income families (Aurand, 2014; Gabbe, 2018; Whitehead, 2007; Greenhalgh&Bosman, 2016; Gurran&Whitehead, 2011; Nouwelant, Davison, Gurran, Pinnegar&Randolph, 2015).

In Türkiye, the 1999 earthquake and 2001 crisis had an impact on housing policies in the 2000s. Within this context, some decisions were taken in the 8th five-year Development Plan to eliminate the effects of the earthquake. The legal regulations that were developed within the scope of housing policies after 2003 are important. With the amendments made in the Mass Housing Law, TOKI's powers and application areas were expanded, and its resources were increased. Since then TOKI, as the pioneer housing project builder, has had a great significance in the housing production of Türkiye. TOKI has been given such new tasks as establishing housing-related companies, going into a partnership with existing companies, providing personal loans and mortgage loans, providing loans for urban transformation projects, and performing such activities as building houses, infrastructure, and social infrastructure. In 2004, TOKI was also given the authority to implement urban transformation projects. While, in the process that started from the enactment of the Mass Housing Law until the amendments in 2003, the effect of cooperatives was effective, from 2003 on, TOKI and urban transformation practices have been effective (Keleş, 2009; Çoban, 2012). The strategy of TOKI is described as offering social housing for the low-income and middle-income groups and the necessary service units by completing their infrastructures. It has been stated that TOKI has produced 717,154 social houses until today. Although TOKI does not have a detailed definition of social housing, credit facilities are provided to low-income households by limiting the level of income in housing purchases in these projects. Under the housing title of the final development plan, providing access to affordable housing for everyone, especially those with low income, is stated as the goal. In addition, there is the target of producing 250 thousand social houses for low-income households and disadvantaged groups (11th Development Plan). Again, TOKI has introduced a project called "100 thousand Social Houses Every Year" for low-income households. All these show that TOKI is the most important actor in providing housing for low-income households. Therefore, it is important to evaluate TOKI houses produced for low-income households in terms of affordability, which is one of the aims of Türkiye's latest internationally accepted development plan.

1.1. Affordable Housing and Supply

Affordable housing means low-priced housing stock in the market (Gurran&Whitehead, 2011). Affordable house is appropriate for the needs of a range of very low- to moderate-income households and priced so that these households can also meet other basic living costs such as food, clothing, transport, medical care, and education. As a rule of thumb, housing is usually considered affordable if it costs less than 30% of gross household income (Internet 4). In a study conducted in Texas, the USA, Mueller (2010) defines the concept of affordable housing as the housing that low-income households (including families with children) can afford economically. On the other hand, Goetz (2008) defines the concept of affordable housing as a concept used to describe various housing options such as low-cost houses, flats, and elderly homes for people with different profiles (to varying stages of the life cycle, at different income levels, with different needs of housing). Government representatives in Australia describe affordable housing as that which suits low-income and middle-income families' needs and allows them to meet other basic living costs (Nouwelant, et al., 2015). There are two important criteria in the definitions for affordable housing. The first is a specific target group as low-

income and/or middle-income, and the second is the cost of housing that allows people to cover other basic living costs.

It can be seen that affordable housing criteria are addressed in different ways in different studies. For example, in a study conducted in London, Brighton, and Hove in the United Kingdom, it was found that those who earn less than the average income among the low-income working households (LIWH) that spend more than 30% of their income for housing costs suffer from financial difficulties (Walker&Niner, 2010; Lund, 2011). In the United Kingdom and Australia, the ratio of home expense to income is used in calculating affordable housing. If housing expenses are 30% or less of the total income, accepting that home as affordable also supports the previous study (Gurran&Whitehead, 2011). Similarly, in a study conducted in the USA, it was accepted that a house is not affordable when 30% or more of the income is spent on the house (Jun 2017). In a study comparing the affordable housing plans of London and New York, it was stated that affordable housing expenses should constitute less than 30% of the income (Marom&Carmon, 2015).

In a study by Aurand (2014), affordable housing is defined as low-cost housing for low-income households. In the study, the target population was limited to households earning less than 80 percent of the average income (Aurand, 2014). In Australia, Queensland Urban Land Development Authority has adopted two criteria when calculating affordable housing, namely target group, and income/housing cost ratio. First, low- and middle-income groups (annual income of 40-80 thousand dollars) were defined as the target group. Then, households in this target group that spend more than 30% of their gross income on rent or 35% of their gross income on buying houses were accepted as living in non-affordable houses (Greenhalgh&Bosman, 2016). Studies show that the target group is low- and middle-income people. Three definitions are made for these income groups: those who earn less than the average income, those who earn in this income range, and those who earn less than 80% of the average income. In terms of housing cost, one sees that 30% or less of the total income is considered affordable housing. Considering the studies carried out within this context, it can be stated that the houses for which low-income households spend 30% or less of their total income are regarded as affordable houses while the houses for which they spend more than 30% of their total income are considered non-affordable houses.

The concept of affordable housing is not limited to theoretical studies but is also supported by policies regulating its implementation and ensuring affordable house production. In this context, in such countries as Australia, the United States, and the United Kingdom, governments imposed the obligation that 15% of the houses be built in areas where housing projects will be realized by states and local governments to be affordable houses. In addition, to support affordable house production, incentives, such as increasing the construction area in urban design and urban transformation applications, were provided with the condition of producing this type of housing. In another practice, affordable housing was accepted as a public need. It became compulsory for investors to plan affordable housing and general uses such as open spaces and education facilities. At the basis of all the above-mentioned practices are there the principles of ensuring the continuity of existing living spaces of low-income households, protecting their commuting modes, and meeting their other living costs (Davison,

Gurran, Nouwelant, Pinnegar&Randolph, 2012; McGreevy, 2018; Beer, Baker, Wood&Raftery, 2011; Berry, 2003; Crook&Monk, 2011; Gurran&Whitehead, 2011; Paris, 2007; Rowley, James, Gilbert, Gurran, Ong, Phibbs, Rosen&Whitehead, 2016; Nouwelant et al., 2015).

Affordable house production for low-income households has come onto the agenda in our country with the latest development plan. However, the debate on affordable housing is still very new, and there have not been any official definitions and policies regarding this issue. One sees that TOKI, the most active actor in Türkiye in house production for low-income households since 2000, has produced projects in this scope. Discussing these projects in terms of affordable housing is important in revealing the current state in Türkiye and directing the projects to be made in the future. Within this context, the present study aims to question the affordability of the houses stated to be produced by TOKI for low-income households. For the study, (1) parameters were defined to make an affordable housing query, and (2) the affordability states of the houses in a sample area were questioned with the defined parameters.

2. Materials and Method

The study employed a semi-structured interview, which is a qualitative data collection tool. The purpose of using the semi-structured interview technique is to systematically conduct the interviews based on interview protocol that was previously prepared according to the purpose of the study. In this study, the interview was designed to achieve the research aim in questioning the concept of affordable housing using a qualitative research method.

2.1. Sample of the Study

The sample of this study consisted of low-income households, namely the target group of affordability studies. In this context, inquiries were made in this study on TOKI applications, prominent in housing production for low-income households in our country. This study employed the purposive sampling method, which is one of the non-probability sampling methods. In selecting the households to participate in this study, the primary criteria were that they should reside in TOKI houses and be tenants or paying loans. The study was conducted in Trabzon, Türkiye (Figure 1).

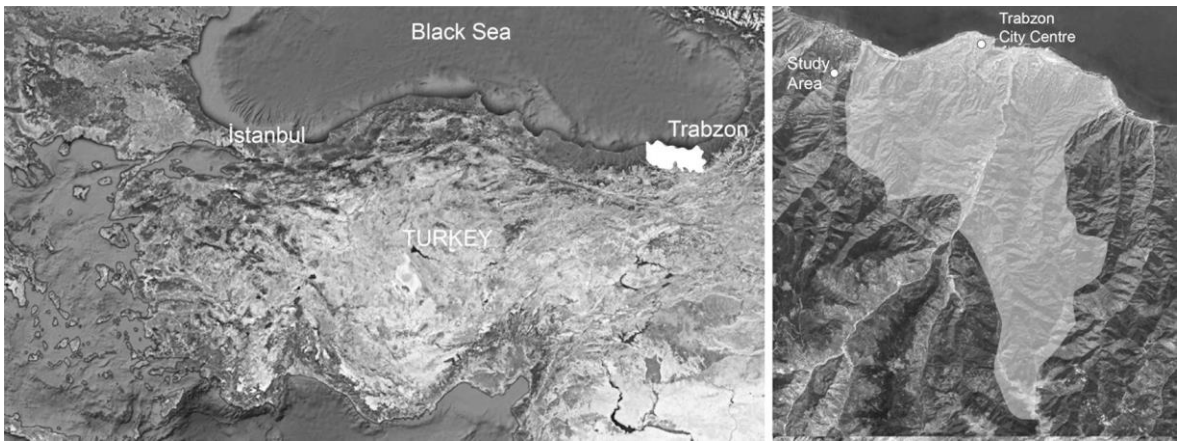

Figure 1. Study Area (Illustration: Authors).

There are 75 TOKI project implementations in Trabzon, of which 43 were completed, and 32 are ongoing. Thirty-seven of these projects include housing units. When the contents of the projects with housing units are examined, it can be seen that 4 of them contain the phrases 'housing for low-income households' and 'housing for the poor.' Furthermore, when these four projects are examined, one sees that they constitute the project in Yıldızlı Neighbourhood, Trabzon Province in the form of stages (Internet 5). The 1st stage consists of 288 flats, the 2nd stage 204 flats, the 3rd stage 258 flats, and the 4th stage 192 flats. The sample was determined as 88 out of 942 residential units with a 95% confidence interval and 10% margin of error. Face-to-face interviews were conducted with 88 households who resided in TOKI houses, paid rents or loans, and volunteered to participate in the study.

2.2. Data Collection

Following the purpose of the study, the necessary parameters for questioning the state of affordable housing were defined. To this end, for affordable housing to be a permanent solution to meet the housing needs of low-income households, the parameters of 'continuity and being economical' were also included in the evaluation. As a result of the definition, two parameters (1. Affordability, and 2. Continuity in housing) were determined. Accordingly, the first parameter includes the cost of housing, income, and other expenses (transportation); the second parameter consists of the moving and location sub-parameters (Table 1).

Table 1. Affordability Query Parameters and Sub-Parameters in Housing.*

Parameter	**Sub-parameter**	**Necessary Data**
Affordability	Housing cost	Rent
		Dues
		Bills (All year)
		Heating expenses
	Income/Target Group	Income
	Other expenses (Transportation)	District and neighbourhood of workplace location
		Mode of transport to the workplace
		District and neighbourhood of the former place of residence.
		The former mode of transport to the workplace
Continuity in housing	Levels of cost	Level of housing cost
		Level of transport cost
	Satisfaction with the Housing	Level of satisfaction with the housing
		Has the house intervened? (Reason for intervention? Type of intervention?)
	Moving status	Desire for moving
		Reason for moving
		Where to?

