ICONARP
International Journal of Architecture and Planning
Received: 08.04.2024 Accepted: 07.12.2025
Volume 13, Issue 2/ Published: 31.12.2025
DOI: 10.15320/ICONARP.2025.331 E- ISSN:2147-9380

Research Article

ICONARP

Components of Design Thinking in Spatial Design Education and a Model Proposal

İpek Yıldırım Coruk *

Abstract

Design thinking, defined in its simplest form as a creative problem-solving process, is interpreted in various ways in the literature, with differing models and components. This study, motivated by the need to identify gaps in existing approaches and to clarify the concept of design thinking, aims to define its key components within the context of spatial design education. To achieve this objective, the study employed qualitative research methods. To collect data, the study utilized both a literature review and content analysis techniques. By categorizing the collected data, it was concluded that design thinking consists of three fundamental components: cognitive-rational, emotional-intuitive, and practical. These components were elaborated upon with subcategories based on literature data, and a comprehensive model proposal for use in space design education was developed. The proposal put forward in this study is significant in clarifying the concept of design thinking and its constituent components. On the other hand, the potential of the proposed model to offer guiding alternatives for the problem-solving process in design studios at various levels and to make design thinking more explicit can be attributed to the pedagogical contributions of this study. From a practical perspective, the study is considered to have the potential to directly inform practice by proposing concrete and applicable steps that can be implemented within the design process. For future research based on this study, it is recommended that the potential contributions of the proposed model be explored through its application in actual design processes. Furthermore, expanding the theoretical scope by questioning different approaches to the components of design thinking is also suggested.

Keywords: *Components of design thinking, Design education, Design process, Design thinking, Spatial design education*

*Department of Interior Architecture and Environmental Design, Fenerbahçe University, İstanbul, Türkiye

E-mail: ipekyldrm22@gmail.com

To cite this article: Yıldırım Coruk, İ. (2025). Components of Design Thinking in Spatial Design Education and a Model Proposal. *ICONARP International Journal of Architecture and Planning,* 13 (2*),* 443-468. DOI: *10.15320/ICONARP.2025.*331

INTRODUCTION

Thought is a set of mental processes and operations carried out in response to a problem. These processes may involve various actions such as reasoning, guessing, association, and imagination. Furthermore, activities related to knowing, thinking, and learning fall within the scope of cognitive science. When design is examined within the framework of cognitive science, discussions focus not only on methodical approaches in design but also on the definition of design thinking and how it emerges as a cognitive process (Koçkan, 2012).

Method movements in design initially emerged with the intention of making design more scientific. However, these efforts ultimately highlighted the fundamental differences between design and science. As a result, scientific design is considered as a blend of design methods grounded in scientific knowledge, incorporating both intuitive and non-intuitive processes (Cross, 1993). Consequently, design methodology encompasses the study of how designers think and work, the formulation of effective frameworks for the design process, the development of innovative techniques and methods, and their application to complex problems (Cross, 2001).

The need to make the design process open to examination and critical evaluation has encouraged the use of scientific methods in design (Lawson, 2005). As a result, scientific methodology has been used to study design activity, reflecting the evolving link between design and science (Akış, 2008). In this way, a new view of design thinking began to appear in the 1960s, focusing on cognitive and working processes, and it grew alongside design methodology (Cross, 2023).

Advances in computer and communication technologies have also significantly influenced both the act of designing and the methods employed. As a result, yet another layer was added to ongoing studies of design methods—many of which had yet to be fully explained—highlighting the need to approach design from a cognitive-scientific perspective (Bayazıt, 2004). Within the cognitive-scientific approach to design, the subjective nature of the design process has been acknowledged, and this perspective has focused on explaining the thought processes of designers (Lawson, 2004).Through studies executed within the framework of design research, designers' actions—such as thinking, perceiving, problem-solving, and conceptualization—have been examined (Uluoğlu, 2003).

Since the general structure of space design education—one of the key domains within design education—proceeds through problem-solving processes, the relationship between designers and their thought processes raises important questions and areas of inquiry (Carmel-Gilfilen & Portillo, 2010). Despite ongoing research and investigation, there remains no widely accepted or stable definition of design thinking. This ambiguity reflects the evolving nature of design thinking as an emerging discipline or field of knowledge (Jones, 2010). This research addresses these issues within the framework of space design education

DOI: 10.15320/ICONARP.2025.331

to contribute to the field. In this study, space design education refers to architecture and interior architecture programs, which are the focus. Space design serves as the core subject in these programs, varying in scale, scope, and detail.

A review of the literature on design thinking reveals ongoing calls for further research and development. For example, Badke-Schaub et al. (2010) emphasize the need to deepen research on design thinking to scientifically support designers and enhance knowledge and progress. Likewise, Lindbergh et al. (2010) highlight the importance of developing a comprehensive design thinking model to guide students through project-based learning courses. Building on these perspectives, Kurt Çavuş (2021) advocates for making design thinking more visible and integrating it into educational curricula. Together, these suggestions form the foundation and motivation for this study.

Another motivation for this study arises from the need to clearly understand the components and approaches that make up design thinking. This understanding is essential for effectively applying design thinking to problem-solving processes within space design education programs (Kurt Çavuş & Kaptan, 2022).

Based on the motivations identified in the literature and the review of existing studies, this research aims to elucidate design thinking and its constituent components within the context of space design education. In line with this objective, design thinking is approached in terms of the problem-solving steps, and a model is proposed for the methodological use of design thinking based on the analysis of relevant literature. Accordingly, the components of design thinking are categorized under three main dimensions: cognitive-rational, emotional-intuitive, and practical components.

METHOD

This study, conducted within the context of space design education, was developed using a qualitative research method. According to Groat and Wang (2013), qualitative research involves an interpretive approach with a multifaceted focus, aiming to make sense of or interpret the meaning of data. In line with this approach, the study used literature review and content analysis as primary data collection techniques.

The main objective of content analysis is to identify concepts and relationships that help explain the collected data. This technique includes grouping similar data under specific themes and concepts. It also involves organizing and interpreting them in a way that is comprehensible to the reader (Yıldırım & Şimşek, 2006). As a qualitative research technique, content analysis focuses on coding the data based on the frequency and significance of particular words and concepts found in the reviewed sources. It aims to identify thematic areas and interpret the findings by systematically organizing the extracted data.

The data for this study were collected by conducting keyword searches using terms such as “design thinking and architecture,” “design

thinking and interior architecture," "design thinking and space design education," and "components of design thinking" across both national and international databases, including Web of Science, Google Scholar, DergiPark, and ScienceDirect. No publication year restrictions were applied.

In line with the research objectives, inclusion and exclusion criteria were established to clarify the data selection process. Studies that explicitly discussed design thinking within the context of design education, architecture, or interior architecture, and provided conceptual or analytical insights into its components were included. Conversely, studies that lacked sufficient methodological detail or did not directly address the components of design thinking were excluded.

Within the scope of this study, the collected sources were examined through a content analysis method, and only those that included classifications related to the components of design thinking were incorporated into the research. During the data selection process, studies addressing the concept of design thinking in theoretical or pedagogical contexts were prioritized to maintain alignment with the research objectives.

In the studies reviewed, various approaches to defining the components of design thinking were examined. These approaches were then grouped according to existing classifications found in the literature. These classifications formed the foundation for the development of the proposed approach. Based on the generalizations derived from the literature the scope and sub-layers of the proposed model were defined. A new model was then proposed by synthesizing various approaches to design thinking and identifying their similarities, differences, advantages, and disadvantages. Since the study approaches design thinking in connection with the problem-solving process, the proposed model was developed based on frameworks aligned with this perspective. The data were further elaborated and expanded by adding subheadings under the main categories.

However, this study relies solely on secondary data, which constitutes one of its main limitations. The empirical validation of the model and the exploration of its potential contributions are therefore suggested as directions for future research.

DESIGN THINKING AND COMPONENTS

The conceptual emergence of design thinking traces back to the late 20th century. Simon (1996) identify design thinking as the application of methodologies and sensitivities characteristic of designers to generate new ideas, choices, alternatives, and practical solutions that address stakeholder needs. Similarly, Rowe (1991), in his book Design Thinking, sought to develop a generalized understanding of the concept. His work aimed to explain the research focus, decision-making processes and internal dynamics involved in the act of designing.

DOI: 10.15320/ICONARP.2025.331

Visser (2006) offers a cognitive perspective on design thinking, emphasizing both internal (mental) and external (e.g., drawings, notes, and plans) dimensions of the design process. The term design thinking is also commonly used to describe an explicit, structured problem-solving approach employed by decision-makers to address real-world challenges (Melles et al., 2012). Simon (1996) further contributes to this discourse by suggesting that, apart from innate internal properties, all aspects of design are artificial—implying that design thinking can be learned and developed over time.

Over time, researchers have recognized that understanding design thinking is a preliminary step toward developing cognitive design tools that incorporate the problem-solving process and address mental activities (Görgün Göksu, 2022). The first Design Thinking Research Symposium marked an initial exploration into research on design and design methodology. Since then, several design thinking models have emerged, each grounded in distinct approaches to studying design situations. These models draw upon theories and frameworks from fields such as design methodology, psychology, education, and beyond (Dorst, 2011).

Design thinking is a mode of thinking and problem-solving that encompasses knowledge applicable to the creative problem-solving process. As such, design thinking and design education are closely intertwined concepts (Kurt Çavuş, 2021). However, despite this close relationship, Oxman (2004) notes that most design schools rarely address the cognitive processes underlying design thinking as explicit instructional content within studio environments.

In the literature, design thinking has been explored through various approaches. Among these, Kurt Çavuş and Kaptan (2022) examined the components of design thinking as regards individual characteristics such as values, principles, perspectives, and skills that a person adopts and utilizes to creatively solve design problems. Howard et al. (2015) address design thinking in a similar manner.

In other studies, researchers such as Börekçi (2015), Choi and Kim (2017), and Taimur and Onuki (2022) have approached design thinking as regards the tactics and strategies employed to generate ideas that embody this concept. In this study, the components of design thinking have examined as steps applicable within the problem-solving process. Accordingly, the approaches to design thinking are categorized under two main headings: (1) approaches that focus on the values, principles, perspectives, and skills acquired by the designer, and (2) approaches that emphasize the tactics and strategies employed by the designer. These two categories serve as the basis for the discussion and analysis presented in the study.

Approaches that Focus on the Values, Principles, Perspectives, and Skills Acquired by the Designer

In this approach, design thinking is examined through the lens of the values, principles, and skills acquired by the designer, with inquiries structured accordingly. In line with this perspective, Kurt Çavuş and Kaptan (2022) discussed the components of design thinking under various headings, drawing upon data from the existing literature. These; human-orientedness, visualization skills, predisposition to multifunctionality, learning orientation, openness to interdisciplinary/multidisciplinary collaborations, openness to different perspectives and diversity, tendency to teamwork, critical questioning, empathy, reframing problems, willingness to make a difference, holistic perspective, avoidance of having to choose, risk-taking, passion for innovation, experimental intelligence/tendency to learning by doing, experience/ learning through error, creative thinking skills and self-confidence, using language as a tool, optimism and tolerance to uncertainty.

In the study by Howard et al. (2015) (Figure 1), the elements of design thinking are categorized under two main themes: design thinking as a way of life and design thinking as a way of working. Within this framework, key components such as collaboration, empathy, visualization, creative thinking, and prototyping are discussed. Additionally, attributes like optimism, curiosity, and holistic thinking have also been associated with design thinking.

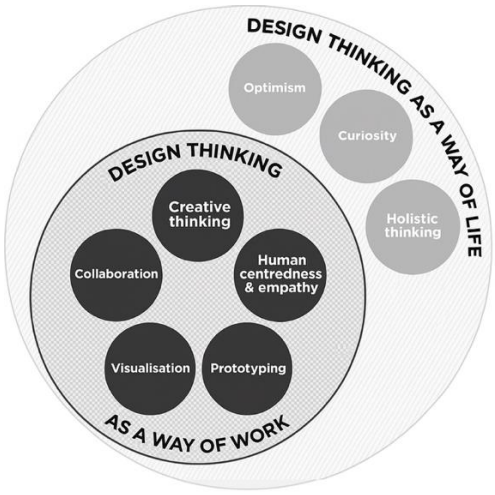


Figure 1. Design Thinking Components (Howard et al. 2015).

Approaches that Emphasize the Tactics and Strategies Employed by the Designer

Various studies in the literature adopt this approach, in which design thinking is addressed with regards to the tactics and strategies employed during the design process. This category is further divided into two subheadings, reflecting different dimensions of strategic and tactical implementation within the design process.