An affordability analysis should be done to question the affordability of a house. In the literature, affordability is generally expressed as the cost of housing at a level that will not hinder meeting other basic life needs. Although there are many different acceptances in the studies on the quantitative questioning of this verbal expression, the formula that "the housing

* This table was adapted from Sheridan, Manley, MacDonald & Flynn, 2002; Davison, Logacy, Liu & Darcy, 2016; Varady, 2006; Goering & Whitehead, 2017; Leviten-Reid & Lake, 2016; Shrestha & Taniguchi, 2003; Bratt & Vladeck, 2014; Knapp, Meck, Moore & Parker, 2007, and Paterson & Dunn, 2009.

expenses (rent + bills + dues) should be less than 30% of the total income", a frequently used formula in the definition of affordable housing, was used in the affordability analysis in this study. Given that the housing costs of affordable housing should be at a level that will allow meeting other living expenses, transportation costs that affect housing costs are also important. In this context, inquiries were made regarding transportation expenses, the relations of the old and new houses with the workplaces, and transportation modes. The information that is the basis for inquiries regarding the affordability of TOKI houses was obtained through an interview for the affordability of the houses that are said to be produced by TOKI for low-income households, consisting of 16 questions.

2.3. Data Analysis

After collecting the data for the research, the analysis and interpretation of the data were made. First, a content analysis was carried out for the data obtained by the semi-structured interview technique. The following steps were followed in the analysis of the data respectively: Coding the Data, Determining the Themes of the Encoded Data, Arranging the Code and Themes, Defining and Interpreting the Findings (Yıldırım & Şimşek, 2013). After coding the data, the responses to each question were divided into themes; then, the codes and themes were arranged, and lastly the findings were defined and interpreted.

3. Findings

The findings were discussed under two headings. The first is affordability, under which the target group was questioned, affordability analysis was carried out, and the findings on transportation costs were presented. The second is continuity in housing, under which findings of house satisfaction, cost (housing and transportation), and moving considerations were presented.

3.1. Affordability

The affordability analysis consists of the parameters of the target audience, income, and housing cost. The target audience should be low-income households. For this reason, the income levels of those living in TOKI Yıldızlı houses were analysed. All the participants in the study have an income below the poverty line in Türkiye (8,856 Turkish Liras) as of February 2021 (Internet 6). This indicates that all participants are from low-income households. In this context, the condition that 'affordable housing is for low-income households' is met in TOKI Yıldızlı housing.

3.2. Affordability Analysis

While conducting the affordability analysis, whether thirty percent (30%) of the monthly income was lower than the calculated housing cost (rent + dues + bills + fuel expenses) was questioned. It was found that there was a difference in the bills in the spring-summer and autumn-winter periods. For this reason, the affordability analysis was calculated for both periods. On the other hand, fuel expenses were added to the monthly expenses without any periodic difference by dividing the total annual amount into twelve, as lump-sum yearly payments are made in the central heating system. The inquiry results showed that the houses of 70.5% of the participants were not affordable in the spring-summer period and the houses

of 77% of participants in the autumn-winter period. Further, to evaluate affordability and its sub-parameters together, a general value was calculated by taking the average of the housing expenses in two periods. Accordingly, while housing is not affordable for 77% of the participants, it is affordable for 23% (Table 2). It was found that the affordability results did not change in the general evaluation due to the high bill expenses in the winter months.

Table 2. Results of Affordability Analysis.

	Spring-Summer		Autumn-Winter		General	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Affordable	26	29.5	20	23	20	23
Non-affordable	62	70.5	68	77	68	77
Total	88	100	88	100	88	100

In addition to the affordability analysis, the distances between the houses and workplaces, and modes of transport, all of which affect other living costs of the participants, were also examined. Accordingly, the participants were asked about their current workplaces, the districts and neighbourhoods of the houses they used to live in, and the modes of transport. It was found that the workplaces of 57% of the participants are in the centre of the city, 20% of the participants are in Yıldızlı, 9% of the participants are in Kemerkaya, 7% of the participants are in Gülbaharhatun, and other neighbourhoods with smaller percentages. When the old living places of the participants were examined, it was found that only 14% of them (n=12) had lived in the Yıldızlı district. Apart from this, 18% of the participants (n=16) stated that they used to live in Ortahisar city centre, 9% (n=8) in Yenimahalle district, 7% (n=6) in Beşirli district, 7% (n=6) in Yeşiltepe district, 5% (n=4) in Erdoğdu district, 5% (n=4) in Gülbaharhatun district, 5% (n=4) in Söğütlü district, and with less percentages in other neighbourhoods. One can see that most of the participants resided in the neighbourhoods around the centre where their workplaces were before moving (Figure 2). As a result of the queries about the old home-work modes of transport, it was found that 45% (n=40) of the participants travelled by minibuses, 25% commuted on foot (n=23), 20% (n=18) travelled by their private cars and 15% (n=14) travelled by buses. As a result, it is possible to say that since the distance between home and work is short, minibus and pedestrian modes of transportation are mostly used (Figure 2).

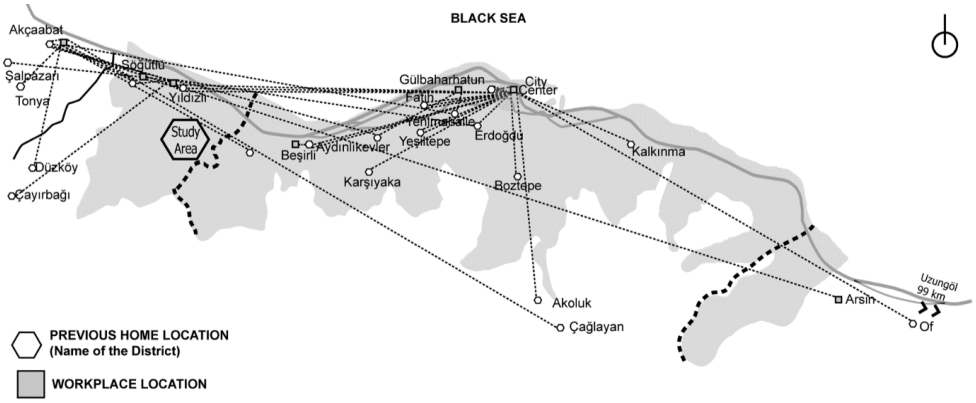

Figure 2. The Distance and Mode of Transport Between the Workplace and the Former Neighbourhood of Residence (Illustration: Authors).

Considering the transportation relationship between TOKI Yıldızlı housing and workplaces, this distance is observed to increase. It was found that 52% of the participants who moved to TOKI Yıldızlı Residences moved away from their workplaces, 39% came closer to their workplaces, and 9% remained the same. In queries about new modes of transport, it was found that 41% of the participants (n=36) use private vehicles, 41% (n=36) use minibuses, 11% (n=10) use buses, and 8% (n=6) use pedestrian transport. One can see that moving away from the workplace also affects the mode of transport. It was found that 70% of those who used to go to the workplace on foot have started to go by private vehicles and 20% of them by buses (Figure 3).

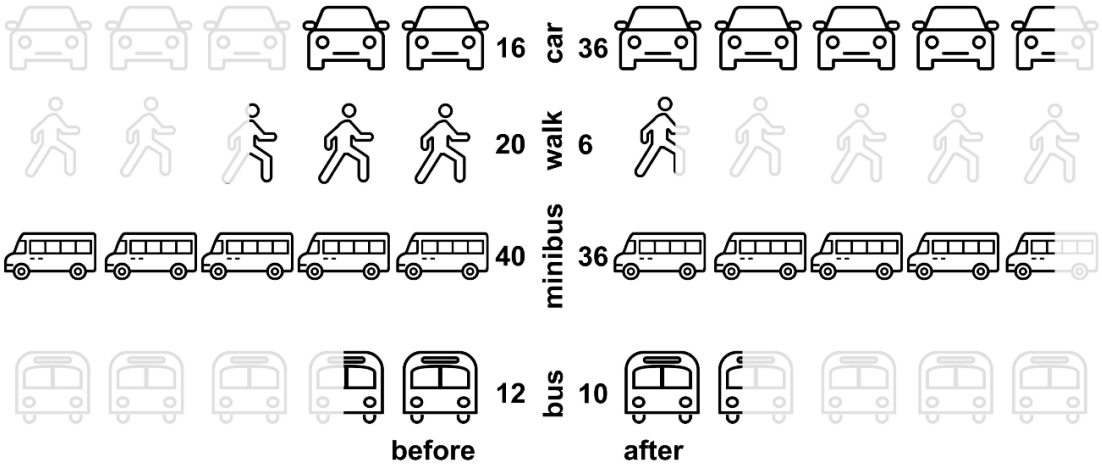

Figure 3. Comparison of Old and New Modes of Transport (Illustration: Authors).

In addition, inquiries made for affordability show that for 82% of 46 households who have moved away from their workplaces, TOKI Yıldızlı houses are not affordable. This finding supports the idea that the location selection criterion in social housing production in TOKI projects is ignored.

3.3. Continuity in Housing

To find out about the continuity in the housing, findings of how the levels of cost of housing and transportation were found, satisfaction with the house, desire to move, and its reasons are included. When the participants' responses about the levels of cost of their housing are examined, it is seen that they find it low, medium, high, and very high. 71% of households defined the cost of housing as high and very high. They see the transportation cost level as high, medium, and low, respectively. Similar to their remark about the cost of housing, all participants stated that they found transportation costs medium and high (Table 3). The cost of housing that should be low in terms of affordability, and the medium and high transport costs that indirectly affect affordability may negatively affect the continuity of the housing.

Table 3. Levels of Housing and Transport Cost.

Level of Housing Cost	Frequency	Percent	Level of Transport Cost	Frequency	Percent
Very low	0	0	**Very low**	0	0
Low	4	4	**Low**	0	0
Medium	22	25	**Medium**	29	33
High	52	60	**High**	59	67
Very high	10	11	**Very high**	0	0
Total	88	100	**Total**	88	100

When the relationship between affordability and the level of housing cost is examined, it is found that 65% of those residing in unaffordable housing find their housing costs high, 20% medium, and 15% very high. On the other hand, 40% of those living in affordable houses stated that they find their housing costs high, 40% medium, and 20% low. While 80% of those who reside in unaffordable housing find their housing costs high and very high, this rate is 40% for those who live in affordable housing. All of those who find the cost of housing low reside in affordable housing, while those who find it too high live in houses that are not affordable. These findings support the inverse proportion between the level of housing cost and affordability. When the relationship between affordability and the level of transport cost is examined, it is found that 78% of those living in unaffordable housing find the level of transport cost high and 22% medium. On the other hand, 70% of those living in affordable houses stated that they find the transportation cost medium and 30% high. The fact that those who live in unaffordable housing find transport costs mostly high, and those who live in affordable housing mostly medium shows that the increase in transport costs affects affordability negatively.

When the participants were asked about their satisfaction with their housing, 48% responded that they were not satisfied. It was also found that 27% of the participants were satisfied, and 25% were undecided. When the relationship between affordability and level of satisfaction with housing was examined, it was found that 57% of those who live in unaffordable housing were not satisfied with their housing, 26% were undecided, and 17% were satisfied. On the other hand, it was found that 60% of those who live in affordable housing were satisfied, 20% were undecided, and 20% were not satisfied (Table 4).

Table 4. Levels of Satisfaction with the Housing in Terms of Affordability.

	Non-affordable		Affordable		Total	
	Frequency	**Percent**	**Frequency**	**Percent**	**Frequency**	**Percent**
Not satisfied	39	57	4	20	42	48
Undecided	18	26	4	20	22	25
Satisfied	11	17	12	60	24	27
Total	68	100	20	100	88	100

Considering that more than half of those who live in unaffordable housing are not satisfied with their housing and that more than half of those who live in affordable housing are satisfied with their housing, it can be said that affordability affects the level of satisfaction with the housing. 80% of the participants did not physically intervene in their housing due to their being tenants. 20% of the respondents who physically intervened stated that mostly the material quality and malfunctions were the reasons for the intervention. While 65% of the participants did not want

to move, the remaining 35% wanted to move. 72% of those who wanted to move stated the transportation problems (distance to the centre, workplaces, and schools) as the reason. 48% of these participants indicated that they wanted to move to places close to their workplaces, and 32% to their old neighbourhoods. 60% of those who did not want to move stated that the reason for this was their financial inadequacies.

When the relationship between affordability and the desire to move was examined, it was found that 63% of those who live in unaffordable housing did not want to move, while 37% wanted to move. The reason stated by those who live in these housing for not wanting to move is generally residents' financial inadequacies. This finding shows that they are in an unsolvable situation. While 30% of the participants who live in affordable housing wanted to move, 70% did not want to move. The reason for wanting to move is mostly (80%) transport problems, and the reasons for not wanting to move are that they are satisfied with their housing and that they are close to their workplaces. The distance from the workplace is the most apparent reason for the desire to move. The fact that they generally desire to move to places close to the workplace also supports this finding. Based on these findings, the home-work distance and ease of access should be considered in choosing a location for continuity in housing.

4. Conclusion

In the present study, the historical development of the concept of affordable housing and its worldwide definitions were revealed by conducting the literature review first. A systematic analysis base consisting of parameters and sub-parameters was obtained to enquire about affordability. In parallel with this base, a semi-structured interview was prepared, and interviews were conducted. The study investigated the affordability and continuity of TOKI housing as social housing for low-income households in Türkiye. The target group of affordable housing is considered to be low-income households in the literature. The inquiry results showed that the houses of 70.5% of the participants were not affordable in the spring-summer period and the houses of 77% of participants in the autumn-winter period.

Based on the investigations made over the poverty line in Türkiye, it was concluded that the TOKI Yıldızlı Housing project meets the feature of being affordable housing for low-income households. However, when the affordability is calculated based on the formula (housing expenses should be below 30% of the total income), which is frequently used in the literature, it was found that the houses are primarily not affordable. Participants whose houses were found to be unaffordable as a result of calculations stated that housing costs were high. However, a small proportion of participants whose housing was found to be affordable found the housing cost low. These findings support the statement in the literature that "the high cost of housing affects affordability negatively." In addition, the fact that those who live in affordable housing also found the cost of housing as high shows that the regulations for tenants in TOKI projects are not sufficient. In TOKI projects where loan facilities are provided when buying a house, it is necessary to consider the tenants and have a plan for them as well.

In the related literature, affordable housing is frequently encountered in built-up areas, which shows that it is essential to protect home-work distance and sustainability of affordable housing. The present study's findings do not support this because most of the residents of

TOKI Yıldızlı Housing moved here from the city centre and its immediate surroundings that were close to their workplaces. Participants whose workplaces didn't change moved away from their workplaces after moving to TOKI Yıldızlı Housing, which is located far from the city centre and main transportation links. This moving away has also caused changes in transportation modes. Those who had commuted to and from their workplaces on foot before started to use vehicles, especially private vehicles. This increased the transportation cost, which is one of the expenses that indirectly affects affordability. In addition, the fact that the houses of those who moved away from their workplaces are, to a large extent, not affordable and that the participants generally find the transportation expenses high can be regarded as the indirect and direct adverse effects of choice of location, which is not in line with what is stated in the literature on affordability. In addition, choosing a location away from the main service areas in the city increases the transportation costs to the workplaces and the transportation costs to these areas. In this respect, it is essential to make location selection decisions that are integrated with the city allowing public transportation related to the facilities areas.

According to the findings of this study, almost half of the participants are not satisfied with their housing. And the majority of participants who are satisfied with their houses are living in unaffordable housing. It was found that more than half of those who live in affordable housing are satisfied with their housing. Based on these findings, it can be concluded that affordability has a positive effect on satisfaction with housing. Therefore, housing solutions for low-income households have a positive impact on the continuity of housing. When the participants' desire to move was analysed in the inquiry of sustainability, it was found that more than half of the participants did not want to move. When this was investigated, the majority of "financial insufficiency" responses were received especially from those who live in unaffordable housing. Considering that they cannot move to other houses due to financial inadequacy, although they currently do not live in affordable housing, it becomes necessary to seek different housing solutions for low-income households. Although the proportion of those who think of moving is not low, it is close to 1 in 3. The respondents stated that the reason for thinking about moving was the distance to the workplaces, and the majority of them indicated that they wanted to move to places close to their workplaces. This shows the importance of location selection in terms of affordable housing and the sustainability of housing. As stated in the literature, residential areas where low-income households presently live and proximity to the city centre and business areas should be considered determinant factors in location selection.

TOKI can try production models that offer rental opportunities as well as buying houses for low-income households. When producing solutions for rental housing, the thirty percent condition of affordability should be addressed as an essential criterion. The fact that TOKİ, which does projects in many different areas, is the sole authority in housing production for low-income households in our country does not coincide with practices worldwide. In this context, the state should follow policies that also encourage the private sector as well as TOKI to produce affordable housing for low-income households, as in the examples in foreign countries. Housing production for low-income households should not be considered solely to meet the housing need. Choosing a place for housing construction should be made by considering other living needs of individuals. In addition, as seen in the examples in the literature, projects that will make it possible for different income groups to live together should

be designed. In this context, as well as projects for low-income households, TOKI must include affordable housing also in other housing projects.

Declaration of Ethical Standards

This research was carried out with the permission of Karadeniz Technical University, Natural and Engineering Sciences Ethics Committee with the decision numbered 129639-1301, dated in 24/05/2021.

Conflict of Interest

There was no conflict of interest between the authors during the research process.

Authors' Contributions

All authors contributed equally to the article.

Declarations

The authors take full responsibility for the content and any modifications made during this process.

Originality Report

According to the originality report obtained from the iThenticate software, this article's similarity rate is 10%.

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Research Article

Exploring the Regenerative Capacity of Architecture in the Anthropocene Era Through Anna Heringer's Architecture

Kübra BIYUK ÖKSÜZ[1], **Kübra SAĞLAM**[2]

[1]Department of Architecture, İstanbul University, İstanbul, Türkiye, kubrabiyuk@istanbul.edu.tr
[2]Department of Architecture, Artvin Çoruh University, Artvin, Türkiye, kubrasaglam@artvin.edu.tr

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Abstract

In the Anthropocene era, human-driven destruction of nature, primarily caused by diverse industries worldwide, is significantly worsening the degenerative impacts on nature at varying scales globally. The study aims to discuss the potential and responsibilities of architecture to be regenerative for nature, knowing that nature still has the power to heal despite all that humans have done to nature. In this study, the regenerative potential of architecture in the Anthropocene era is discussed through regenerative design that aims at the co-evolution of human and natural systems. The study focuses on architect Anna Heringer's significant work, particularly the METI Handmade School in Bangladesh's Dinajpur region, where her philosophy of holistic local sustainable development originated. As a method in the study, Heringer's work will be analyzed through deep readings on the potential of architecture to be regenerative and these readings will be presented with a relational diagram/ collage. The study assesses the METI School's condition pre and post-construction. It discusses how Heringer's architecture, rooted in local materials, energy sources, and global knowledge, demonstrates regenerative potential. The findings highlight architecture's ability to generate regenerative effects in a living environment. It is claimed that the construction of local with environmentally focused decisions promotes social and economic development locally and contributes to the community's ability to create strong and well-connected social capital. This study argues that the regenerative effect of architecture in the Anthropocene era requires not solely environmental focus but also the active involvement of strong, interactive local human capital to sustain these decisions.

*Corresponding author.
E-mail address: kubrabiyuk@istanbul.edu.tr (IU).

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1. Introduction

Since the beginning of their existence, human beings have acted as though they were the sole owners of all actions in the world and have caused positive and negative transformations in their environment. For this argument, a striking metaphorical example can be given: the 'handprints' cave art found in Cueva de las Manos in Argentina, Río Pinturas. Its history dates back between 13,000 and 9500 years (“UNESCO World Heritage Centre”. n.d.; Figure 1). This cave painting can be regarded as an indication that, hypothetically, humans have had dominion over nature since ancient times. Although the influence of humans on the planet he lives in has manifested itself since the very moment of his existence, it is a fact that in the past the scope and intensity of this influence were less compared to today. In 1993, Cesare Emiliani proposed a new geological calendar called the Holocene Epoch, in which he claimed the starting point for modern humanity to be approximately 11,000 years ago. It is known that in the Holocene Epoch when the transition to settled life began with the end of the ice age, the influence of humans on nature began to increase slowly. However, in this age of millennia, it is thought that the influence of humans on nature was considerably less than today. The realization that human impact on nature had reached harmful levels is most commonly dated to the Industrial Revolution (Crutzen & Stoermer, 2000). The industrial breakthroughs, especially the invention of steam engines, led to the rapid development of certain countries. Eugene F. Stoermer and Paul J. Crutzen, in their article titled “The Anthropocene”, published in 2000, emphasized that the age we live in has changed considerably due to the results of human actions, and therefore, it should be referred to by a different geological name. As of this date, this age in which human beings cause almost irreversible destruction by putting themselves in the place of nature's only creature is called The Anthropocene Era by the scientific community. This name is derived from the Greek words 'anthropos-' meaning human and '-cene' meaning age. It is defined as ‘The Human Epoch’ in English and as ‘İnsan Çağı’ in Turkish.