DOI: 10.15320/ICONARP.2025.331

Design thinking has been categorized in numerous ways in the literature (Cross, 2023; Kimbell, 2011; Johansson-Sköldberg et al., 2013). In this study, the data were classified based on the framework proposed by Johansson-Sköldberg et al. (2013), as it provides a categorization specific to design disciplines. However, the aspect of design thinking related to values acquired by students is not included in their classification; therefore, this study introduces it as an additional argument for expanding the categorization of design thinking. Based on Johansson-Sköldberg et al.'s framework, design thinking is divided into two subcategories: design thinking as a way of reasoning and making sense and design thinking as a problem-solving activity.

Design thinking as a problem-solving activity

Choi and Kim (2017) classified the components of design thinking into three levels: the design process level, the design strategy level, and the design representation level (Figure 2). At the design process level, subcategories include design activity, problem analysis, solution finding, evaluation, idea generation, detailing, and the creative leap. The design strategy level elaborates on strategic resources, which are categorized as knowledge-based and implicit reasoning methods. Finally, the design representation level encompasses both external and internal forms of representation.

Design Process Level		
Design Activity		
Problem Analysis	Analysing the given task	Problem space
	Establishing a new need	
Solution Finding	Gathering information	Solution space
	Developing conceptual design	
	Implementing designs	
Evaluation	Evaluating a proposed solution	
Idea Generation		
Fluency	Proposal of a new idea	
Elaboration 1	Development of a proposed idea	
Elaboration 2	Rediscovery and redevelopment of a proposed idea	
Creative Leap	Making a leap by producing a creative idea	
Stuck	Being tied up by a problem	
Design Strategy Level		
Strategy Resource		
Information driven	Utilising the information collected during the problem analysis	
Knowledge driven	Utilising knowledge acquired previously	
Schema driven	Utilising existing experience	
Implicit	Unclear source	
Reasoning Method		
Type	Analogy	
	Metaphor	
	None	
Period	Problem identification	
	Solution generation	
	Function finding	
	Explanation	
Design Representation Level		
External representation	Transformation	
	Mutation	
	Conventional representation	
Internal representation	Collaborative discussion	
	Individual thinking	

Figure 2. Design Thinking Components (Choi and Kim, 2017).

According to Katoppo and Sudradjat's model (Figure 3), the elements of design thinking include: understand, observe, point of view, idea generation(ideate), prototype and test.

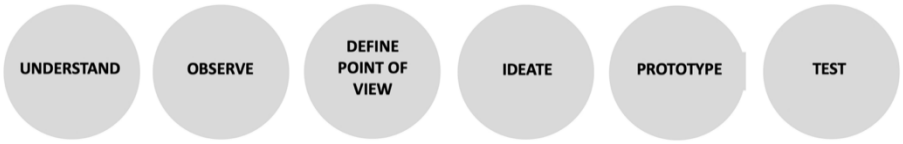


Figure 3. Design Thinking Components (Katoppo and Sudradjat, 2015).

Taimur and Onuki's approach (2022) includes five iterative phases; empathize, define, ideate, prototype, test. However, the test phase is handled in the form of transmission (Figure 4) as it is used in the context of design thinking education.

Figure 4. Stages of Design Thinking (Taimur and Onuki, 2022).

A similar approach (Figure 5) has also been proposed by the Stanford School. In this approach, the last stage transmission, has been replaced by the test title.

Figure 5. The Five Phases of Design Thinking Process (Standford School, 2025).

In the study conducted by Koçkan Özyıldız and Yıldız (2020), design thinking has explained through three main components: preparation, conceptualization, and spatialization (Figure 6).

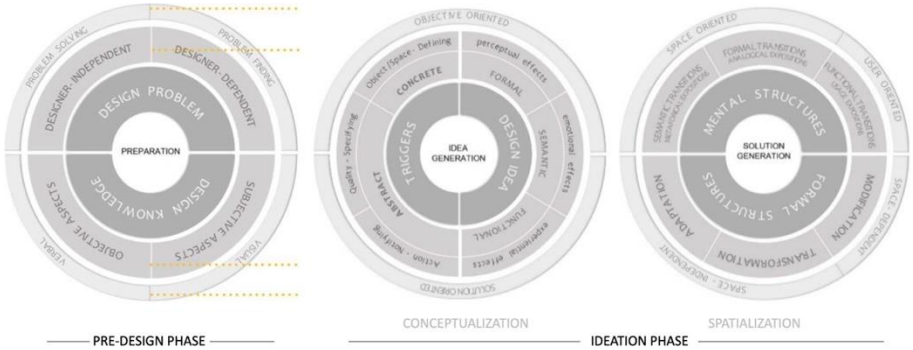


Figure 6. Infographic Model of the Design Thinking Process (Koçkan Özyıldız and Yıldız, 2020).

According to the model, design thinking includes two main stages: the pre-design stage and the ideation stage. The elements of the pre-design stage are defined as design problem and design information. The ideation stage is further divided into two sub-processes: idea generation and solution generation. In the conceptualization phase, the layers of triggering concepts or images, along with the main idea, are analyzed. In

DOI: 10.15320/ICONARP.2025.331

the subsequent spatialization phase, the focus shifts to the layers of mental and formal structures.

As stated the model, the definition of a design problem varies depending on how the designer approaches it. The designer's approach reveals the relationship between two fundamental styles: problem-solving and problem-finding. On the other hand, design knowledge varies depending on how the design problem is defined. The designer processes prior experiences, educational and professional background, and subjective tendencies together with fundamental information about the design problem. In other words, design knowledge and the design problem interactively initiate and shape the design process (Koçkan Özyıldız and Yıldız, 2020).

Akpınar et al. (2015) state that design thinking is not merely a model adapted from rational behaviors such as analysis, synthesis, evaluation, or formulation-synthesis-analysis. Rather, design—and by extension, design thinking—also encompasses intuitive thinking and reasoning processes. According to this approach, design thinking is addressed under several components: problem formulation, previous experiences, goal/target formulation, design thinking, avoidance logic, pragmatic maxim, development of design alternatives, and design implementation (Figure 7).

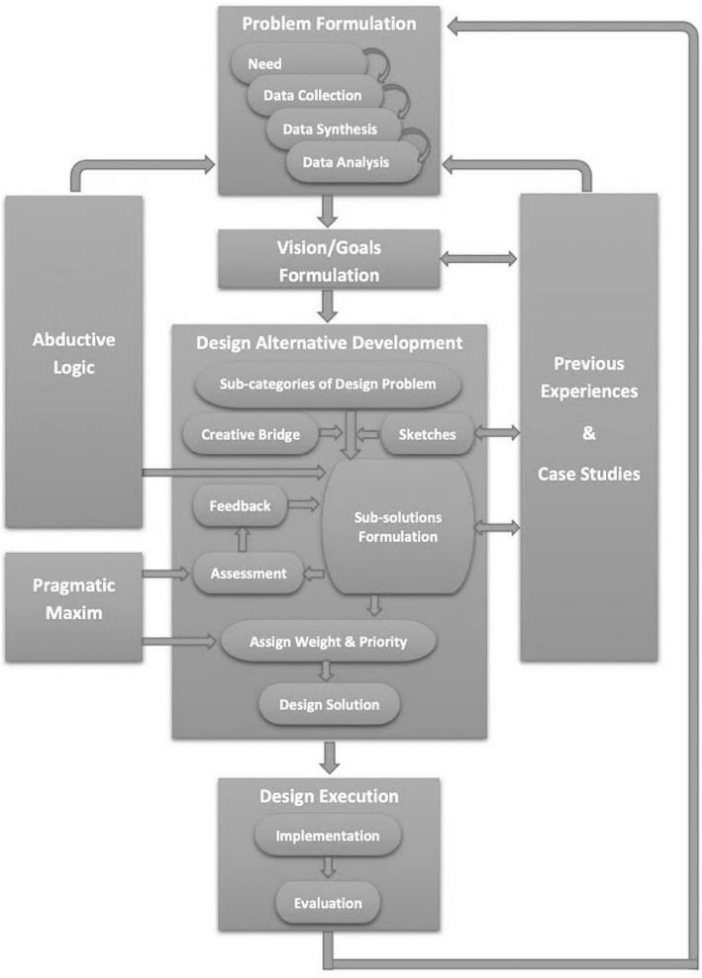


Figure 7. Design Thinking Model (Akpınar et al. 2015).

Lindberg et al. (2010) define the components of design thinking under the categories of exploring the problem area, discovering the solution space (Figure 8), and integrating these two areas. However, rather than presenting these as sequential process steps, the authors conceptualize them through modes of operation. These working modes include framing the design problem, comprehending external information, pooling information, synthesizing, selecting a path, generating ideas, defining concepts, and concretizing those concepts.

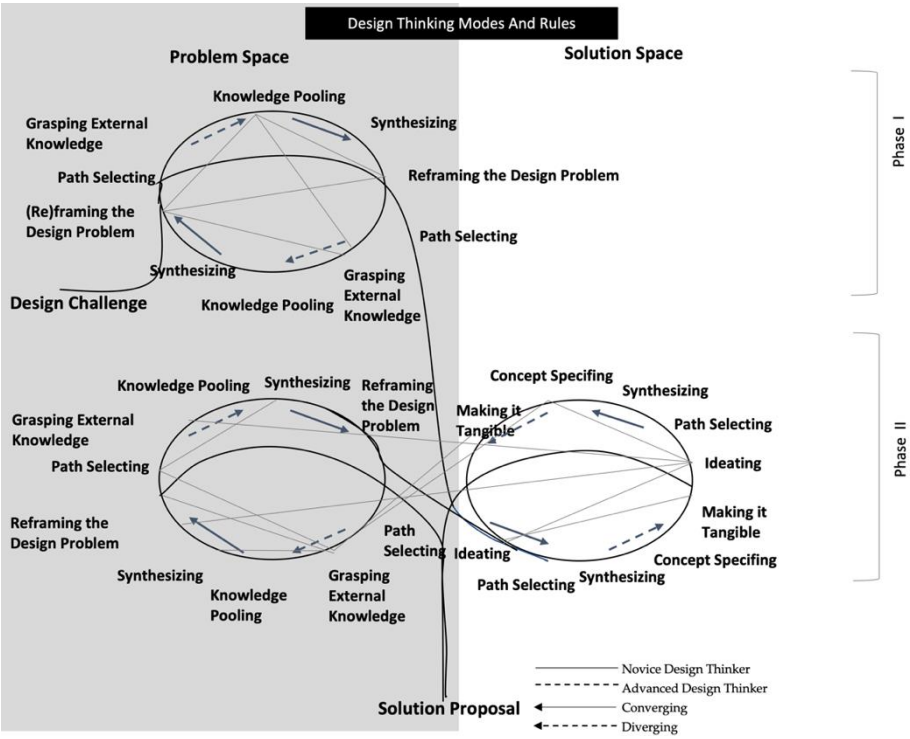


Figure 8. Adaptive Design Thinking Workflow Model (Lindberg, et al. 2010).

In the design thinking approach proposed by Howard and Davis (2011) (Figure 9), the elements of design thinking are categorized under the stages of defining the problem, researching, prototyping-testing, implementing, evaluating, and storytelling. In this model, the defining the problem stage emphasizes curiosity and is driven by asking "why" questions. During the research step, information is collected and synthesized through the literature of relevant disciplines.

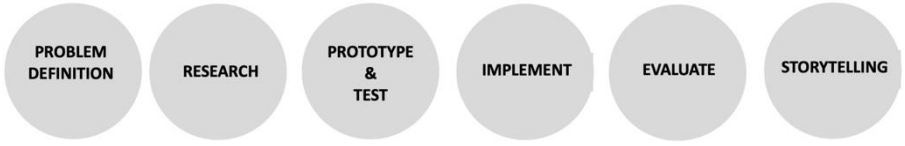


Figure 9. Design Thinking Model (Howard & Davis, 2011).

The incorporation of prototyping and hypothesizing in the model enables the use of creativity to generate potential solutions. The implementation and evaluation stages correspond to the rollout and review phases. According to Howard and Davis (2011), once the solutions

DOI: 10.15320/ICONARP.2025.331

are implemented and assessed, it is essential to communicate the design process and outcomes through both informal and formal storytelling.

Another approach links the higher-order thinking stages proposed by Bloom—an influential figure in educational psychology—with design thinking, and this association is reflected in relevant studies within the field of space design.

According to Bloom, thinking consists of three domains (Figure 10): cognitive, affective, and psychomotor. The cognitive component pertains to mental skills, while the affective domain involves emotional development and attitudes. The psychomotor domain, on the other hand, encompasses physical skills that require coordination betwixt the brain and muscles (Aslan, 2012).