Figure 1. ‘Cave of the Hands’ in Argentina, Río Pintura (“UNESCO World Heritage Centre”, n.d.).

In this Anthropocene era, the destruction of nature by humans is primarily driven by the excessive activities of various industries. The use of non-recyclable and toxic materials for nature as a cumulative human action, the production of wastes that will destroy nature, and the occurrence of these actions faster than nature can handle are the main destructive reasons that cause the name of a geological age to change. Alongside the widespread pollution around the world, there are also human actions (such as atomic bombs, and nuclear wastes) that occur singly and leave very destructive traces. The most important consequence of this age is the climate crisis. The deterioration of the balance of nature due to the climate crisis results in drought, floods, fires, deforestation, depletion of freshwater resources, warming of the earth, and extinction of species. Rockström et al. (2009) discuss the Anthropocene Era under nine main topics: climate, ocean acidity, chemical balance, atmospheric emissions, biodiversity, land use patterns, clean water, nitrogen and phosphorus cycles, and ozone layer thickness.

It would be unfair to hold all humanity or all manufacturing industries responsible for the destruction of the planet that is brought about by the total actions of all humanity. Donna Haraway (2015) blames not all humans for the destruction in the Anthropocene, but the capitalist states, corporations, and their human forms, which have carried production to a point that is too much for the planet to bear. Donna Haraway, when contemplating the Anthropocene, does not attribute responsibility for the damage to all humans but rather blames capitalist states, corporations, and their human forms for pushing production far beyond what the planet can sustain. People in various places of the world consume energy differently depending on their modern level of 'development', and their carbon footprints are quite different from each other. Although not all people are responsible, the consequences affect all humanity.

In this age, one of the important stakeholders of the human-made destruction to nature is undoubtedly the construction sector. Regarding the construction industries, the 'handprint' of human beings on nature appears as the destructive traces of architects, engineers, and contractors on nature. The various applications of this industry, across different scales and in other parts of the world, are having increasingly degenerative impacts on nature. In particular, the rapid urbanized world demands a rapid order that turns villages into towns, towns into cities, and cities into megacities (Roös, 2021). In this rapid order, architecture serves the consumption-oriented progress order of the world as a development subject. It is a fact that the adopted development ideologies are aimed at exploiting nature and living beings. Architectural sustainability paradigms adopted due to the damage caused by architecture to nature and the physical environment have become a series of actions that have been emptied over time. Companies, organizations, or governments may prefer the concept of 'development' to the concept of sustainability especially in sustainable development decisions. The powers that hold capital use seemingly positive concepts like development, progress, and advancement to rationalize their right to harm people, nature, and our physical environment.

With the transition of architecture from "design for need" to "design for profit" for development purposes (Madge, 1993), it is seen that production within the framework of industrial innovation and economic growth creates rapid degenerative effects. Architecture consists of many practices that do not accord with nature, including small and large projects. The practices of 'excavation' and 'filling', which are the basic actions of architecture, are among the most destructive effects as they cause significant ecosystem transformations. As one of the basic

action practices of architecture, 'destroy-build' architecture causes damage to the natural and physical environment by increasing construction waste. Planning decisions, which stand at the intersection of architecture with politics, also contribute to this degenerative order. Irrational and out-of-context planning decisions have other devastating effects like in the case of urban transformation decisions that do not coincide with earthquake risk maps. As another example, mega projects that ignore the context and ecosystem and thus having a destructive effect on operational processes can be given. One of the biggest effects of architecture on the planet is the materials that are incompatible with nature and the pollution caused by the supply of these materials to different regions. In relation to this subject, according to the United Nations Environment Program (2022), the construction industry and built environment are responsible for 39% of global carbon emissions on an annual basis (“UNEP”, n.d.). The construction industry appears to be responsible for a significant portion of the pollution produced on the planet. It is a fact that the common production methods of architecture create a separation between nature and humans and exploit nature.

In environment-friendly works produced in the Anthropocene era, designers' environmental awareness is taken into consideration, while different professionals are brought together by blurring their boundaries. However, the regenerative design approach tries to position designers and different professionals in a holistic system. In this context, the regenerative design will be discussed as a new environmental approach in the Anthropocene era.

1.1. Regenerative Design and Architecture

Regenerative design is about people and aims to develop approaches that support the 'co-evolution of human and natural systems' for both natural and social capital; moreover, regenerative design requires a fundamental re-conceptualization of the act of building design primarily in terms of imagining, formulating and enabling its role within a larger context (Cole, 2012). According to Lyle (1994), the regenerative approach emerged from earlier concepts of sustainable development. While the ecological order or energy lost in a sustainable system cannot be released again, regenerative design allows lost systems to exist by renewing themselves. In the current Anthropocene era, the limitlessness of human intervention in the environment increases the loss of systems, so humans cause a damaging transformation in nature. The Anthropocene offers an integrated socio-cultural-spatial framework for understanding global and environmental change and creates a platform for environmental politics (Polat&Kahraman, 2019). The Anthropocene Age (Castree, 2014), which is a common discussion topic among natural and social sciences with an integrated framework, can be removed from its negative effects with regenerative design, an environmentally holistic approach that supports natural and social sustainability.

Regenerative design requires changes in the existing design and planning processes by shifting from a piecemeal, technological, and mechanical approach to a model that better reflects the understanding of how the universe as a whole actually works (Roös, 2021). Regenerative design supports a holistic environmental approach instead of a piecemeal modern working system. Although the technical strategies of the green design/sustainable approach, one of the approaches popularized before regenerative design, will remain valid, the purpose and language of regenerative design offers a significant potential for a broad-

based environmental approach, especially for the partnership and coexistence of human and natural systems (Roös, 2021). According to Robinson and Cole (2015), all future goals in the Anthropocene age should be brought together in a common pot with a certain understanding of the social, economic, technological, and ecological constraints to change. Reed (2007) states that regenerative design is a living systems approach as a whole, unlike piecemeal and technologically based green buildings. At this point, the concepts of regenerative and Anthropocene are associated with each other, both in terms of their meanings and their positions in practice. As a different perspective on these two concepts that can leak into each other, regenerative design can be suggested as a key to the search for a common holistic system in the Anthropocene era.

The importance of understanding and caring for place is realized and promoted in the regenerative design literature (Mang, 2007). For example, Littman (2009) proposes an expanded definition of architecture in this context as the art or practice of designing and building place through the integration of space and building. Regenerative design is a holistic approach that cares about considering all stages of design such as place, area, building, construction, process, and application together. The architectural results that emerge with regenerative design are expected to emerge by responding carefully and thoughtfully to the unique social, cultural, and ecological opportunities and constraints of place, and making equal use of the appropriate use of contemporary technological capabilities (Cole, 2012). Since regenerative design emphasizes a holistic view, it can be said that it aims to provide different types such as social, economic, and environmental sustainability at the same time. Since a holistic view requires considering theoretical and practical factors together in design, it makes it possible to be sustainable as it allows the continuity of these factors together.

Regenerative design directs the design process as well as the application, production, and relationships for the sustainability of the environment. Within regenerative design and development, built projects, stakeholder processes, and inhabitation are collectively focused on enhancing life in all its manifestations (human, other species, and ecological systems) through an enduring responsibility of stewardship (Mang&Reed, 2012). Regenerative design responsibilities are suitable for design work at different scales and contexts such as city, urban, neighbourhood, and building. In this context, to summarize regenerative design, its prominent principles can be listed as follows:

- By their nature, regenerative approaches require an adaptable direction to building design and operations.
- They allow combined human-technical systems in the construction process to adapt to change over time.
- Many of the core aspects of regenerative design and development (systems thinking, community engagement, and respect for place) are well-defined and accepted practices.
- They collectively emphasize a qualitative context for building design, together with the concepts of partnering, co-evolution, and socio-ecological.
- Developing the ‘capacity to take transformative action and to navigate transformation’ (Griffith et al., 2010) is a primary objective of regenerative design and development.

- It assumes that neither human systems nor natural systems are embedded in each other, but rather they co-evolve (Cole et al., 2013).
- Regenerative design requires changes in the temporal and spatial scope of the design process. The first change is to think of buildings as processes that can be adapted over time, rather than as human artefacts. The second is to focus on the neighbourhood in which the building is located, rather than to focus on the individual building and its location. Both of these changes apply not only to ecological systems but also to socio-cultural processes.

Since regenerative design is in its embryonic period, it also has some outstanding difficulties. For example, since this approach is still in its development stage, it must be clearly and firmly proven that the claimed benefits can be achieved and that the necessary efforts will yield results (Cooper, 2012, p.358). Additionally, the concept of co-evolution points to a developing future. For this reason, it raises a number of problems such as sociocultural and ecological systems, cycles, uncertainties of results, constant commitment, and participation. Since the built environment is located in an overlapping region between culture and nature, the fact that it has the potential to be a problem in both areas which are cultural and natural can be shown as one of the challenging aspects of this design approach.

The city plays a role as an initiator and as a consequence of the Anthropocene, many cities around the world face a variety of challenges and opportunities linked to changing demographic and environmental pressures, which means that cities need to be well coordinated and respond effectively to different pressures so that they and their inhabitants survive and develop (Polat&Karaman, 2019). At this point, regenerative design can be mentioned as an effective method to solve problems because it is an approach that can be adapted to all scales and scopes in a city. Regenerative design is a suitable approach to discuss problems such as biodiversity loss, changes in atmospheric and ocean chemistry, urbanization, and globalization triggered by the Anthropocene era. It is also suitable to address problems such as democracy, sustainability, and sustainable development, which have become distant from their purposes and distorted in a way adapted to the Anthropocene era. As seen in Figure 2, the regenerative principles of regenerative design can bring environmental, social, and economic sustainability to the causes and consequences of the Anthropocene. In this context, regenerative design must accept the complex and constantly evolving interrelationship between socio-cultural-ecological systems and understand the role of construction within this evolving context. To understand this role, Aga Khan award-winning architect Anna Heringer, who tries to achieve social, economic, and environmental sustainability in the best possible way, can be mentioned. Her architectural approach has become valuable in exploring the potential of regenerative design in the Anthropocene era through her works.

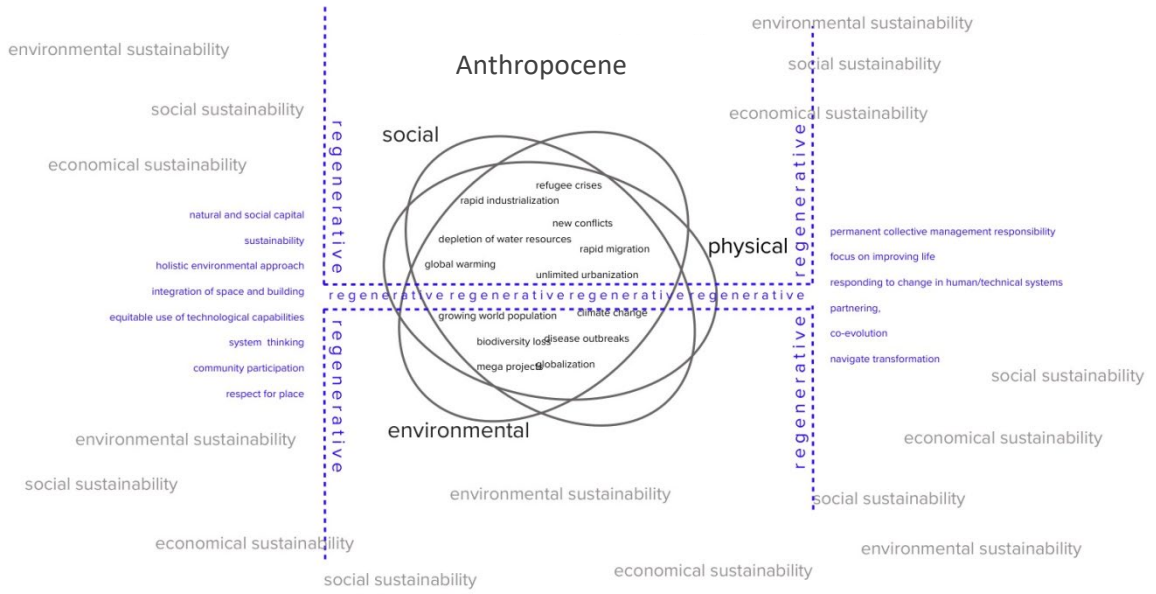

Figure 2. Diagram of Regenerative Design in Anthropocene Era (Created by the Authors).

2. Method and Material

The Anthropocene has comprehensive literature in the context of sustainability through socio-cultural and ecological systems as a new topic of discussion, but it has not yet been subjected to serious scrutiny within the framework of new design approaches and its concepts. In this study, a discussion is initiated on how the Anthropocene can be connected to the concept of regenerative design by drawing upon interdisciplinary literature. In the study, Heringer's work has been analysed through deep readings on exploring the capacity of architecture to embody regenerative principles and these readings have been presented with a relational diagram/collage.

In the study, various examinations are presented on how, in the Anthropocene era, an environmentally focused regenerative design can provide a stronger theoretical framework for sustainability. This analysis is carried out in conjunction with diagrams, which explain the facets and potentials of regenerative design, using Heringer's works as a focal point. The methodological steps of the study are as follows: providing a literature review on the Anthropocene era and regenerative design, establishing a conceptual relationship between these two subjects, conducting an in-depth analysis with a focus on regenerative design within Heringer's works, and interpreting the findings within the context of the Anthropocene era.

2.1. General Features of METI Handmade School

Anna Heringer has created many significant architectural products aimed at preserving and fostering ecological balance. She aims to utilize architecture as a tool to enhance people's lives, depending on local materials and sources to promote and empower communities and individuals (Parkes, 2022). The experiences she gained during her travels to Bangladesh during her student years played a significant role in Heringer's perspective on architecture (“Architects not Architecture”, 2023). She has a profound interest in the sustainable development of diverse societies and their built environment. She has been participating actively in the development cooperation efforts in Bangladesh since 1997. The METI (Modern

Education and Training Institute) School is significant in terms of being the first building where Heringer's architectural principles took shape. Heringer conducted the design and concept development of the structure, while the architectural construction process was a collaborative work with Eike Roswag. The main purpose of the project was to enable sustainable development in rural areas to prevent mass migration from rural to urban areas.

The METI Handmade School is located in Rudrapur, a district in Bangladesh's Dinajpur (Figure 3). The school presents an alternative to the typical frontal teaching method. The design of the new school aligns with this concept, offering various types of spaces and functions to support this teaching and learning approach. On the ground floor, which features sturdy earthen walls, three classrooms are situated, each of which with its own entrance is leading to an organically designed system of 'caves' located at the back of the classroom. These cosy interiors are intended for tactile engagement, relaxation, exploration, or focused study, whether individually or in groups (“Archdaily”, 2010). The school is a perfect example of sustainable architectural practices and was awarded the Aga Khan Award for Architecture in 2007. The jury emphasized that the structure ''creates beautiful, meaningful and humane collective spaces for learning, so enriching the lives of the children it serves' in their evaluation (“Anna Heringer Architecture”, n.d.). It was recognized for its simple yet compassionate design, its striking visual appeal, and the exceptional level of collaboration that took place among the architects, craftsmen, clients, and beneficiaries.

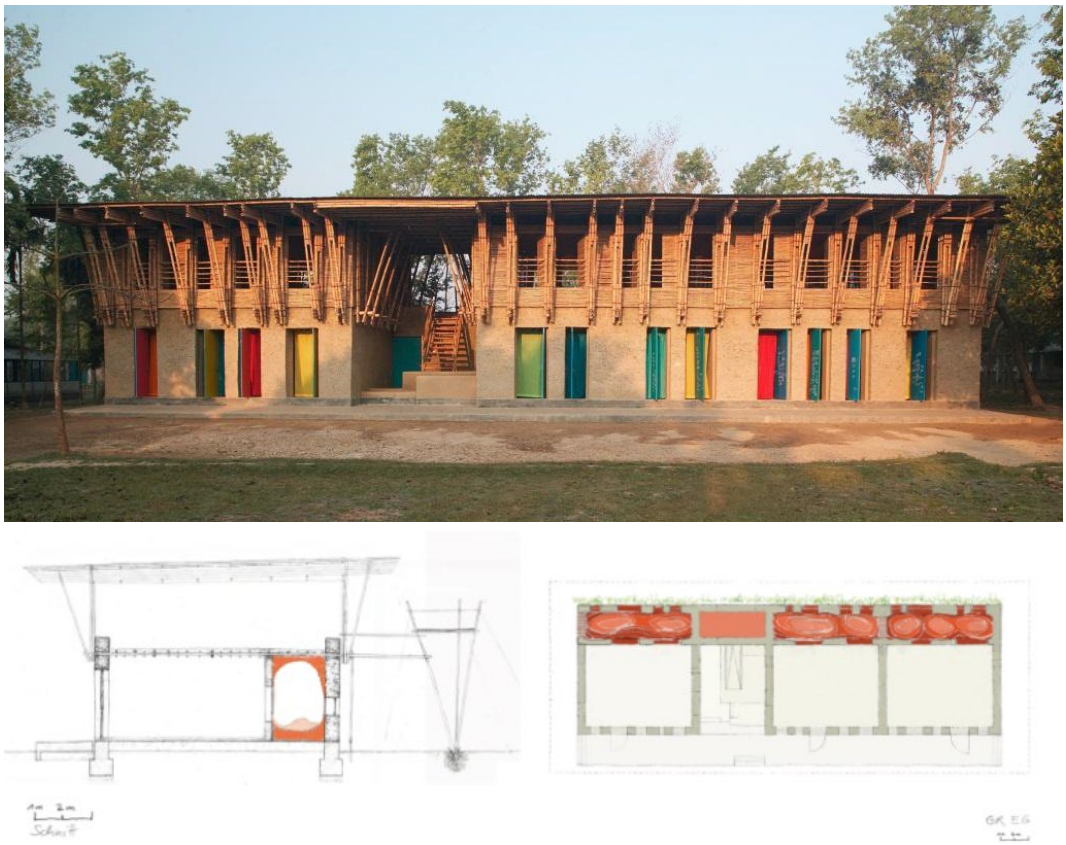

Figure 3. The Overall Appearance and Drawings of the Building (“Anna Heringer Architecture”, n.d.).

2.2. Exploring the Regenerative Potentials of Architecture through the METI Handmade School

The concept of regenerative design, based on the idea of the co-evolution and systemic integration of human and natural capital (Cole, 2012), can be discerned in Heringer's structure. Heringer aimed to use local resources and reduce external dependencies in her architectural approach, which is rooted in respect for nature, in the METI School project. This section explores the environmental, social, and economic regenerative impacts of the school generated during both the construction process and its ongoing existence. The structure's regenerative potential is being revealed. This discovery is presented through a relational diagram (Figure 4). The diagram illustrates how the environmentally oriented decisions targeted during the construction of the structure are interconnected with social outcomes.

Figure 4. Regenerative Potentials of MEDI Handmade School (Created by the Authors).

In the METI School project, Heringer implemented the working principle of local materials, local energy sources, and global knowledge (“Architects not Architecture”, 2023). This design principle has served as a fundamental catalyst for sustainable development through architecture. The principle adopted by Heringer for the construction process of the structure continues to be applied during its usage phase as well. During the process of renewing aging parts of the structure, this working principle is revisited to re-establish regenerative effects.

- **Local materials:** In the project, materials reachable in the construction area, including mud, bamboo, and textiles produced by local artisans, were utilized. These materials are locally recognized and commonly used in the traditional construction methods of the region. Heringer believed that the creative potentials of materials could be combined through a fusion of traditional and modern methods. In addition to being used in the ground walls of the school, mud was also utilized to construct the back corridor, which functions as an unexplored cave for students. The cave was creatively constructed to facilitate activities such as play, relaxation, exploration, and interaction for the students. The most important environmental characteristics of mud/earth as a material include its easy availability from the local environment, its traditional use by the native community, its non-toxic nature making it usable for everyone, its suitability for low-tech processing, and the ease of renewal when needed, utilizing local human and material resources. Another important material in the structure is bamboo, which was creatively combined into the first floor and roof of the building using innovative joining methods. Bamboo, with its significant environmental features, such as being a natural material, locally grown, familiar to the native community, having a high load-bearing capacity, and the ease of sourcing new bamboo when needed, was utilized in the project due to its regenerative potential. In addition to the sustainable properties inherent to the plant, the architect creatively and aesthetically integrated the material into the design. It can be said that traditionally these materials had limited usage patterns. However, the combination of traditional materials with global knowledge and creativity is believed to create a highly regenerative cycle for the native community. The creative and aesthetic use of locally sourced materials is also seen as contributing to the formation of a local identity.

Another material that shapes the character of the structure is textiles produced by local women. Fabrics were used as a semi-open divider between the interior and exterior on both the ground and first floors. The utilization of textiles produced by women is considered regenerative from environmental, social, and economic perspectives, serving as both an empowerment tool for women and a means to reduce external material dependency.