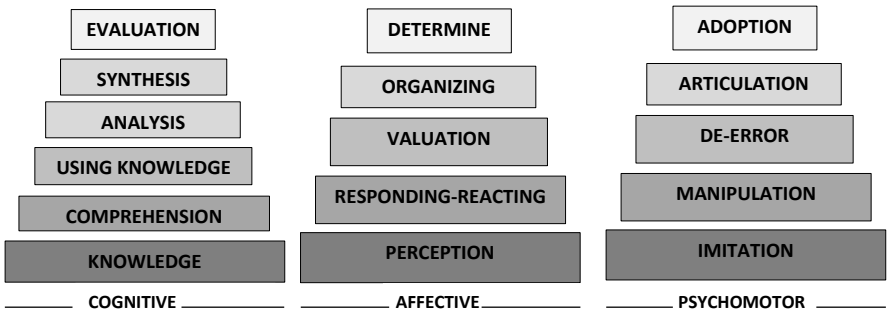


Figure 10. Phases of Thinking (Aslan, 2012).

In the study conducted by Yıldırım (2022), design thinking was examined through the lens of Bloom's taxonomy, categorizing it into cognitive, affective, and psychomotor components (Figure 11). According to this framework, the processes of problem definition and problem-solving are related with the cognitive component of design thinking. The affective component involves the internalization of the problem and its articulation through a subjective perspective. Finally, the psychomotor component encompasses the expression or transmission off all these processes.

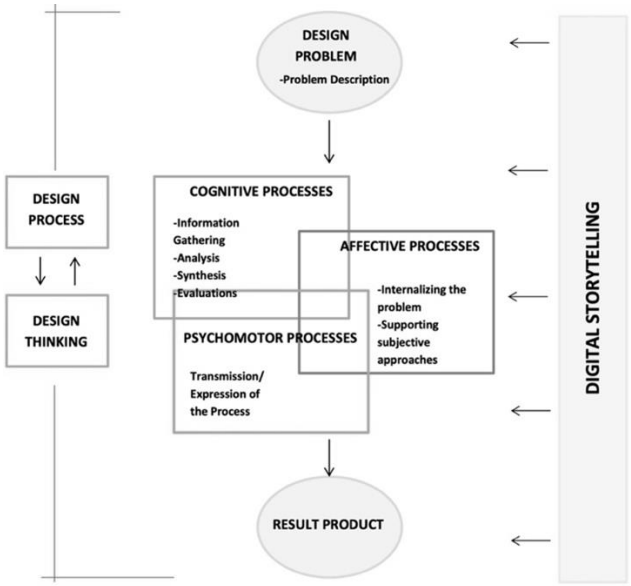


Figure 11. Design Thinking Components and Digital Storytelling (Yıldırım, 2022).

Wrigley et al. (2018) conceptualize the components of design thinking through the Design Education Ladder model (Figure 12). In this framework, the elements of design thinking are sequentially identified as understanding, application, analysis, synthesis, and evaluation. Within this model, understanding is regarded as a cognitive learning outcome, while application, analysis, and synthesis are categorized as skill-based learning outcomes. Evaluate, in turn, is interpreted as an affective learning outcome.

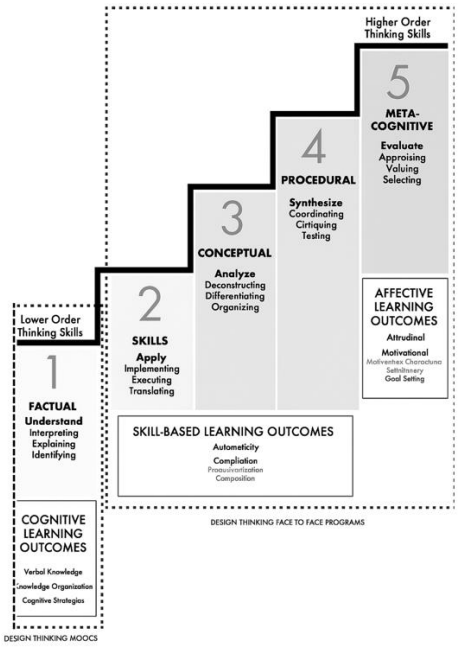


Figure 12. Design Education Ladder Model (Wrigley at al. 2018).

Avsec and Jagiello-Kowalczyk (2021) approached design thinking as a reflective process, linking it to the concept of metacognition, and proposed a model grounded in the Stanford School framework (Figure 13). In this model, design thinking is conceptualized as a cyclical process composed of the core components of empathize, define, ideate, prototype, and test. Surrounding these core components are broader elements such as learning activities, awareness, interpersonal skills, learning strategies, and evaluation, control, knowledge and monitoring.

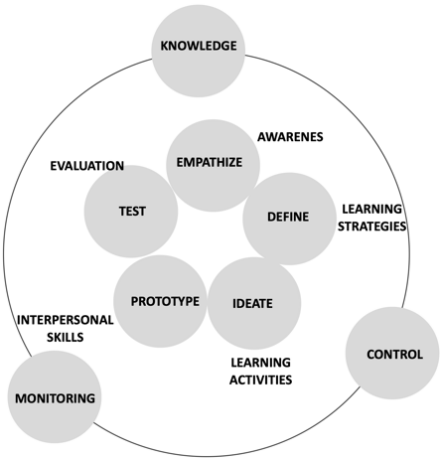


Figure 13. Metacognitive Design Thinking Model (Avsec & Jagiello-Kowalczyk, 2021).

DOI: 10.15320/ICONARP.2025.331

Design thinking as a way of reasoning/making sense of things

Börekçi (2015) conceptualized the components of design thinking through three main themes and twelve design thinking tactics. These tactics include incorporating personal experiences, accounting for user-based observations, the use of past experiences, the use of analogies, and the review of examples. During the solution-oriented analysis of the problem, emphasis is placed on exploring the user and the environment as well as examining similar ideas. Finally, the technical analysis of the summary involves reviewing project requirements, deviating from the design brief and providing technical information.

Dorst (2010) identifies the components of design thinking as grounded in five core activities: formulating, representing, transporting, evaluating, and managing design thinking carriers. According to this framework, formulation involves identifying the key issues within a problem space and reframing them in a novel and original manner. Within design disciplines, representation of both problems and solutions plays a critical role, as it enables designers to develop their ideas through an ongoing dialogue with these representations. The process of evaluation is also central to maintaining direction in a design project. Particularly in the early stages—when problems and solutions remain ambiguous—this evaluation tends to be subjective in nature, shaped by the designer's interpretations and insights.

Goldschmidt and Rodgers (2013) propose three key strategic components of design thinking that are widely applicable across various design disciplines. These components include adopting a broad systems approach to the problem, rather than adhering to narrowly defined problem criteria; framing the problem in a distinctive and original way; and designing from first principles.

Lawson (2006) identifies the central dimensions of design thinking as formal, symbolic, practical, and radical. According to this framework, formal constraints pertain to the aesthetic and compositional qualities of a design. Symbolic constraints influence the interpretive meanings embedded within the design. Practical constraints address the technical and construction-related aspects, including materials, mechanical systems, and technological requirements. Lastly, radical constraints relate to the core purpose or fundamental function of the designed object or system.

Given that design thinking is inherently oriented toward innovation, Brown (2008) outlines three key stages necessary for the innovation process to function effectively. The first stage is the inspiration area, which involves gathering insights and ideas that inform the problem-solving process. The other stage is the idea area, where these ideas begin to take shape through prototyping. The final stage is the application area, which focuses on developing a comprehensive production plan to bring the innovation to the intended user.

The fundamental concepts of design thinking across various design disciplines are often explored through studies on design cognition and

design action. In this context, Howard (2013) emphasizes that design thinking arises from an equal integration of analytical and intuitive thinking (Figure 14).

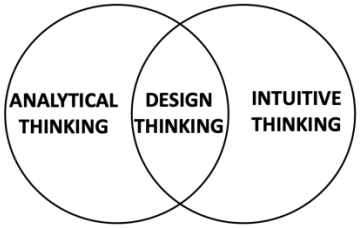


Figure 14. Design Thinking Working System (Howard, 2013).

Goldschmidt and Badke-Schaub (2010) conceptualize the components of design thinking under four key categories: search, mental image, evaluation, and structuring learning. In this framework, the process of search—which includes seeking information and generating potential solutions—contributes to the expansion of knowledge within the design context. Mental image is essential for constructing and adapting mental models in the face of complex problem-solving tasks. Furthermore, evaluation and structuring learning are critical for determining which ideas and information are advanced, organized, or discarded.

According to Jones (2010), design thinking is characterized as a trajectory involving kinesthetic, emotional, and mental movements, despite following a structured process. Consequently, he conceptualizes the components of design thinking under cognitive, emotional, and kinesthetic.

Smulders and Subrahmanian (2010) conceptualize the components of design thinking under three key headings: problem, system-principles, and integration. From this perspective, even when a problem appears well-defined initially, it is essential to treat problems or initial conditions as ill-defined to allow for novel integrations and innovative solutions. Addressing design challenges at more abstract and comprehensive levels (the system) or at more fundamental levels(principles) provides designers with strategies to challenge and potentially overcome existing assumptions. The development of specific design elements often occurs in line with the conceptualization of others; while one aspect is elaborated in detail, another may remain at a conceptual stage until integration becomes feasible. This dynamic interplay exemplifies integration.

Oxman (2004) explains design thinking and its conceptual structure through a method comprising three components: subject, concept, and form (Figure 15). In this framework, the subject component represents the connection to the problem. The concept component reflects a holistic or whole-oriented way of thinking. Finally, the form component embodies the formal or physical manifestation of the idea or thought.

DOI: 10.15320/ICONARP.2025.331

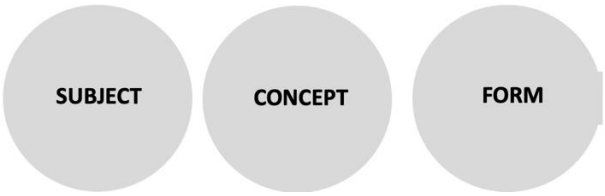


Figure 15. Design Thinking Components (Adapted from Oxman, 2004).

FINDINGS

Based on the data obtained from the study, which aims to identify the components of design thinking within the context of space design education, it is evident that these components have been described in numerous ways in the literature. An overview of these descriptions is provided in Table 1.

Table 1. Studies in the literature on design thinking components.

1.Approaches that focus on the values, principles, perspectives, and skills acquired by the designer	
Kurt Çavuş & Kaptan (2022)	▪ Human-orientedness, ▪ Visualization skills, ▪ Predisposition to multifunctionality, learning orientation, ▪ Openness to interdisciplinary/multidisciplinary collaborations, ▪ Openness to different perspectives and diversity, ▪ Tendency to teamwork, ▪ Critical questioning, ▪ Empathy, ▪ Reframing problems, ▪ Willingness to make a difference, ▪ Holistic perspective, ▪ Avoidance of having to choose, ▪ Risk-taking, ▪ Passion for innovation, ▪ Experimental intelligence/tendency to learning by doing, ▪ Experience/ learning through error, ▪ Creative thinking skills and self-confidence, using language as a tool, ▪ Optimism ▪ Tolerance to uncertainty.
Howard & Senova & Melles (2015)	▪ Empathy, ▪ Collaboration, ▪ Creative thinking, ▪ Visualization, ▪ Prototyping ▪ Optimism, ▪ Curiosity, ▪ Holistic thinking
2. Approaches that emphasize the tactics and strategies employed by the designer	
2.1. Design thinking as a problem-solving activity	
Choi & Kim (2017)	▪ Design process level, ▪ Design strategy level, ▪ Design representation level
Katoppo & Sudradjat (2015)	▪ Understand, ▪ Observe, ▪ Point of view, ▪ Idea generation ▪ Prototype ▪ Test
Taimur & Onuki (2022)	▪ Empathize, ▪ Define, ▪ Think, ▪ Prototype,