- **Local Energy Sources:** During the construction process, local energy sources were used to minimize external dependency. Local energy sources included local labourers, volunteer community members, craftsmen, and even buffaloes. In an area considered economically disadvantaged, even the supply of electrical power is a challenge. Hence, the construction maximized the community's self-sufficiency capacity. For instance, during the construction, buffaloes and people were employed to mix the mud. Human labour was utilized in various stages, including sourcing bamboo, preparing it for construction, and making necessary adjustments during the building process. In the plastering of mud materials, initially, men started working, but as women in the area showed interest, Heringer requested their involvement (“TED”, 2017). Children also participated in the production of this communal space alongside women. The non-toxic nature of the material, made primarily from pure natural earth, allowed all members of the community to willingly participate in the production. In this sense, the earth stands out as an inclusive material environmentally, socially, and economically. In achieving environmental sustainability, the individuals living within the community actively participated in these actions, becoming an essential part of

sustainable development. This sustainability concept has been holistically realized not by certain individuals but by the entire community. This participatory approach can be said to have paved the way for the development of social capital, to have increased social interaction and empowerment of women, and to have enhanced community production responsibility and engagement within the community. Active involvement in the construction process of the structure not only fostered a sense of place and belonging but also maintained feelings of pride and a host of positive feelings associated with the space's utilization.

- **Global Knowledge**: The construction involving earth building and bamboo was carried out by local labourers, with building techniques being developed and implemented in collaboration with architects and craftsmen from Germany and Austria. This project also provided training to 25 local tradesmen from the area, creating employment opportunities and offering professional assistance for self-sufficiency (“Archdaily”, 2010). The convergence of traditional knowledge with global knowledge has created a regenerative impact in the field. A sustainable system has been established where individuals who participated in the construction process can undertake restoration if the structure deforms in the years following its construction. These same individuals have also acquired the knowledge to construct similar buildings without the need for external sources. This situation defines a process that can contribute to the regenerative sustainable development of the region.

Within the sixteen-year lifespan of the structure, the ability to repair and restore damaged areas using local knowledge, resources, and capital is a significant regenerative effect for the region. The capacity to complete repairs using materials sourced from nature without leaving toxic ruins is a notable example of environmental sustainability. Additionally, relying on local energy and human capital instead of exporting high-tech solutions for repairs showcases social sustainability. The fact that the region does not have to depend on other countries or engage in commercial relationships to repair this architectural structure demonstrates efficient resource utilization for economic sustainability. The strong relationship this building establishes with the local environment refers to all dimensions of sustainability, affirming the region's sustainable development.

3. Conclusion

The study investigates the regenerative potential of architecture, which has significantly caused the planet's mass degenerative effects during the Anthropocene Era. Through the examination of Heringer's METI Handmade School structure, the article has produced several findings indicating regenerative potential. It is believed that Heringer's environmentally-focused design ultimately fosters community spirit creation.

Bangladesh, specifically the Dinajpur region where METI School is situated, is characterized by rural-to-urban migration, poverty, and a lack of established local development. Local nongovernmental organizations collaborated with the METI organization with the goal of promoting the level of education in the area and creating a school where students can freely showcase their abilities. METI School was constructed based on Heringer's holistic design

principles of local materials, local energy sources, and global knowledge. The study has focused on the regenerative outcomes of these design principles. As a result of the analysis, it has been observed that these design principles work in conjunction with each other. The environmentally oriented design decisions have generated outcomes in the field that contribute to social and economic development. Local materials like mud and bamboo have enabled the entire native community to participate in the construction process. The use of non-toxic materials is believed to reinforce strong social sentiments such as community participation, social interaction, and a sense of place within the local population. It is believed that the community members who participated in the construction process will establish a different type of pride, ownership, loyalty, and appreciation relationship with the building during its use. In the event of the building's restoration, the building material is demolished by mixing it with the earth, ensuring that no harmful waste is generated. This offers a regenerative proposal to counteract the degenerative act of demolishing and rebuilding in current architectural tendencies. Additionally, a cyclical regenerative effect has been generated by teaching local individuals the global know-how for using these materials in construction through creative designs in this field. In production which utilizes the resources of the land, economic sustainability is established by not allowing the economic resources of the region to flow outwards. The study reveals that positive impacts can be generated without the need for high-tech solutions. The school was produced through the alternative design power with the community against technological determinism.

The study concludes that one-dimensional actions often struggle to create regenerative effects. For instance, in environmentally oriented decision-making, the lack of community involvement causes unsustainable situations. The sense of inclusion within the community is an inevitable factor in regenerative impact. In the Anthropocene era, it is believed that the regenerative potential of architectural work can only be realized through environmentally conscious decisions and the understanding, adoption, and preservation of these decisions by the community. Regenerative potential varies according to the context. This variation is influenced by various factors such as rural-urban distinctions, scale, level of development, political circumstances, climate, opportunities within the context, and human resources. In determining regenerative effects through architecture, it is important to thoroughly analyse the context and define its possibilities. The regenerative impact generated by Heringer's example in Bangladesh may not necessarily be applicable in the same way in another context. Understanding the context is crucial in achieving regenerative effects. The carbon footprint of individuals in Bangladesh is different from that of individuals in Western countries. It can be argued that people in Bangladesh have the least impact on the destructive causes affecting the Anthropocene era. Therefore, the regenerative impact generated for our planet in Bangladesh through architecture should be quite different from the regenerative impact generated through architecture in Western countries.

By conducting an in-depth analysis of a specific region's challenges and implementing unique measures, it can be established a sustainable development cycle. This cycle can strengthen local attachment within the community and mitigate migration. It has been understood that rural areas can contribute to their own social and economic development through environmentally conscious architectural design decisions. The development of local areas can potentially

reduce urban migration and allow cities to remain more manageable, thereby reducing cities' destructive impact on the environment. As a result, in this study, the belief that the solution of the climate crisis will be possible not by nature itself but by changing the life of the human species is defended. It is suggested that the regenerative potential of architecture will be possible with the analysis of contextual information and the application of the analysis based on local resources and knowledge.

In the study, potential outcomes of the environmental-social relationship have been discussed. To obtain more concrete results regarding regenerative impact, methods such as on-site observation and in-depth interviews in these areas could be operated, contributing to a deeper conceptual understanding of regenerative effects.

Declaration of Ethical Standards

The article complies with national and international research and publication ethics. Ethics Committee Approval was not required for the study.

Conflict of Interest

There was no conflict of interest between the authors during the research process.

Authors' Contributions

All authors contributed equally to the article.

Declarations

The authors take full responsibility for the content and any modifications made during this process.

Originality Report

According to the originality report obtained from the iThenticate software, this article's similarity rate is 15%.

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Research Article

Indicator and Indicated: Sampling Semiotics in Architecture Through Three Station Structures

Pınar ÖKTEM ERKARTAL

Interior Architecture and Environmental Design, İstanbul Atlas University, İstanbul, Türkiye, pinar.erkartal@atlas.edu.tr

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Abstract

Architectural form is shaped in the light of many different parameters. This process is influenced by the environmental context as well as the message the architect wants to convey through the building. In terms of revealing how an architectural structure communicates with its environment, semiotic concepts have been a guidance throughout history. This study deals with semiotic concepts in architecture through station buildings. The reason for choosing station buildings is that these buildings are nodes that are introductory, orientating and character-emphasizing for their surroundings. In the study, the concepts of icon, index and symbol, which constitute the three main branches of semiotics, are examined by interpreting three different case studies that are seen as their equivalents in architectural design. The results of the analyses reveal that these three concepts create form formations of different characters in architecture, but they are effective on the user in terms of the character of the environment, the expression of its historical or unique aspects.

*Corresponding author.
E-mail address: pinar.erkartal@atlas.edu.tr (IAU).

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1. Introduction

Architecture, beyond meeting the physical, social, or psychological needs of individuals, possesses semantic references through various features such as form, tectonic structure, or façade. It has the potential to engage in communication by demonstrating and indicating relationships and transmissions, extending beyond the mere fulfilment of basic needs. The language of this communication, namely the representational form of architecture, can be explained in the context of the relationships and transmissions of indicator and indicated. For this reason, architectural design has been interpreted through semiotics for years, or approached with its concepts and definitions.

The concepts of icon, index, and symbol are crucial in the field of semiotics, which is the study of signs and their use or interpretation. Developed by Charles Sanders Peirce, a pioneering American philosopher and semiotician, these concepts are indispensable in all reasoning. In Peirce's semiotic framework (1931, p.369), an icon “exhibits a similarity or analogy to the subject of discourse”. It is a sign that resembles the physical object it represents, like a picture of a “heart” indicating “love”. On the other hand, an index, “like a pronoun demonstrative or relative, forces the attention to the particular object intended without describing it” (Peirce, 1931). Indexical signs establish a direct and causal connection with their referents and this relationship is not based on similarity, as in the case of icons, but on cause-and-effect process. For instance, smoke is an index of fire. Symbols, the third category, rely on conventionalized associations between the sign and its meaning. Peirce (1931) describes symbol as “general name or description which signifies its object by means of an association of ideas or habitual connection between the name and the character signified”.

The exploration of the tree main concepts of semiotics in architecture draws upon seminal works in the field of architectural theory. Various theorists explored how signs and symbols function within the built environment. Key references include Venturi’s (1966) *Complexity and Contradiction in Architecture*, and Rossi's *The Architecture of the City* (1966), which show how semiotic principles can be integrated into their discourse and how signs and symbols contribute to the richness of architectural language. Similarly, Charles Jencks (1977) described the linguistic aspects of post-modern architecture, underlying the symbolic and communicative dimensions of architectural form. Umberto Eco, in his work titled *The Role of the Reader* (1979) explained how signs and symbols contribute to the interpretation of texts, including architectural structures. Tschumi (1996) explored the disjunction between architectural elements and their intended functions, in the context of the symbolic and semiotic aspects of architectural design. And in *The Space of Encounter* (2001), Liebeskind emphasized the symbolic and experiential dimensions of architectural space, mentioning the communication potential of built forms.

These and various similar studies (Medway&Clark, 2003; Ferreira, 2011; Shoja&Sajadzade, 2015; Huang&Zhou, 2020) also explore the semiotic dimensions of architectural space analysing how architectural forms function as semiotic systems that transmit meanings, reveal the subtle interplay between architectural design and semiotic categories and provide a means to grasp the layered meanings embedded in the built environment. These studies, located at

the interface of semiotics and architecture, deepen and enrich our understanding of the deep and multifaceted representation that structures spatial experiences.

In architecture, icons are structures or buildings that are intended to closely represent a particular idea, concept, or purpose. Just as in semantics, architecture icons visually reflect or remind the qualities of the intended meaning. This makes it possible to establish a clear and tangible connection between the sign and its referent. These buildings telling stories and evoking emotions are typically immediately recognizable and visually distinctive, making them landmarks in their surroundings. Buildings like Sydney Opera House, Beijing National Stadium, and the Lotus Temple in New Delhi are examples of the application of the iconic sign in architecture.

In the use of iconic signs in architecture, the meaning intended to be reflected by the architect or designer is most likely to be perceived by the viewer due to the visual relationship of the icon with the signified. There is no need for the existence of a common vocabulary between the architect and the viewer (Kalpaklı, 1998). However, this is not the case in exceptions when also the signified cannot be defined by the viewer. In this case, to clarify the relationship between the icon and the signifier, it is necessary to give information about what is intended to be shown and why it is intended to be shown.

In architecture, indexicality may manifest through features, elements, or expression such as form, material, colour, scale, detail, façade, ornamentation, or articulation and include clues of a specific context, history, or function. It provides information or evidence about an unobservable phenomenon and unlike an icon, which has a similarity or resemblance to its referent, an index is linked to its object through cause-and-effect or correlation. Thus, a building or a structure that is capable of being an index offers users perceptible clues about the environment or activities associated with the space.

A symbol is a sign whose relationship with its meaning is based on convention, agreement, or cultural understanding (Zappulla et al. 2014). Unlike icons and indices, symbols have an arbitrary connection to what they represent. Symbols in architecture can be socio-cultural, functional, religious, economic, and even political (Mankus, 2014). For instance, a dome in architecture might symbolize grandeur and importance in some cultural contexts, while the use of certain colours or patterns could be symbolic of cultural or religious meanings. Symbolic associations are more subjective than iconic associations since the perception of form and gestalt can vary according to the viewer's personal characteristics and momentary state (Göldeli, 1984).

It is possible to see symbolism in architecture since the earliest periods of history. Buildings can be consciously symbolic, while at other times they spontaneously become a forceful symbol. The Egyptian Pyramids are not only monumental tombs, but also an indication of the power of the emperor. The colonnaded system surrounding St Peter's Square in Vatican City reflects the embracing nature of religion. The Eiffel Tower proudly displays steel that reflects the spirit of its time. The Turkish Grand National Assembly is not only a state structure but also a symbol of national will. The Barcelona / Mies Van der Rohe Pavilion, which remained open in Barcelona only for a certain period, was so adopted that it was rebuilt and now is identified

with the city. These and many other countless similar examples reveal the symbolic character of architecture.

This paper discusses the relationship between signifier and signified in architecture through three station structures. In this context, the aim of the study is, first, to explain the language of representation that architecture has, beyond creating a physical volume, in the context of a type of building that a person can experience every day in daily life routine. The study deals with the architectural design-context dialectic with the concepts of icon, index, and symbol, examining how they manifest in the built environment, convey meaning, and contribute to the overall architectural experience.

2. Material and Method

The material of this study is three station structures designed by different architects in different geographies. The station buildings were selected as case studies due to their role as critical nodes that facilitate the circulation of daily life for large numbers of people, and their potential to evolve into significant memory sites within the urban landscape.

The case study method is a research approach in which a particular case or example is studied thoroughly and in detail (Gerring, 2007; Yin, 2014). The main purpose of a case study is to provide a comprehensive understanding of a particular problem, phenomenon, or situation, allowing researchers to investigate the interaction of various factors in real-world situations. In architecture, case studies can be used to examine specific buildings, design approaches and develop urban development projects. These provide insight into the impact of architectural decisions on the design process, user experience, and built environment.

Each case was chosen to illustrate the concept that constitutes the main triad of semiotics. The first example was chosen from the Ruhr region, which regionally attributes value to its industrial heritage, identifies with it and highlights it. Traces of the region's semantic ties with its industrial heritage were sought in the station structure. The second example was chosen from Finland, a country characterized by wood in terms of its natural richness, cultural heritage, traditional and contemporary built environment. The semiotic reflection of the semantic value of wood for the country is analysed. Lastly, the last example was selected for its architect, Santiago Calatrava, who employs semiotics in his architectural designs to convey meaning and evoke emotional responses. The third case examines how he transforms architectural form into a semantic element.

2.1. *Station Architecture as an Urban Node*

Stations are nodes that regulate people's movements, support them in this flow, and at the same time, according to Lynch (1960), are one of the five elements that have an important place in terms of the legibility and image of the city, especially as nodes where pedestrian and vehicle traffic intersect within the urban pattern. They serve as critical transportation hubs, connecting different places, cities, regions, and sometimes even countries. In fact, over time, these special places have not only defined and directed flows, but have also become centres for various commercial activities, cultural spaces, and social interaction.

When discussing station architecture, we can cover a broad range of topics, including rail systems, wheeled vehicles, sea transportation, and aviation. Although each has distinct and common features, all these structures have been both functional and aesthetic spaces that have left their mark on cities' image and history, even literature and visual arts from past to present. The design of ferry piers, airports, train stations, bus terminals and bus stops have been the subject of various studies (Snegar&Džidić, 2019a; Edwards, 2005; Binney&Hamm, 1984). The cases in the scope of this article are the transfer points of railway systems.

Throughout history, cultural aesthetics, technological breakthroughs, and the necessity for functionality have all had an impact on the architecture of railway stations. Architects strive to create structures that are not only efficient but also visually appealing. Utilitarian architecture, which prioritized functionality over architectural beauty, was a common feature of early railroad stations. As the railway network grew, particularly in the wake of the industrial revolution, stations started to exhibit the architectural designs of the times in which they were built. Grand and elaborate architectural designs, such as Beaux-Arts, Neoclassical, and Gothic architecture, are characteristic of many old railway stations. These designs frequently exuded grandeur and importance, which was appropriate given the importance of rail transportation during the height of the industrial revolution. In the early 20th century, railway stations in some regions embraced Art Nouveau and Art Deco styles. These styles emphasized decorative elements, streamlined forms, and modern materials. With the advent of modern architecture, railway station design evolved to emphasize functionality, efficiency, and clean lines.

Contemporary stations frequently have striking forms that conceal inventive and distinctive structural design (Snegar&Džidić, 2019b; Džidić&Snegar, 2019). Considering the station's role in shaping the urban environment, new stations have an emphasis on integration with their surroundings through translucent façades and positive voids. Some modern train stations use green and sustainable design concepts such as green roofs, eco-friendly materials, solar power systems, and energy-efficient lighting after environmental issues have gained popularity (Rzepnicka&Załuski, 2017).

In brief, although train station architecture has evolved and transformed over time to reflect the demands of a changing society, technological developments and historical aesthetic preferences, the purpose of these buildings has always been to create places that are efficient and hospitable, and that add to the character of the cities they serve.

The three examples, which will be mentioned in detail, have also different meanings beyond their function and represent their regions in different ways. These station structures indicate another phenomenon besides their own existence within the scope of the relationship between the signifier and the signified and constitute an example of the reflection of the three main concepts of semiotics in architecture.

2.2. *Case 1: Oberhausen Neue Mitte Train Station, Germany*

The first case, the Neue Mitte Station, is located in Oberhausen, Germany. Completed in 1996, the station (Figure 1) was designed by Christoph Parade and Partners. Referring to the history of its location, the design is formally a trackwork icon, consisting of stacked steel bars and plates.

The steel structure with its tubes, lattice supports, metal elements and randomly stacked surfaces was designed to look like a demolished building and was not intended to be "pleasing" but “provoking”. A former freight railway line, which had not been used since the 1990s, was converted into a local public transport route connecting the newly created district to Oberhausen city centre. The Neue Mitte Train station, built on this line, has become both a landmark and an icon that emphasizes the historical context with its eye-catching architecture resembling a chaotic pile of rubble.

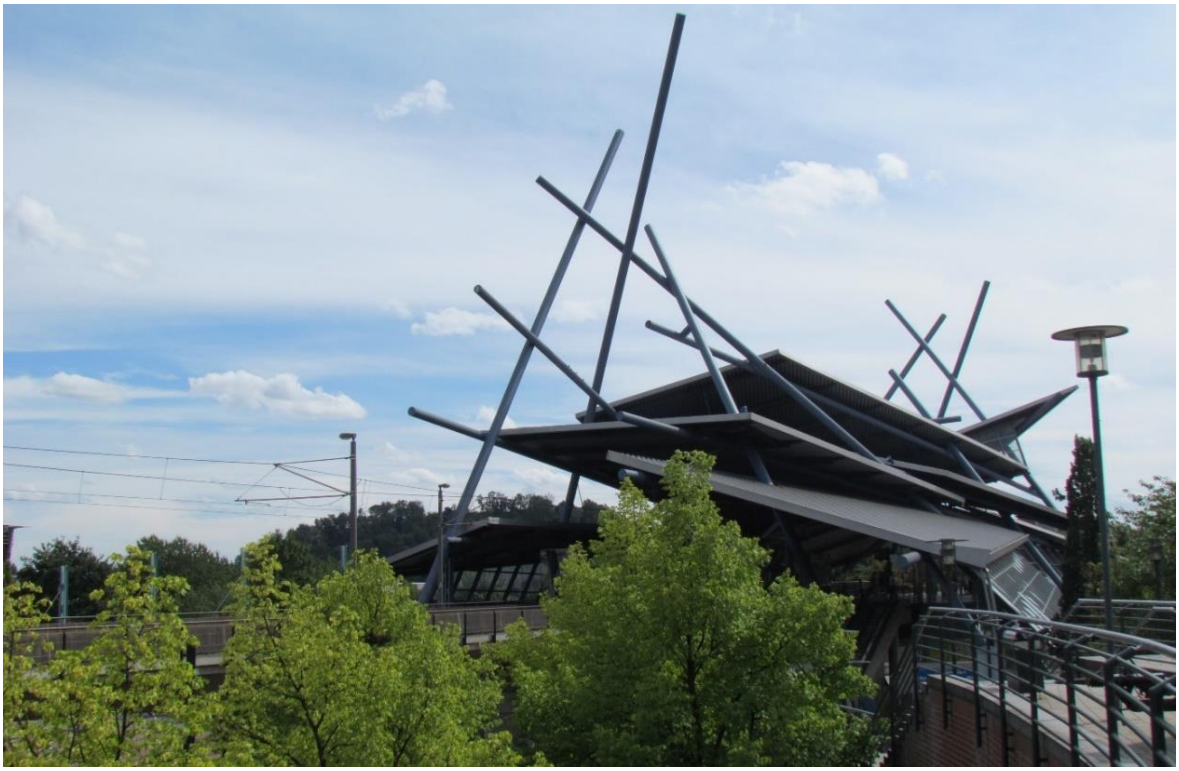

Figure 1. Neue Mitte Train Station, Oberhausen (Photo taken by the author, 2018).

The background to Parade’s design was the history of the Ruhr region with its "environmentally destructive interventions and artificial landscapes in the form of blast furnaces, winding towers and factory chimneys, railroad lines and overhead line pylons" (Figure 2). Steel pipes and beams support the roof sculpture. Metal roof panels and seemingly floating glass façades form the platform's shell. Beneath this is the customer centre in a solid structure (Figure 3). Architects aim to design a place where people stop inside - in memory of decades of steel production that points the way to the future (Knümann, 2014).