	▪ Test/present
Koçkan Özyıldız & Yıldız (2020)	▪ Preparation, ▪ Conceptualization ▪ Spatialization
Interaction Design Foundation	▪ Emphatize ▪ Define ▪ Ideate ▪ Prototype ▪ Test
Akpınar & XU & Brooks (2015)	▪ Problem formulation, ▪ Previous experiences, ▪ Goal-target formulation, ▪ Design thinking , ▪ Avoidance logic, ▪ Pragmatic maxim, ▪ Design alternative development, ▪ Design implementation
Lindberg, Gumienny, Jobts & Meinel (2010)	▪ Exploring the problem area, ▪ Discovering the solution space ▪ Integrating these two areas
Howard & Davis (2011)	▪ Problem definition, ▪ Researching, ▪ Prototyping-testing, ▪ Implementing, ▪ Evaluating ▪ Storytelling
Aslan (2012), Savaş (2019) & Yıldırım (2022) based on Bloom	▪ Cognitive process ▪ Affective process ▪ Psychomotor process
Wrigley & Mosely & Tomitsch (2018)	▪ Understanding ▪ Application, ▪ Analysis, ▪ Synthesis ▪ Evaluation
Avsec & Jagiello-Kowalczyk (2021)	▪ Emphatize ▪ Define ▪ Ideate ▪ Prototype ▪ Test ▪ Awareness ▪ Learning Strategies ▪ Learning Activities ▪ Interpersonel skills ▪ Evaluation ▪ Knowledge ▪ Control ▪ Monitoring
Koçkan Özyıldız & Yıldız (2020)	▪ Preparation, ▪ Conceptualization ▪ Spatialization
2.2 Design thinking as a way of reasoning/making sense of things	
Börekçi (2015)	▪ The inclusion of personal experiences, ▪ Solution-oriented analysis of the problem, ▪ The technical analysis of the summary
Goldschmidt & Rodgers (2013)	▪ Adopting a broad systems approach to the problem, ▪ To frame the problem in a distinctive ▪ To design from first principles.
Lawson (2006)	▪ Formal, ▪ Symbolic, ▪ Practical, ▪ Radical
Brown (2008)	▪ Inspiration area, ▪ Idea area, ▪ Application area

DOI: 10.15320/ICONARP.2025.331

Howard (2013)	▪ Analytical thinking ▪ Intuitive thinking
Dorst (2010)	▪ Formulating, ▪ Representing, ▪ Transporting, ▪ Evaluating ▪ Managing
Goldschmidt & Badke-Schaub (2010)	▪ Search, ▪ Mental image, ▪ Evaluation, ▪ Structuring learning
Jones (2010)	▪ Cognitive, ▪ Emotional ▪ Kinesthetic
Smulders & Subrahmanian (2010)	▪ Problem, ▪ System-principles ▪ Integration
Oxman (2004)	▪ Subject ▪ Concept ▪ Form

The frequency of usage of the elements that constitute the concept of design thinking is presented in Figure 16.

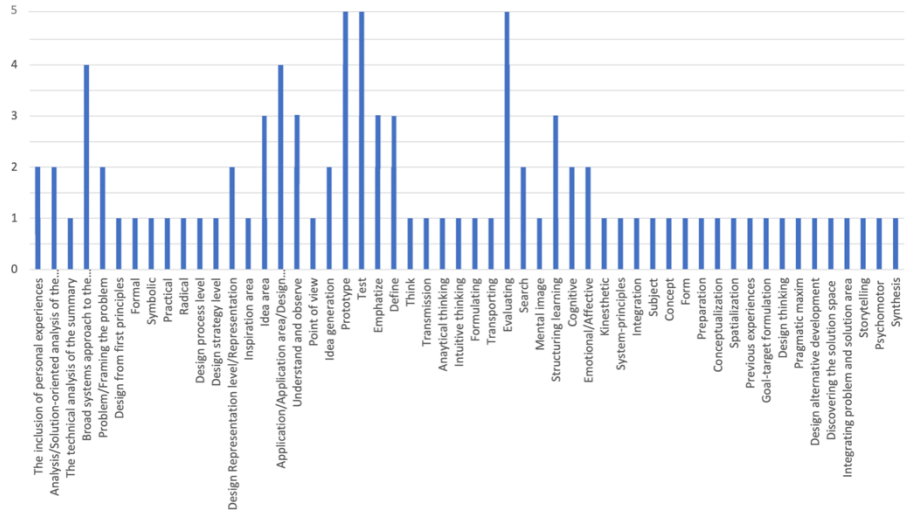


Figure 16. Design Thinking Components and Frequency of Use.

Accordingly, Börekçi's (2015) approach to the components of design thinking is structured as a guidance framework for problem-solving. Within this approach, various dimensions of design thinking are addressed through specific sub-headings, emphasizing both the incorporation of personal experiences and the analytical examination of the problem.

Goldschmidt and Rodgers (2013) propose redefining and narrowing the design problem by adopting a broader systems perspective and by encouraging designers to work from first principles. However, when evaluated within the context of space design education, this approach appears to be general, as it primarily concentrates on the nature of the problem and its formulation within the design process. It tends to overlook the subjective dimensions of design thinking, and the communication or expression of the design process.

In the components of design thinking discussed by Choi and Kim (2017), the design process level encompasses elements such as analysis, synthesis, and evaluation, which correspond to the cognitive dimension of design thinking. While the strategy level aims to highlight the subjective aspect of design thinking—particularly in terms of reasoning—it is considered to remain ambiguous. Additionally, the representation level addresses the expression of ideas through various techniques, emphasizing the communicative aspect of design thinking. Although Choi and Kim's framework is both comprehensive and clearly structured, its applicability within the problem-solving processes of space design education remains uncertain and open to further investigation.

Although Brown (2008) addresses various dimensions of design thinking through the stages of inspiration, ideation, and implementation area, it is argued that the scope of these components and their adaptability to the design problem-solving process are not clearly articulated.

Although Katappo & Sudradjat (2015), Taimur & Onuki (2022), Dorst (2010), and Wrigley et al. (2018) define the elements of design thinking using similar terms—such as perspective, empathy, problem definition, ideation, prototyping, testing, and presentation—these elements are largely framed as sequential steps within a problem-solving process. However, this process-oriented perspective does not fully encompass all dimensions of design thinking.

In the design thinking model proposed by Howard and Davis (2011), the components include commonly recognized stages such as problem definition, research, prototyping and testing, implementation, and evaluation. However, a notable addition in their framework is storytelling, which sets it apart from other models. While the overall approach addresses the cognitive dimensions of design thinking—like analysis, synthesis, and iteration—storytelling introduces a subjective to the process.

Although Avsec & Jagiello-Kowalczyk (2021) address themes like other design thinking models, their approach is distinguished by its incorporation of sub-layers such as awareness, learning activities, and personal abilities. Moreover, while acknowledging the cognitive dimension of design thinking, their model also integrates its subjective and experiential aspects and framing the process as cyclical rather than linear.

Goldschmidt and Badke-Schaub (2010) identified the components of design thinking as research, mental imagery, evaluation, and the structuring of learning. Howard (2013), in contrast, argued that design thinking involves an equal integration of intuitive and analytical modes of thinking.

Jones (2010) states that design thinking encompasses cognitive, emotional, and kinesthetic components. Oxman (2004), on the other hand, describes design thinking and its conceptual structure through a

DOI: 10.15320/ICONARP.2025.331

method comprising the components of subject, concept, and form. While both approaches are valuable in addressing different dimensions of design thinking, they offer limited guidance for effectively engaging with the problem-solving process.

Lindberg et al. (2010) define the components of design thinking under the categories of exploring the problem space, exploring the solution space, and integrating these two domains. Moreover, design thinking is approached in terms of modes of operation rather than as a sequence of interdependent process steps. This perspective incorporates various components and stages intended to facilitate the application of design thinking. However, it is considered to involve complexities that may hinder its practical use in problem-solving processes.

In the study conducted by Koçkan Özyıldız and Yıldız (2020), design thinking is conceptualized through three main components: preparation, conceptualization, and spatialization. This model considers design thinking not only from a cognitive perspective but also from an affective standpoint, incorporating subjective dimensions. However, the final component—spatialization—raises questions regarding its content, particularly in relation to abstract outcomes typically associated with basic design studios. On the other hand, models based on Bloom's taxonomy support this study by offering a multidimensional and detailed framework for understanding design thinking.

The model proposed by Akpınar et al. (2015) is considered valuable for its acknowledgment of both the rational and intuitive dimensions of design thinking. However, the complexity of the model's sub-headings and the relationships among them presents challenges in terms of readability and adaptability to the problem-solving process.

When design thinking is understood in its simplest form as the generation of ideas and solutions during problem solving, the process can be seen as comprising a series of cognitive stages commonly associated with the design process—namely, problem identification, information gathering, analysis, synthesis, evaluation, and the development of a final product. However, it would be inaccurate to view this process as consisting solely of these stages. The problem-solving process also encompasses affective dimensions—subjective thoughts and the internal frameworks of the designer—which play a critical role in shaping outcomes. Furthermore, the forms of expression that emerge at the conclusion of this process are also components of the design thinking.

Within the study sample, some research (e.g., Katappo and Sudradjat, 2015; Taimur and Onuki, 2022; Dorst, 2010; Wigley et al., 2018; Howard and Darwis, 2011) outlined the components of design thinking in a broad manner, whereas others (e.g., Koçkan Özyıldız and Yıldız, 2020; Lindberg et al., 2010; Bloom) have provided more detailed discussions. Consequently, the examples examined in this study offer insights into various dimensions of design thinking. However, the complexity and level of detail in some models, as well as the difficulty in following certain

procedural steps, raise questions about their applicability to problem-solving processes in space design education.

In this study, the components of design thinking were synthesized by drawing on themes identified in existing approaches. By examining the similarities, differences, strengths, and limitations of these approaches—as well as their potential contributions—the aim is to propose a model that is both inclusive and adaptable to the problem-solving process.

Since the model proposed in this article is intended to serve as a guide for the problem-solving process, it has been developed based on approaches that emphasize the tactics and strategies employed by the designer.

Based on the data acquired from the literature, common themes across all process models include subject component, formal component, inspiration area, formulation, comprehension, cognitive processes, problem/problem area, system approach to the problem, analytical thinking, rational thinking, understand/observe, design process level, preparation, concept development and empathy/definition. These elements are generally recognized as processes that encompass all or some of the essential steps involved in problem solving. As indicated in the reviewed studies, the initial components of design thinking typically follow a sequence involving problem definition, formulation, or exploration. In essence, this initial phase of design thinking encompasses steps such as understanding, defining, discovering, identifying, and addressing the problem. These steps can be collectively categorized as the cognitive-rational component.

In this classification, the second generalizability can be addressed under headings such as: concept, idea area/generation, mental image, emotional, solution area, system/principles, framing the problem, intuitive thinking, point of view definition, design strategy level, conceptualization, awareness, learning strategies, learning activities, interpersonel skills, emotional-situational component and thinking. When the components are generalized, it becomes evident that they also encompass subjective approaches to the problem. This indicates that another key component of design thinking involves its subjective, emotional, and intuitive dimensions.

Considering that design thinking is fundamentally a problem-solving process, it is natural for it to incorporate both objective and subjective approaches. The inclusion of this component in most of the studies reviewed in the literature shows that another component that constitutes design thinking is the emotional-intuitive component.

According to Table 1, when the components that constitute design thinking are generalized, another common approach refers to the transmission, representation and externalization dimension of the problem-solving process (design thinking). Although these approaches are referred to by various terms—such as form, practical/radical, application area, representation, evaluation, kinesthetic, integration, prototype, design representation level, spatialization, application,

DOI: 10.15320/ICONARP.2025.331

psychomotor component, test, and control—they all reflect the externalization aspect of the process. Therefore, another component in the proposed model is the practical component, which constitutes the representational dimension of design thinking.

Based on these generalizations, it is considered that the initial components of design thinking are grounded in rational processes, as they encompass the fundamental stages of problem solving—commonly referred to as cognitive processes—and do not involve the subjective values of the designer. Accordingly, this first component of design thinking is termed the cognitive-rational component. The second component of design thinking has identified as the emotional-intuitive component, as it encompasses elements that reflect the designer's subjective approaches. Finally, in most studies, a component grouping related to the transmission and externalization of the entire process has been observed. This tendency indicates that another essential component of design thinking is the practical component.

The subheadings in the proposed model have identified by drawing on the subheadings found in the literature that represent design thinking components, while also considering their relevance to the three categories (cognitive-rational, emotional-intuitive, practical) established in this study.

CONCLUSION

This study addresses the lack of a stable consensus regarding design thinking and its components within space design education. Accordingly, its objective is to identify and clarify the key elements that constitute design thinking in this context. Based on an analysis of data gathered from international literature, three primary components of design thinking have been identified: the cognitive-rational component, the emotional-intuitive component, and the practical component.

On the other hand, these three main components were further elaborated based on the obtained data. They were divided into sub-layers, and the suggestion model/approach in Figure 17 was created. Accordingly, while the primary components of design thinking are cognitive-rational, emotional-intuitive, and practical, the subheadings that constitute the cognitive-rational component are identified as problem, comprehending and understanding, framing the problem-producing new problems, using information (prior knowledge-design knowledge), analysis, synthesis and evaluation. The subheadings that constitute the emotional-intuitive component are identified as perception, responding-reacting, point of view identification, valuation (sensory-mental-spiritual), identification-characterization (main idea-concept-conceptualization). Finally, the practical component is defined to include the subcategories of application, transmission, imitation, manipulation, and transformation.

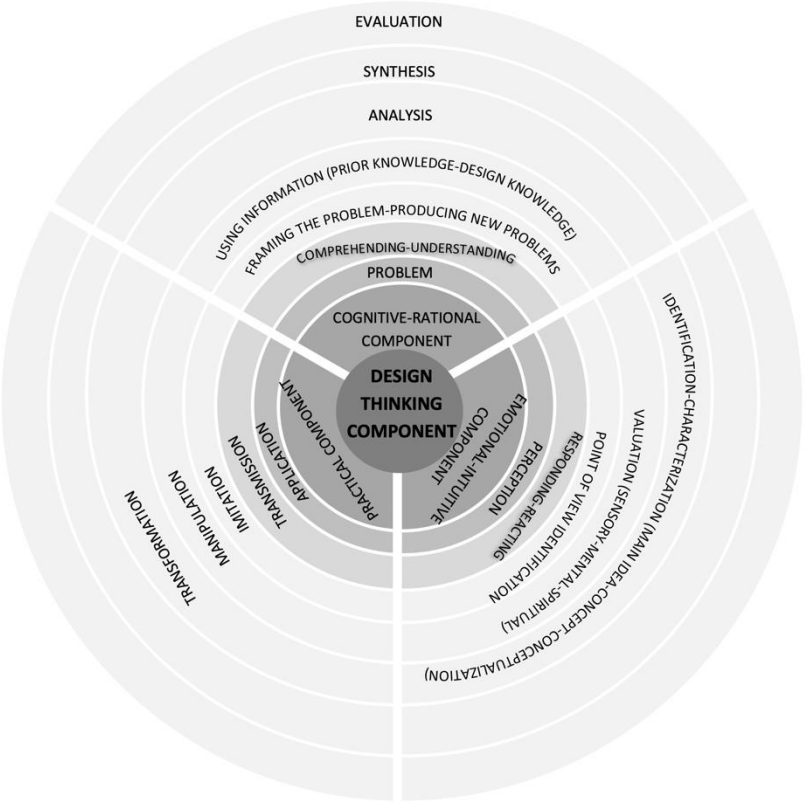


Figure 17. Design Thinking Components Suggestion Model.

The subheadings that comprise the cognitive-rational component basically refer to the problem-solving process. They encompass all the stages the designer experiences. These include comprehending and understanding the problem, limiting the problem accordingly (solving the existing problem) or defining a new problem (finding a problem), using the information (prior knowledge-design knowledge), analyzing the obtained data in ways that contribute to problem resolution, synthesizing these analyses meaningfully for problem solving, Finally, an evaluation step assesses the product's potential to address the initial problem.

The emotional-intuitive component enables the designer to seek meaning in the problem. In other words, it involves identifying a design purpose or selecting a starting point using information the designer has obtained. This sub-component represents one of the most critical stages of design thinking. It marks the moment when subjective and internal processes begin to be expressed and externalized. To facilitate the externalization of these implicit and intuitive processes, the designer needs triggers, such as concepts and images related to the problem.

The emotional-intuitive component covers subjective aspects of design thinking. It is characterized by subheadings such as perceiving, responding or reacting, defining a point of view, valuation (sensory, mental, spiritual), and determining or characterizing the main idea or concept. Subjectivity begins with how the student perceives the problem. This perception leads to initial responses or reactions. Defining a viewpoint is the stage where the first concrete data about the problem

DOI: 10.15320/ICONARP.2025.331

appear. Valuation involves further developing and assessing this information. Finally, identification-characterization mark when these subjective approaches form the main idea or concept and are reflected in the study.

The practical component is the phase for shaping the idea and expressing the process. It includes subheadings: application, transmission, imitation, manipulation, and transformation. Application means implementing the proposed process, solution, or creating an archetype. Transmission is expressing or representing the process. Imitation is abstracting a concrete form as a starting point, or adapting methods found through the internet or digital media. Manipulation means applying skills or steps by following instructions. Transformation is changing the visual features of the design concept or main idea. These subheadings are included because the practical component consists of several approaches and techniques.

In the space design education problem-solving process, the student must identify a situation, phenomenon, event, or problem, generate information to resolve it through definitions they construct, and ensure the development of the information is traceable. This entire progression constitutes design thinking and its components. While many studies treat these stages as linear (Choi and Kim, 2017; Howard & Davis, 2011; Katoppo and Sudradjat, 2015; Taimur and Onuki, 2022), they are in fact cyclical and interdependent. Therefore, the model presented in this study was developed holistically, represented as a single circle.

The studies by Koçkan Özyıldız and Yıldız (2020) and Akpınar et al. (2015) contributed to the development of the model proposed in this study by addressing the intuitive and rational dimensions of design thinking. However, the proposed model expands the scope of the subject by differing from existing approaches. It addresses the components of design thinking in a holistic manner, incorporates stages that can support the problem-solving process, and establishes theoretical connections with the emotional–intuitive and practical dimensions, which have been relatively underrepresented in the literature. These characteristics demonstrate the model's originality and comprehensive structure.

On the other hand, the model's potential to be integrated into design studios at different levels—offering alternative pathways to guide the problem-solving process and enabling the visualization of the components that constitute design thinking—is associated with the pedagogical contributions of the study. The practical contribution, in turn, lies in the model's potential to provide direct guidance for design practice by proposing concrete, applicable steps to be employed within the design process.

For future research grounded on this study, it is recommended to use the proposed model as an analytical tool in the design process and investigate its potential contributions to the field and to integrate it with space design education studio environments.

The integration of this model into studio environments can be implemented as follows: The model can be introduced to students from the very beginning of a project. Students can use the model both as a guiding framework and as a structure supporting their problem-solving processes. At each stage, the ideas and proposals they develop are linked to the model's core components, explained, and justified. In this way, the implementation of the model not only assists students in addressing complex design challenges but also provides an opportunity to evaluate its effectiveness and contributions within the studio context. Moreover, this process also helps to make design thinking and its components more visible.

REFERENCES

Akış, T. (2008, June 5-7). The dance of science and design in first year studio: Contributions of Bilgi Denel to basic design in Turkey [Conference presentation]. Design Train Conference 2: Designing Design Education, Amsterdam, Holland.

Akpınar, A., XU, M., Brooks, K. (2015). Design thinking: A model development based on archived documents. METU Journal of the Faculty of Architecture, 32(2), 151-169. http://dx.doi.org/10.4305/metu.jfa.2015.2.5

Aslan, Ş. (2012). Temel tasarım eğitiminde duyum sürecine yönelik bir yaklaşım (Publication No. 315022) [Doctoral dissertation , Hacettepe University]. YÖK Thesis Center.

Avsec, S., Jagiełło-Kowalczyk, M. (2021). Investigating possibilities of developing self-directed learning in architecture students using design thinking. Sustainability, 13(8), 1-25. https://doi.org/10.3390/su13084369

Ayyıldız Potur, A. (2007). Mimarlık eğitimi başlangıcında biireyin ilgi-yetenek-yaratıcılık düzeyi ile tasarım performansı arasındaki ilişkiler (Publication No. 201324) [Doktoral dissertation, Yıldız Technical University]. YÖK Thesis Center.

Börekçi, N. (2015). Usage of design thinking tactics and ıdea generation strategies ın a brainstorming session. METU Journal of the Faculty of Architecture, 32(2), 1-17. http://dx.doi.org/10.4305/metu.jfa.2015.2.1

Badke-Schaub, P., Roozenburg, N., & Cardoso, C. (2010, October 19-20). Design thinking: A paradigm on its way from dilution to meaninglessness? [Conference presentation]. A. DAB Faculty of Design, 8th Design Thinking Research Symposium, Sydney, Australia.

Bayazıt, N. (2004). Tasarlama kuramları ve metotları. Birsen Yayınevi.

Brown, T. (2008). Design thinking. Harward Business Review, 3-10.

Carmel-Gilfilen, C., Portillo, M. (2010). Developmental trajectories in design thinking: An examination of criteria. Design Studies, 31, 74-91. https://doi.org/10.1016/j.destud.2009.06.004

Choi, H. H., Kim, M. J. (2017). The effects of analogical and metaphorical reasoning on design thinking. Thinking Skill and Creativity, 23, 29-41. https://doi.org/10.1016/j.tsc.2016.11.004

Cross, N. (1993). Science and design methodology: A review. Research in Engineering Design, 5, 63-69.

Cross, N. (2001). Designerly ways of knowing: Design discipline versus design science. Design Studies, 17, 49-56.

DOI: 10.15320/ICONARP.2025.331

Cross, N. (2023). Design thinking: What just happened?. Design Studies, 86, 1-10. https://doi.org/10.1016/j.destud.2023.101187

Dorst, K. (2010, October 19-20). The nature of design thinking. [Conference presentation]. A. DAB Faculty of Design, 8th Design Thinking Research Symposium, Sydney, Australia.

Dorst, K. (2011). The core of design thinking and its application. Design Studies, 32, 521-532. https://doi.org/10.1016/j.destud.2011.07.006

Görgün Göksu, G. (2022). The effects of performance-based design tools on design thinking process (Publication No. 717421) [Master Thesis, Middle East Technical University]. YÖK Thesis Center.

Goldschmidt, G., Badke-Schaub, P. (2010, October 19-20). The design-psychology indispensible research partnership. [Conference presentation]. A. DAB Faculty of Design, 8th Design Thinking Research Symposium, Sydney, Australia.

Goldschmidt, G., Rodgers, P. (2013). The design thinking approaches of theree different groups of designers based on self-reports. Design Studies, 34, 454-471. https://doi.org/10.1016/j.destud.2013.01.004

Groat, L., Wang, D. (2013). Architectural research methods. Wiley.

Howard, Z. (2013, March 8). Introducing design thinking. Slideshare.Retrieved March 10, 2024, from https://www.slideshare.net/zaana/introducing-design-thinking

Howard, Z., Davis, K. (2011). From solving puzzles to designing solutions: Integrating design thinking into evidence based practice. Evidence Based Library and Information Practice, 6(4), 15-21. https://doi.org/10.18438/B8TC81

Howard, Z., Senova, M., Melles, G. (2015). Exploring the role of mindset in design thinking: Implications for capability development and practice. Journal of Design Business&Society, 1(2), 183-202. https://doi.org/10.1386/dbs.1.2.183_1

Johansson-Sköldberg, U., Woodilla, J., Çetinkaya, M. (2013). Design thinking: Past, present and possible futures. Creativity and Innovation Management, 22(2), 121-146. https://doi.org/10.1111/caim.12023

Jones, D. (2010, October 19-20). What kind of thinking is design thinking? [Conference presentation]. A. DAB Faculty of Design, 8th Design Thinking Research Symposium, Sydney, Australia.

Katoppo, M., Sudradjat, I. (2015). Combining participatory action research (PAR) and design thinking (DT) as an alternative research method in architecture. Procedia-Social and Behavioral Sciences, 184, 118-125. https://doi.org/10.1016/j.sbspro.2015.05.069

Kimbell, L. (2011). Rethinking design thinking: Part I. Design and Culture the Journal of the Design Studies Forum, 3(3), 285-306. https://doi.org/10.2752/175470811X13071166525216

Koçkan Özyıldız, P., Yıldız, P. (2020). The infographic model design thinking process. International Journal of Architecture and Planning, 8(1), 282-310. https://doi.org/10.15320/ICONARP.2020.114

Koçkan, P. (2012). Tasarım araştırmaları bağlamında tasarımcı düşünme ve tasarım süreci (Publication No. 314919) [Master Thesis, Hacettepe University]. YÖK Thesis Center.

Kurt Çavuş, Ö. (2021). İçmimarlık öğrencilerinin akademik motivasyon profillerinin belirlenmesi ve tasarım düşüncesi özellikleri ile ilişkilerinin değerlendirilmesi (Publication No. 681933) [Doctoral dissertation, Eskişehir Technical University]. YÖK Thesis Center.

Kurt Çavuş, Ö., Kaptan, B. (2019). Bilgi türleri bağlamında tasarım bilgisi ve Türkiye'de akademik alandaki yeri. Online Journal of Art and Design, 7(1), 67-85.

Kurt Çavuş, Ö., Kaptan, B. (2022). Tasarım düşüncesi bileşenleri ve iç mimarlık eğitimi çerçevesinde değerlendirilmesi. Sanat&Tasarım Dergisi, 12(1), 99-116. https://doi.org/10.20488/sanattasarim.1133803

Lawson, B. (2004). What designer know?. Elsevier.

Lawson, B. (2005). How designers think?. Elsevier.

Lindberg, T., Gumienny, R., Jobts, B., Meinel, C. (2010, October 19-20). Is there a need for a design thinking process?. [Conference presentation]. A. DAB Faculty of Design, 8th Design Thinking Research Symposium, Sydney, Australia.