Figure 2. Neue Mitte Train Station, Oberhausen (Photo taken by the author from the information board at the station, 2018).

Figure 3. Neue Mitte Train Station, Oberhausen, under the Roof (Photo taken by the author, 2018).

This station serves as a visual representation of what the area has endured, reminds destroyed steel factories and collapsed carriers once stood here. The end of coal and steel marked the beginning of a profound structural change. Thus, this structure also indicates change instead of finality. It acts as a cultural memory marker, preserving the collective memory of the community. By incorporating the demolished building aesthetic, it becomes a tangible

representation of the regions' industrial heritage. It invites people to engage with the history of the place in a unique and thought-provoking way. The station has already been awarded the prize of the NW Chamber of Architects as an exemplary building (1997), the German Steel Construction Prize (1998) and the NRW Architecture Prize (2000).

2.3. *Case 2: Kohta Train Station, Kosta, Finland*

Kohta Train Station (Figure 4), designed by 17 students at Aalto University Wood Program to serve Koria's 2019 Housing Fair, is an index of Finnish lifestyle, wood construction mastery and sustainability. Inspired by a walk in the forest, the structure reflects the inseparable union between nature and life in Finland. With its straight, curved and twisted wooden elements, it resembles a modern and aesthetic dwelling in nature. The structure consists of modules with different geometric compositions that serve as serving areas and a large roof plane that holds them together (Figure 5). Each module has three walls and a roof. Thanks to the diversity of organization that the modules have, the station allows the user to choose their own experience while waiting for public transport. It features bike racks and information screens and a sitting area. The station provides cooling during the hot days and offers shelter during windy and rainy weathers.

Figure 4. Kohta Train Station (Aalto University Wood Program, Tuomas Uusheimo).

Figure 5. Different Modules of Kohta Train Station (Aalto University Wood Program, Tuomas Uusheimo).

The Kohta train station is also unique in terms of implementation. Each piece that makes up the structure was prepared by digitally defining and CNC manufacturing each wall piece, followed by cutting with a table saw to a unique angle and length. Each element is individually assembled in the workshop with high precision, achieved through a combination of digital and traditional techniques. The modules were then transported to the site where the fixings were used and assembled in one day. Originally designed as a temporary facility, it has become a permanent landmark of the city.

Kohta began as a study for a train station and provided a valuable learning opportunity for its architects throughout its design, development, manufacture, and installation. The structure is an index of the Aalto Wood Program and at the same time reflects the emphasis on timber construction in the country itself. Finland is known for its rich forestry resources and a strong tradition of using wood in construction. Finnish architect Alvar Aalto, one of the most important representatives of Modern Architecture, who gave his name to the programme, is also identified with wooden designs (Isohauta, 2013). The Alvar Aalto Wood Program continues his legacy and works on the design dynamics and application areas of wood (URL-1). Through the physical structure of the station the university showcase their expertise and research initiatives as well as the potential of wood in terms of design and applicability.

Kohta is, therefore, not only a station but also an indexical representation of Finland, Alvar Aalto and the Alvar Aalto Wood Program. The choice of building materials is often influenced by architectural preferences, environmental considerations, and regional building practices. The choice of building material here is entirely the result of the natural richness of the region, the presence of the architect and the educational program identified with the region.

2.4. *Case 3: Stadelhofen Station, Zurich, Switzerland*

An example where we can see the symbolic meaning is Stadelhofen Station (Figure 6), redesigned and renowned by Santiago Calatrava and reopened in 1990. The major railway station located in the eastern part of Zurich, Switzerland, serves as a crucial transportation hub, connecting various rail lines and serving both regional and national train services. The structure's location near Lake Zurich and the city centre, a vibrant area with its shops, restaurants, and other amenities, enhances its accessibility for residents and visitors, thus it plays a crucial role in facilitating the movement of commuters and travellers in Zurich and beyond (Calatrava, 2024; Jodidio, 2015).

Figure 6. Stadelhofen Station (Photo taken by the author, 2013).

Calatrava's design is characterized by his unique and modern curves (Figure 7), featuring a glass and steel canopy that spans the tracks, allowing natural light to illuminate the platforms (Figure 8). The extensive use of glass in the station's design allows natural light to flood the platforms, creating a bright and airy atmosphere. The station is designed to be accessible to pedestrians and cyclists, promoting multimodal transportation. The design is often considered a symbol of movement and dynamism because of its sweeping lines and canopy that resembles the wings of a bird in flight. According to Tzonis (1999), the paths and passageways in the stations are creating a smooth-flowing circulation and directing different types of movements. This dynamic and fluid design creates a sense of motion and suggests the idea of progress, transportation, and connectivity. Calatrava's asymmetry and organic forms precisely embrace the sense of endless flow and continuity experienced within the city. The economic, social, and cultural mobility of the city is symbolized by the station's nature-

embracing form, rhythmic structure, and different elevations. Stadelhofen Station's location as a major transportation hub in Zurich further reinforces its symbolic role. As a central point for rail connections, the station embodies the idea of people and goods constantly moving in and out of the city.

Figure 7. Stadelhofen Station, Curves (Photo taken by the author, 2013).

Figure 8. Stadelhofen Station, Different Levels and Materials (Photo taken by the author, 2013).

3. Findings

Gaining meaning with the context in which it exists, architecture reveals the relationship it establishes with its surroundings through various features such as its form, façade, function, and orientation. One of these ways of communication is to utilize semiotic concepts in design. The three examples, in which the reflections of icon, index and symbol in architectural form are interpreted, reveal that there are aspects in which all three concepts differ and have similarities. Findings obtained after examining the three station structures are tabulated in Table 1.

Table 1. Findings of the Case Studies.

	Iconic Architecture	**Indexical Architecture**	**Symbolic Architecture**
Definition	Architecture that resembles or has similarity to the object, event or whatever it represents.	Architecture that has a direct, causal connection or correlation with the object, culture, event or whatever it represents.	Architecture that represents something by convention or agreement, with an arbitrary connection between the sign and its meaning.
Semiotics Context	Semiotic sign based on visual similarity.	Semiotic sign based on a direct relationship or connection.	Semiotic sign based on cultural or conventional associations.
Message	Direct representation through visual similarity. For this reason, what the structure describes is often easy to understand. It can be a method to be used especially in narratives related to the past.	Representation through a direct connection or correlation. What it indicates may not be obvious at first glance because there is no visual similarity. Nevertheless, it has clear messages, especially for indigenous people, because of its strong connection to what it wants to relate to.	Representation through cultural, conventional, common-agreed or predictable meanings. Compared to others, the message it conveys is the most open to interpretation and discussion. It is possible to say that the more the structure reflects what it symbolizes, the more interesting and memorable it is.
Design Tools and Character	Form is shaped by visual relationship. This relationship can be quite literal or abstract according to the designer's interpretation. In one-to-one representations, there is a high risk of the structure becoming kitsch.	Form does not depend on any visual similarity. Nevertheless, since the structure must show a cause-and-effect relationship, it must provide this through material, colour, detail, ornament, or form.	Form has infinite alternatives. It is often expressive and memorable. It can reflect what it symbolizes through form, structure, material, colour or any detail. It is open to interpretation for those who experience or see it.
Impact	It contributes to the recognition of the region and acts as a visual document or affective scenery for its environment, especially when it represents something important.	Since it is based on cause-and-effect relationship, it exhibits and introduces the characteristic (cultural, technological, historical, etc...) features of the environment. Thus, it contributes to heritage transmission.	Symbolic architecture is engaging and intriguing and has the potential to become a landmark not only of what it represents, but also of the environment and the city in which it is located. In this way, there is also an increase in the recognition of the environment and urban image.

4. Conclusion

Architectural forms are never shaped independently of their location, environment, function, in short, their context. This shaping is related to the parameters required by the context as well as the way the architect who shapes it interprets the context and the message to be conveyed. Throughout history, the discourses of buildings on time, culture, geography, environment and definitely nature have been made visible through various methods. One of these methods is

semiotic concepts. By employing icons, indices, and symbols intentionally, architects can contribute to the creation of spaces that convey specific messages and enrich the cultural and social significance of the built environment.

In this context, icons utilise the relationship of one-to-one visual similarity, while indices provide a cause-and-effect situation, and symbols provide a relationship through concepts and associations. Thus, the messages conveyed explicitly or indirectly can be read just like a text. However, as in all fields related to language, meaning and cognition, what the architectural work tells and how the perceiver comprehends this message may not always coincide. Interpretation depends not only on the way the sign is constructed, but also on subjective qualities such as the character, culture and knowledge of the receiver.

Stations, which can be seen as important nodal points especially in terms of urban image and character, can act as a means of communication about the history, importance and distinctive feature of the place where they are located. The three examples analysed in this paper show reading alternatives for how and for what purpose different semiotic concepts can be integrated into architecture. Icon stops create visual similarities, and they can affect users by acting as realistic scenes. In these designs, rather than the visual aesthetics of the form, its resemblance to what it is indicative of and its potential to evoke it gain importance. Indexical structures, on the other hand, construct indirect message through the characteristic features caused by the signified. In this way, they provide information about the character, style, richness, cultural and historical heritage of the signified and contribute to the indirect transmission of these elements to future generations. As in all indirect messages, the level of knowledge and awareness of the perceiver in indexed indicators affects the success of message transmission. Structures using symbolism can be more memorable and intriguing with the aesthetic power of their forms. They play an important role especially in increasing the recognition of their surroundings due to their high potential to become landmarks. These structures, which convey variable messages depending on the user's interpretation, are good examples of the effects of cultural and environmental context on architectural form.

In conclusion, semiotic concepts are not necessary or mandatory in architectural form, but are useful for guiding the form production, for ease of perception, conveying information and character, recognition, and discourse creation. As the user of architecture, human beings are in constant interaction with physical, social and cultural contexts and produce semiotic objects that reflect this interaction in the built environment they create. The architectural form, which offers the opportunity to give a message directly to those who use it or to others about those who use it, becomes a cognitive content at the same time as it envelops people spatially. This semiotic feature facilitates the specialization and characterization of architecture in line with a specific context such as place, culture, history, or in line with the values that society attributes to a phenomenon for completely different reasons; in other words, it becomes semantically unique.

Declaration of Ethical Standards

Ethics Committee Approval was not required for the study.

Conflict of Interest

There was no conflict of interest between the authors during the research process.

Authors' Contributions

All authors contributed equally to the article.

Declarations

The authors take full responsibility for the content and any modifications made during this process.

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Originality Report

According to the originality report obtained from the iThenticate software, this article's similarity rate is 4%.

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