Melles, G., Howard, Z., Tompson-Whiteside, S. (2012). Teaching design thinking: Expanding horizons in design education. Procedia-Social and Behavioral Sciences, 31(6), 162-166. https://doi.org/10.1016/j.sbspro.2011.12.035

Oxman, R. (2004). Think-maps: Teaching design thinking in design in design education. Design Studies, 25, 63-91. https://doi.org/10.1016/S0142-694X(03)00033-4

Rowe, P. (1991). Design thinking. MIT Press.

Savaş, S. (2019). Mekanı anlamak, aktarmak, üretmek, öğrenmek bütününde parametrik tasarım yaklaşımlarının iç mimarlık tasarım eğitimine entegrasyonu (Publication No. 622080) [Doctoral dissertation, Mimar Sinan Fine Arts University]. YÖK Thesis Center.

Simon, H. (1996). The science of the artificial. MIT Press.

Smulders, F., Subrahmanian, E. (2010, October 19-20). Design beyond design: Design thinking & design acting. [Conference presentation]. A. DAB Faculty of Design, 8th Design Thinking Research Symposium, Sydney, Australia.

Standford School. Retrieved March 10, 2025, from https://web.stanford.edu/~mshanks/MichaelShanks/files/509554.pdf

Taimur, S., Onuki, M. (2022). Design thinking as digital transformative pedagogy in higher sustainability education: Cases from Japan and Germany. International Journal of Educational Research, 114, 1-25. https://doi.org/10.1016/j.ijer.2022.101994

Uluoğlu, B. (2003). Tasarlama araştırmaları-biliş çalışmaları ilişkileri üzerine bir irdeleme. Tol 1, 59-70.

Visser, W. (2006). The cognitive artifacts of designing. CRC Press.

Wrigley , C., Mosely, G., Tomitsch, M. (2018). Design thinking education: A comparison of massive open online courses. The Journal of Design, Economics and Innovation, 4(3), 275-292. https://doi.org/10.1016/j.sheji.2018.06.002

Yıldırım, A. Şimşek, H. (2006). Sosyal bilimlerde nitel araştırma yöntemleri. Seçkin Yayıncılık.

Yıldırım, İ. (2022). Temel tasarım eğitimi ve güncel öğrenme ortamlarında dijital öyküleme yöntemi (Publication No. 709683) [Doctoral dissertation, Hacettepe University]. YÖK Thesis Center.

Resume

İpek Yıldırım Coruk, received her B.Arch (2015), MSc. (2018) and PhD (2022) from Department of Interior Architecture & Environmental Design, Hacettepe University. She currently working as a Assistant Professor Dr. at Fenerbahçe University. Her research interests include, design education, basic design education, first-year design studio, design thinking, design process, and digital storytelling.

DOI: 10.15320/ICONARP.2025.331

ICONARP
International Journal of Architecture and Planning
Received: 13.02.2024 Accepted: 04.07.2025
Volume 13, Issue 2/ Published: 31.12.2025
Research Article *DOI: 10.15320/ICONARP.2025.332 E- ISSN:2147-9380*
ICONARP

A Comparative Assessment Towards the Use of Informal Education Buildings as a Tool in Sustainability Education: A Case Study of Türkiye

Kutlu Sevinç Kayıhan *
İrem Tunçbiz Özgür **

Abstract

Aim: This study explores how sustainably designed informal education buildings can serve as tools for sustainability education, focusing on both architectural features and their integration into educational practices. It addresses a research gap in Türkiye by examining the hidden educational potential of such buildings through theoretical analysis and comparative evaluation with international best practices. Method: Selected buildings in Türkiye were assessed based on sustainable architectural design principles and their capacity to contribute to public education. These were compared with internationally recognized examples using five core sustainability criteria: site and transportation, water, energy, materials, and indoor environmental quality. Data collection included literature review, field visits, and semi-structured interviews. Findings: Four out of five main sustainability themes—site and transportation, water, energy, and materials—are relatively well integrated into educational uses in international examples. However, indoor environmental quality remains underutilized in both international and national contexts. In Türkiye, educational use is primarily limited to features related to energy and site planning. National examples also fall short in terms of training duration and instructional quality compared to their international counterparts. Conclusion: For informal educational buildings to function effectively as tools for sustainability education in Türkiye, early-stage design processes must intentionally incorporate educational strategies tied to environmental features. Emphasizing interdisciplinary collaboration and integrating educational theories into design can significantly enhance the impact and accessibility of sustainability education.

Keywords: *Architecture and learning, Buildings that teach, Informal environmental education, Sustainable design, Sustainability in Türkiye*

*Department of Architecture, Gebze Technical University, Kocaeli, Türkiye *(Corresponding author)*
E-mail: sevinc@gtu.edu.tr

**PhD student, Department of Architecture, Graduate School, Bursa Uludag University, Bursa, Türkiye
E-mail: iremtuncbiz@gmail.com

To cite this article: Sevinç Kayıhan, K., & Tunçbiz Özgür, İ. (2025). A Comparative Assessment Towards the Use of Informal Education Buildings as a Tool in Sustainability Education: A Case Study of Türkiye. *ICONARP International Journal of Architecture and Planning,* 13 (2), 469-493. DOI: 10.15320/ICONARP.2025.332

INTRODUCTION

Sustainability is a broad concept encompassing environmental, economic, social, and cultural dimensions (United Nations, 1987; United Nations, 1992). However, studies have historically focused on its environmental and economic aspects, overlooking the social dimension—a gap addressed only in recent years.

In the building sector, sustainability is often reduced to energy and resource certification systems, neglecting its broader meaning and educational potential. This results in a public perception of sustainability as abstract and inaccessible. Architects are thus responsible for making sustainable design more tangible and communicative.

Sustainable buildings hold significant potential as educational tools that raise awareness through their physical features. The integration of sustainable design into school architecture and curricula has enhanced societal understanding of sustainability. However, learning is not limited to schools. The separation of "school" and "learning" is increasingly questioned due to the limitations of formal education in providing real-life experiences.

The idea that cognitive learning for sustainability is not confined to the formal curriculum is well-supported in the literature (Gramatakos & Lavau, 2019: 386) (Hopkinson et al., 2008; 435-454) (Lipscombe, 2008: 455-468). The concept of “using sustainable buildings as educational tools,” though often applied to schools, is also relevant to various building types. This approach transforms buildings into learning tools by embedding educational science into spatial design.

Out-of-school environments like museums, ecological centers, and botanical gardens offer motivational and experiential learning opportunities (Laçin Şimşek, 2011: 45; Adıgüzel, 2006: 32–41; Bozdoğan, 2011: 15). Informal education, characterized by unstructured, lifelong learning, adapts to the learner’s needs and contexts (Colardyn & Bjornavold, 2004: 69–89; Dip, 1987: 300–315).

UN conferences and reports emphasize education’s central role in achieving sustainability goals. The Stockholm Conference, Brundtland Report and Agenda 21 highlight the need for interdisciplinary, lifelong, and accessible sustainability education (United Nations, 1972, United Nations, 1987, United Nations, 1992). Meredith et al. (2000: 39) underline that environmental awareness must be nurtured continuously.

Globally, there is a growing trend of designing buildings that incorporate sustainability both socially and educationally. For such buildings to serve as effective educational tools, sustainability principles must be integrated into the early stages of design with pedagogical intent. This study reviews notable practices at the intersection of sustainability education and architecture.

LITERATURE REVIEW

UNESCO, as the specialized agency of the United Nations for education, is responsible for leading and coordinating the Education 2030 Agenda, a

DOI: 10.15320/ICONARP.2025.332

key component of the global movement to eradicate poverty through the achievement of the 17 Sustainable Development Goals (SDGs) by 2030. Education plays a central role in reaching all of these goals and is specifically addressed in Goal 4, which aims to “ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.” The Education 2030 Framework for Action serves as a roadmap for the implementation of this ambitious goal and its associated commitments.

In the Berlin Declaration on Education for Sustainable Development, published by the United Nations Educational, Scientific and Cultural Organization (UNESCO) within the scope of the "Education for Sustainable Development (ESD) for 2030" framework, it is emphasized that:

"Education for Sustainable Development (ESD) should be integrated into all levels of education and training — from early childhood to tertiary and adult education, including technical and vocational education and training (TVET) — as well as into non-formal and informal learning, ensuring that all individuals are provided with lifelong and life-wide learning opportunities for sustainable development” (UNESCO, 2022: 3).

According to Orr, whose studies examine the evolution between architecture and educational science, design and construction are not merely technical aspects—they reflect the broader worldview of a society. Buildings and landscapes carry implicit messages that can significantly influence learning (Orr, 1997: 597–600; Taylor, 2009: 59–60). Efficient sustainable design fosters a conscious, meaningful relationship between nature and humanity. It is about ethical, communicative interaction with users rather than simply adding solar panels or green roofs (Guarinello, 2005: 38).

Individuals interact with many buildings throughout different stages of their lives, experiencing diverse activities and emotions within them. A building thus becomes a dynamic participant in social and cultural life, offering various perspectives (Cole, 2014: 836–857). With its architectural design and the possibilities, it offers, a building possesses an active, vibrant, and variable structure—one that is deeply connected to, and influenced by, its location. It is in a constant state of change and transformation, adapting to shifting conditions (Arslan Avar, 2009: 9).

According to Priest, informal education—which is based on “learning by doing” and emphasizes the relationship between humans and nature:

- takes place both inside and outside the building,
- involves cognitive, emotional, and motor skills that appeal to various senses (sight, hearing, taste, touch, smell, and intuition),
- is interdisciplinary,
- considers human relationships at personal, ecosystemic, and broader environmental levels

(Priest, 1986: 13–15).

A key aspect of designing a building as an educational tool is to treat both its interior and exterior as a cohesive whole, shaped by

environmental data. Building service systems can be integrated into the curriculum—for example, students can observe and learn from the visibility of heating and cooling systems, or explore how electricity from renewable sources is generated as part of science or business lessons. Similarly, students can study solar movement and light-shadow patterns through window and eaves design.

This transformation requires collaboration among professionals from diverse fields—architects, educators, mechanical system designers, and clients. Through such cooperation, buildings shift from being passive to active educational agents. Their sustainable features become lesson materials and laboratories, turning the building into a living organism that communicates directly with users.

For this interaction to be successful, the architect must:

- understand the pedagogical and philosophical foundations of sustainability and environmental awareness,
- collaborate with other disciplines to create a curriculum based on these foundations,
- have knowledge of integrating system-monitoring elements into the building

(Jones, 2010: 83).

With this level of awareness, individuals can better understand environmental problems, evaluate possible solutions, and propose innovative ideas. Sustainability-focused educational activities help people develop a sense of responsibility, raise awareness about environmental issues, and apply this knowledge in everyday life.

AIMS and SCOPE of the STUDY

Comparative evaluation of the informal educational buildings with the sustainable architectural design features in Türkiye, in the framework of international pioneering examples, has been targeted in the study. It is intended to suggest recommendations for improving the use of national samples as a tool in sustainability education in the light of available data. The lead research questions of the study are as follows;

- Which building types currently carry the mission of presenting sustainability education informally to the community in the international and national environment?
- What kinds of methods are used for the purpose of using architecture/building as a tool to teach sustainability in informal educational buildings?
- What is the level of sustainable informal educational building examples aim to teach sustainability in Türkiye?
- What can be done to improve sustainable informal educational buildings examples in Türkiye in the context of "architecture's contribution to sustainability education"?

Though there is an absence of any studies to assess informal educational buildings serving with the mission to teach sustainability in Türkiye, it is hoped to raise awareness about the issue with such a study.

DOI: 10.15320/ICONARP.2025.332

Building types with different functions such as solar house, clean energy house, energy education center, waste, and energy museum and education center have been determined for the case study in Türkiye. It has been observed that only academic and/or research activities are carried out while community education is not included in some of the sample buildings. In the others, the concept of sustainability is included on an educational basis, but there is no use of architectural features as educational tools. Consequently, examples of buildings that are both designed with the sustainable architectural design approach and using these features in sustainability education at the same time are determined for the case study. The sampling is limited with seven buildings that meet the main parameters determined for the study. These buildings located in different cities in Türkiye, they function as a museum, training center, solar house and mixed. Despite the frequent occurrence of library examples included the sustainability education in the international stage, could not be reached the appropriate library example may be included in the study in Türkiye.

MATERIALS and METHOD

Methods and strategies identified in this study are as follows;

• Literature survey / Determination of case study

First of all, a comprehensive literature search was carried out and both the theoretical infrastructure and the sample buildings were examined. The parameters determined during the design of the study are shown in Figure 1;

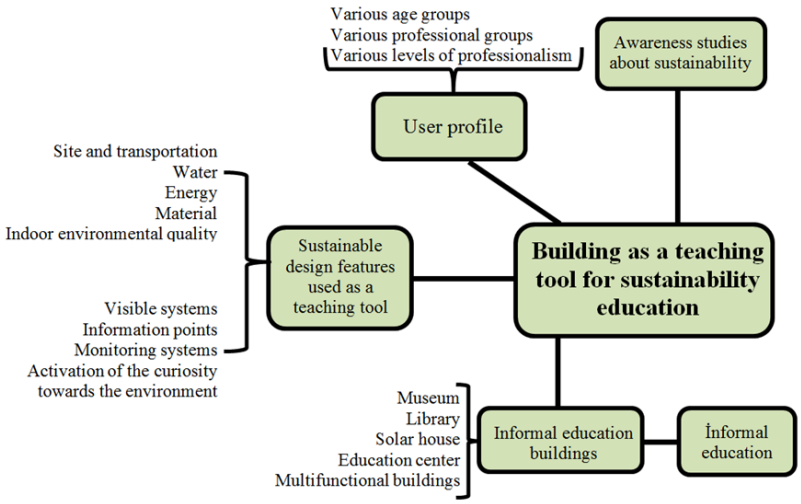


Figure 1. Parameters of teaching sustainability through architecture.

In the framework of criteria presented in Figure 1, successful international and national samples were determined (Figure 2 and 3). Information on the architectural characteristics, current statuses and use for sustainability education of all example buildings has been reached.

• Creation of building identification sheets

Sustainable architectural features of determined example buildings have been examined under five main titles (site and transport, water,

energy, material, interior environmental quality) (Table 3 and 4). On the other hand, the inclusion of sustainable building characteristics to the sustainability education has been questioned. In this respect, the introduction chart which combines the "sustainable design" title with the "education" title, has been created for all international and national examples included in the study (Table 5).

• Building visits and interviews with authorities

Building visits and interviews with authorities were held in order to gather information on the use and current status of the buildings. In addition to the national samples, the CAT (Center for Alternative Technology-UK) was also visited. A semi-structured interview method has been preferred in order to find innovative ideas that may arise during negotiations and inferences for future plans and programs [Merriam, 2013]. With the semi-structured interview method, the accuracy of the information obtained from the literature was confirmed and information was obtained from the authorities on the current status of the buildings and plans for the future.

• Visual Aids for Comparative Analysis

International and national samples have been transferred to the graphs utilizing all the data obtained within the framework of the identified main titles. Microsoft Excel program was used to produce graphics (see Figure 4-9).

CASE STUDY

While the main goal was to evaluate and develop national examples, successful and leading international examples were also identified and included in the study in order to be able to make a comparative assessment in the case study.

International Case Studies

Museums, libraries, education centers and mixed-use building types are used as tools to teach sustainability in the international case. Ten examples identified for the study are shown in Figure 2. The basic selection criterion for each sample is the successful implementation of sustainability education through the building. Descriptive information for these examples provided in Table 1.

DOI: 10.15320/ICONARP.2025.332

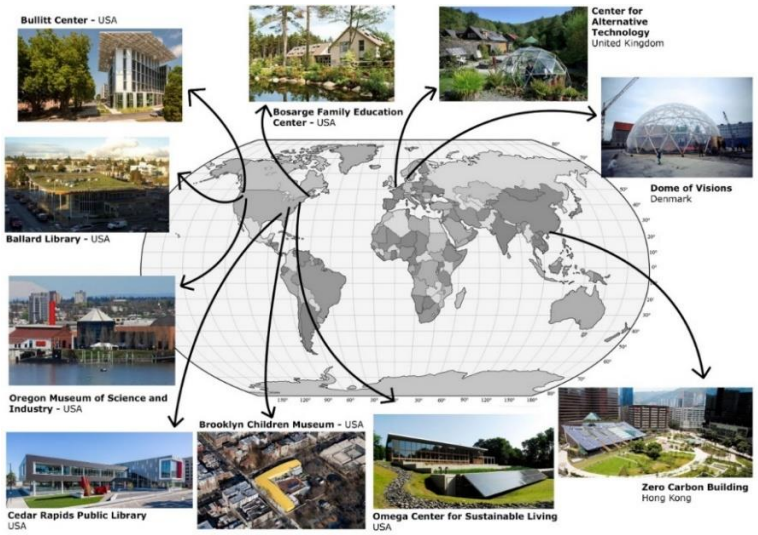


Figure 2. Location scheme of international informal education buildings

Table 1. Basic data of selected international buildings

BUILDING TYPE	BUILDING NAME	LOCATION	YEAR	AREA	FUNCTION
MUSEUM	Brooklyn Children Museum	USA	2008 (1899)	9500 m²	Museum, Cafe, Exhibition Area
	Oregon Museum of Science and Industry	USA	1992 (1944)	19710 m²	Museum
LIBRARY	Ballard Library	USA	2005	15000 m²	Library and Neighborhood Service
	Cedar Rapids Public Library	USA	2013	94000 m²	Library, Cafe, Auditorium
EDUCATION CENTER & SOLAR HOUSE	Omega Center for Sustainable Living	USA	2009	560 m²	Waste water Treatment Centre, education laboratory
	Dome of Visions	Denmark	2013	350 m²	Cultural Centre, Greenhouse
	Bosarge Family Education Centre	USA	2011	761 m²	Education Centre
	Centre for Alternative Technology	United Kingdom	1973	160.000 m²	Eco center
MIXED-USE	Bullitt Center	USA	2013	4800 m²	Office
	Zero Carbon Building	Hong Kong	2012	14700 m²	Office, Home, Exhibition Area

National Informal Education Buildings Used as a Tool in Sustainability Education

The use of some museums, solar houses and mixed-use buildings have sustainable features as a teaching tool for sustainability in Türkiye were analyzed in line with the purpose of this study. It has been researched whether the selected buildings use these potentials adequately. Due to development of the building samples constructed with this purpose and actively used only in recent years in Türkiye, the size of the search universe is already quite-limited. The seven sample buildings and their locations are shown in Figure 3. Descriptive information for these examples provided in Table 2.

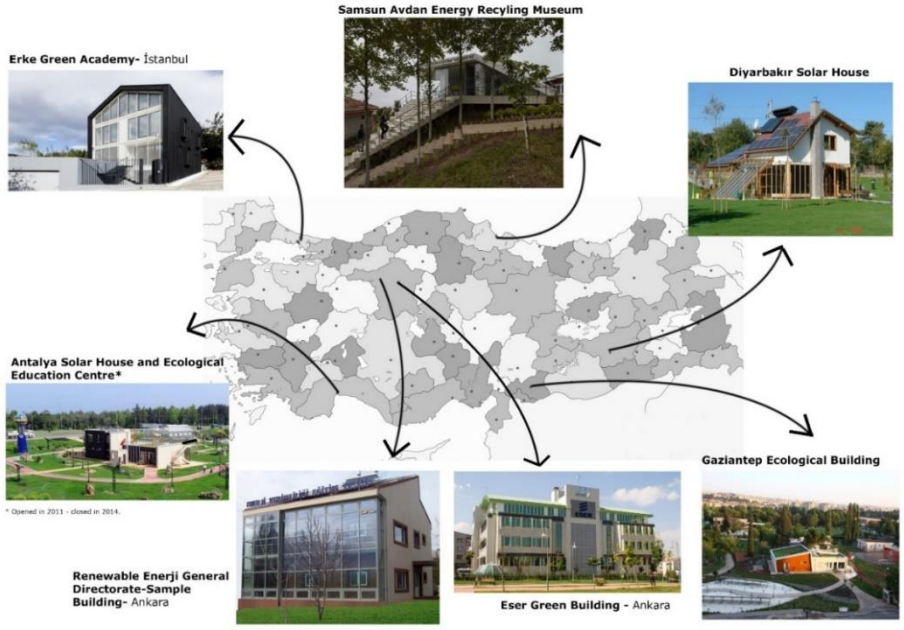


Figure 3. Location scheme of determined national informal education building examples

Table 2. Basic data of selected national buildings

BUILDING TYPE	BUILDING NAME	LOCATION	YEAR	AREA	FUNCTION
MUSEUM	Samsun Avdan Energy Recycling Museum	Samsun	2015	810 m²	Visitor center, museum
EDUCATION CENTER & SOLAR HOUSE	Antalya Solar House and Ecological Education Centre	Antalya	2010	10000 m²	Eco-center and solar park
	Gaziantep Ecological Building	Gaziantep	2013	325 m²	Conference hall, exhibition space
	Diyarbakır Solar House	Diyarbakır	2008	120 m²	Solar House
	Renewable Energy General Directorate-Sample Building	Ankara	2006	275 m²	Education Centre
MIXED-USE	Erke Green Academy	İstanbul	2013 (1980)	400 m²	Office and Education Centre
	Eser Green Building	Ankara	2010	7500 m²	Office

FINDINGS and DISCUSSION

The study focuses on the use of international and national building examples as educational tools and innovative approaches and methods for this use. In international case, informal sustainability education has spread to the buildings with various functions such as museum, library, solar house, training center and mixed-use. Both international and national examples - except for the two examples - were built after the 2000s. When area-based comparisons are made, it is seen that international samples are generally spread over a much wider area (most of which is more than 10,000 m2). Most of the national samples are small-scale, experimental ones under 1000 m2. The sustainable architectural design features of international and national informal education buildings are presented in Table 3 and Table 4. Table 5 illustrates how

DOI: 10.15320/ICONARP.2025.332

these features are utilized as tools for sustainability education and integrated into educational activities.

Table 3 shows how the concept of sustainability can be embodied through architectural design and conveyed to visitors. Most notably, many systems function not only to improve building performance but also as educational tools. Energy and water topics in particular are successful in translating theoretical knowledge into practice in international examples.

Table 3. Key sustainable design elements observed in selected international buildings

Sustainable Design Topics \ Building Example			Museum		Library		Solar House & Education Center				Multi-use Building	
			Brooklyn Children's Museum-BCM	Oregon Museum of Science and Industry-OMSI	Ballard Library	Cedar Rapids Public Library	Omega Center for Sustainable Living	Dome of Visions	Bosarge Family Education Centre	Centre for Alternative Technology – CAT	Bullitt Center	Zero Carbon Building-ZCB
Site and Transportation	Site selection									All mechanical equipment of the rail system is directly visible. The lakes that supply water to the system are used as landscape elements.	There is no private car parking lot. There are changing rooms and showers to support bicycle transportation.	
	Transportation									In order to compare the efficiency of using compost and manure in different combinations with slate stone, cultivated gardens were arranged.		
	Native landscaping and ecosystem protection			Information boards are used to explain how the "Rainwater Ditches" system works, why it is environmentally friendly and why it is important.						Every system and structure used in open space is part of sustainability education.		
	Outdoor classroom				The green roof can be observed by climate and ecology working groups and visitors. The green roof can also be observed through a periscope mounted on the wall near the book borrowing desk. In addition, the development of the plants on the green roof is constantly monitored and their adaptation to the conditions and their productivity are recorded.	The green roof of the building is open to visitors and used for social events. There are information boards about the use and benefits of the green roof.				As an alternative to agriculturally inefficient slate-covered land, fertile areas for agriculture are obtained with different fertilizer and compost components. Sample gardens are located side by side to compare these areas and observe their yields.		
	Landscape				The amount of water collected and consumed is presented to the visitors on the LED screen.	Cisterns and solar panels on the green roof can be observed by visitors. There are information panels about these systems.	Rainwater collected from the roof is transmitted to the fountain at the entrance of the building to make visitors feel the water acoustically and sensually. People feel the effect of water at the entrance of the building.			The collection of rainwater and its transfer to groundwater can be observed by visitors. Visitors can also observe the treatment of the water collected in the pools in the water source area.	The rainwater collection and treatment systems of the building can be examined by the visitors.	
Water	Storm water		With the water station, which includes questions such as "How much water is wasted by flushing the toilet?" and principles of water conservation, children learn about water conservation and use.			Current and past water usage data of the building is monitored on the LED screen located at the entrance of the building.			Water usage data is presented to visitors through the monitoring screen.	The water-balanced rail system, which moves with the power of water energy, transfers the water supplied from the upper level to the ponds in the center by gravity and from there it is stored in the lower chamber of the rail system wagons and descends to the lower level by gravity.	The luminaires used can be observed by visitors.	
	Conservation and monitoring						The biological pond inside the building can be observed by visitors. Visitors are informed about the working principle of the biological pond; gray and black water.			There are warnings that personal products used by people staying at the facility should contain ingredients that are not harmful to the environment. The consequences of this situation in the water supply and treatment system are detailed in each room.	The gray water treatment systems of the building can be examined by the visitors.	
	Waste water	Grey water					The stages until the water from the toilets is treated and transmitted underground are described schematically around the biological pond.			The tanks and processes of the waste accumulated for fertilizer can be observed.		
		Black water										The systems used for lighting and ventilation and their functioning are clearly visible throughout the building.
Energy	Total performance	Lighting										
		Ventilation		Information boards are used to explain how the heating, cooling system works, why it is environmentally friendly and why it is important.				The building is a center where mostly social events are organized and people from different disciplines come together. Due to its innovative solutions, visitors can experience the building and learn about its different features.		Different examples such as rammed earth walls, the use of skylights and heat pumps are illustrated with diagrams of the buildings in which they are used. In addition, the systems are not hidden but directly visible and can be examined by visitors.		
		Heating	Geothermal system elements are painted in bright colors to make them interesting. In addition, the working principle of geothermal energy, the movement of water from the earth and its use as an energy source, is explained with electronic panels and diagrams.									
		Cooling	The solar panels on the facade and roof are visible. Thus, they attract the attention of visitors. In addition, the layout principles and functions of the panels are explained to the visitors with information boards.		Electric energy data generated from solar energy is transmitted to visitors with indicators placed on the window sills. In addition, all energy data of the building is monitored and presented to visitors on the LED screen.		Solar panels in the landscape used for electricity generation are not hidden and used as design elements.		The solar panels on the south façade of the building can be perceived in the parking lot area. In this way, the building conveys its sustainable features to the visitors.	Eco cabins accommodate groups or families visiting the center in groups. In this way, the impact of the items used in daily life and the behaviors applied on the environment are understood. In order to observe the energy provided by the solar panels and the conditions under which the panels produce energy, there are monitoring boards and information texts opposite the panels.	In a region like Seattle, where the number of sunny days is very low, the construction of a building that provides all its energy from the sun (zero energy) is exemplary. Visitors and employees using the building can monitor the energy production and consumption data of the building.	
	Renewable energy			With the use of weight principle elevator, low-energy and environmentally friendly weight principle elevator is used instead of hydraulic elevator system requirements. There are information boards about the working principle of the elevator. These panels explain how the system works, why it is environmentally friendly and why it is important.						The passive design features and energy use relations of the buildings are conveyed to the visitors within the framework of trainings.		The data provided on energy conservation are transferred to the tracking screen in the input area in 3D and graphically. These data are analyzed under five main headings: energy, layout, indoor quality, materials and water.
	Conservation					Current and past energy data of the building is monitored on the LED screen located at the entrance of the building.			With the Truth Wall, a region on the wall is made transparent, showing layers of insulation.	Sample buildings can be examined comparatively. In addition, a section of the wall of the consultation building is made transparent to show the sheep wool used for insulation.		
	Insulation									Six different joint details of timber column-beam systems are observed in sample building. While visitors observe the different details, architecture students work		

									on and build this structure in certain periods.			
Material	Local materials	The materials used throughout the building are introduced to the visitors. The methods by which they are recycled and their uses are explained. In addition, the fact that bamboo is a fast-growing plant and that it is therefore chosen as a flooring material instead of wood is expressed with information boards.	Through the use of recycled and recyclable materials, awareness of sustainability is raised and information is provided on the techniques of obtaining these materials, their use in daily life and their production.						The material properties of the buildings are presented to visitors on information boards or during building tours.		
	Reuse, recycled and recyclable material usage						Bringing together the use of innovative materials, architectural design and sustainability, the building hosts different events and interacts with the people of the region.	Data on the materials used are presented to visitors through the tracking screen.	Photographs and explanations of the sources of the materials used, such as hemp fiber, compressed soil, wood, perlite and cork, and the stages of their use in the building are included together with material samples.	The source and content information of the materials used are shared with the visitors. In addition, the materials used in the interior are not hidden but openly exhibited, and their fasteners and carrier elements are observed.	The selection criteria for materials, their use and their impact on daily life are explained to visitors.
	Specific sustainable material selection criteria											
	Waste material control											
Indoor Env. Quality	VOC											
	Thermal comfort											
	Daylighting											
	Views											

According to Table 4; energy is the most commonly and successfully used topic in the examples in Türkiye. Topics such as water, materials and indoor environmental quality are both poorly integrated in terms of architecture and are not used in terms of education.

Table 4. Key sustainable design elements observed in selected national buildings

Sustainable Design Topics \ Building Example			Museum	Solar House & Education Centre				Multi-use Building	
			Samsun Avdan Energy Recycling Museum	Antalya Solar House and Ecological Education Centre	Gaziantep Ecological Building	Diyarbakır Solar House	Renewable Energy General Directorate- Sample Building	Erke Green Academy	Eser Green Building
Site and Transportation	Site selection		Within the structure in the landfill site, the theoretically explained issues can be directly observed in the field.	With the establishment of the center, the region was brought to the city.					
	Transportation							There is no private car parking lot. There are changing rooms and showers for those who reach the building by bicycle. In this way, bicycle transportation is supported.	
	Native landscaping and								
	Outdoor classroom			At the end of the building tour, tomatoes grown in the greenhouse are tasted by the visitors. Thus, visitors are shown that agriculture can be practiced with innovative methods other than traditional agriculture.					There are examples of systems used to obtain energy from alternative energy sources such as solar, water and wind, and explanations of these systems. In this way, the impact of sustainability can be observed not only within the building but also in the use of outdoor spaces.
	Landscape								
Water	Storm water								
	Conservation and monitoring								
	Waste water	Grey water						The gray water treatment system can be observed in the parking lot.	
		Black water							
Energy	Total performance	Lighting							With the system, which is first explained theoretically, the building can be observed by visitors on a tour and its functioning can be examined. Experiencing that sustainable design features are not always used with the same efficiency, the users organize a joint study with TÜBİTAK and set up a meteorological station that enables the automation system of the building to be updated instantly, monitors instant humidity, temperature, daylight data and transfers these data to the systems inside the building.
		Ventilation							
		Heating			Canadian well air intakes are observed from outside the building with solar panels.	The green pipes used for cooling the building on the ceilings are left exposed and therefore can be observed.	The effect of the Trombe wall on passive heating is observed by the visitors. Innovative solutions for heating and cooling the interior space are observed with the exemplary wall system in which ground source energy and wall system are used together.		
		Cooling							
	Renewable energy			Examples of innovative methods such as solar trees used in the open space and sports equipment that generate electricity with human energy can be examined by visitors. In addition, the control center of the building's systems has been made transparent and open to the observation of visitors.	Solar panels in the garden and on the roof are made visible. The energy produced and consumed data is transferred to the visitors through the automation system.	Solar panels on the roof and in the garden are easily visible. It is experienced that daily needs can be met thanks to the energy produced by alternative methods.		The amount of energy produced and consumed is monitored instantaneously and recorded to create an academic data bank.	
	Conservation								
	Insulation					In order to observe different results in roof insulation, free perlite was used in one part and clay and reed from traditional Anatolian houses were used in the other part.			
Material	Local materials								
	Reuse, recycled and recyclable material usage								
	Specific sustainable material selection criteria								
	Waste material control		Examples for the reuse and recycling of construction and structural waste are located within the building. The transformation stages and the process are conveyed to the visitors with examples in the building.						
Indoor Env. Quality	VOC								
	Thermal comfort								
	Daylighting								
	Views		Completely surrounded by glass, the structure allows the subject of transformation, which is explained in the museum with presentations and examples, to be observed throughout the landfill. Due to its location and design, the structure formed by the bending of different surfaces provides viewpoints to different points of the landfill.						

As seen in Table 5, it is observed that 4 of the 5 main headings (site and transport, water, energy and material) in international cases are reflected in a relatively balanced manner in educational use. It is noteworthy to see the finding that shows that only sustainable features of indoor quality don't reflect educational use in both international and national contexts. Sustainable features that are used as educational tools within national examples are concentrated around energy and site and transport

DOI: 10.15320/ICONARP.2025.332

headings. Sustainable features, including indoor environmental quality, water and materials cannot adequately support education.

Table 5. A comparative analysis of sustainable architectural elements in buildings

Building Example / Sustainable Design Topics			**X** -- Sustainable Architecture Design Topics Used As Teaching Tool										**O** -- Sustainable Architecture Design Topics						
			International Building Examples										**National Building Examples**						
			Museum		Library		Solar House & Education Centre			Multi-use Building			Museum	Solar House & Education Centre			Multi-use Building		
			Brooklyn Children Museum-BCM	Oregon Museum of Science and Industry	Ballard Library	Cedar Rapids Public Library	Omega Center for Sustainable Living	Dome of Visions	Bosarge Family Education Center in Coastal Maine	Centre For Alternative Technology-CAT	Bullitt Center	Zero Carbon Building - ZCB	Samsun Avdan Energy Recycling Museum	Antalya Solar House and	Diyarbakır Solar House	Gaziantep Ecological Building	Renewable Energy General Directorate-Sample Building	Erke Green Academy	Eser Green Building
Site and Transportation	Site Selection			X			X	X	X	O			O	O	X				
	Transportation				X					O	O			X	X	X		O	X
	Native landscaping and ecosystem protection		X	X	X		X		X	O		X		X					
	Outdoor classroom			O						O	X	X		O	X	X			O
	Landscape				O	O			X	O		X			X			X	X
Water	Storm Water				O	O	O		X	X	O	X		X	X	X		X	X
	Conservation and monitoring		O		X	O			O	O	O								X
	Waste Water	Grey Water					O			O	O	X			X	X		O	X
		Black water					O			O	X	X			X	X			
Energy	Total Performance	Lighting	X		X	X			X		X	O	X			X	X	X	O
		Ventilation	X		X		X		X			O	X		X	X		X	
		Heating	O	O			X	O	X	O	X			X	X	O	O	X	O
		Cooling	O	O			X	O	X	O	X	X		X	O	O	O	X	O
	Renewable Energy		O		O				O	O	O	X		O	O	O	X	O	X
	Conservation			O		O	X			O	X	O				X			
	Insulation				X		X	X	O	O				X	O		X	X	X
Material	Local materials						X		X	O								X	
	Reuse, recycled and recyclable material usage		O	O	X		X	X		O	X			X				X	
	Specific sustainable material selection criteria				O		X	O	O	O		O	X		X				X
	Waste Material Control						X			X			O						
In. E. Q.	VOC		X				X	X			X								X
	Thermal Comfort														X				
	Daylighting		X								X	X						X	X
	Views					X							O						

Available sustainable features of international buildings are transferred to visitors through daily and weekly building tours and practical training programs. Thus, visitors have both theoretical knowledge about the subjects and experience in the systems in practice. There are also examples of international centers spread over a wide site area and offering accommodation. The area where the building is located is becoming a center of attraction. Individuals can learn by seeing, touching, understanding and experimenting the sustainable features in these public buildings and transfer information to their daily lives.

Sustainability education addressed within the presentation; for introduction of the systems and building tours in the examples of Türkiye; often do not offer the opportunity of observation, experimentation and comparison. Teaching sustainability is already open to development in Türkiye due to problems such as financial difficulties, lack of enough awareness, the issue of sustainability mostly covered within the framework of certification systems, the inability to assess owned features due to the lack of a relationship between the current function of the building and sustainability education, the lack of enough site area and inability to assess and etc. Addressed visitor profile mostly consists of elementary school, junior high school or high school students. Adequate awareness and effort hasn't yet been given to the possibility for people to observe, experiment, compare the systems and find innovative solutions. Table 6 shows the main differences in the scope and

functioning of sustainability education between the examples of international and national informal education buildings.

Table 6. The main differences between national and international examples

Sustainability Education	International Informal Education Buildings	National Informal Education Buildings
Type of buildings	Museum, library, solar house, education center, multifunctional buildings	Museum, solar house, education center, multifunctional buildings
User profile	For all ages and for all professional levels	For mostly primary and high school students
Design	The architecture of buildings reflects their sustainable properties which they have and they are also interesting for their zone.	The buildings except solar houses could not reflect their sustainable properties and they could not be different at their zone.
Used sustainable design titles	Site and transportation, water, energy, material	Site and transportation, energy
Education period	Daily and weekly educations-building tours	Hourly building tours

It would be beneficial to examine each of the sample buildings within the scope of the study individually in the context of each sustainability topic. It is assumed that each criterion in the graphs is equivalent. In the frame of sustainable design topics, findings shown in blue indicate the potential sustainable features that can be used for education; while the red ones indicate the sustainable features that are already integrated with education (see Figure 4-9).

Site and transportation

Sustainability education will not be restricted only to the indoor space; it is well known that educational use of open areas, studies carried out for the protection of plant and animal species and transportation issues are also carrying a high educational potential. The sustainable design features of international and national examples in the context of the site and transport and the situations in which these features are presented to visitors as educational tools are shown in Figure 4.

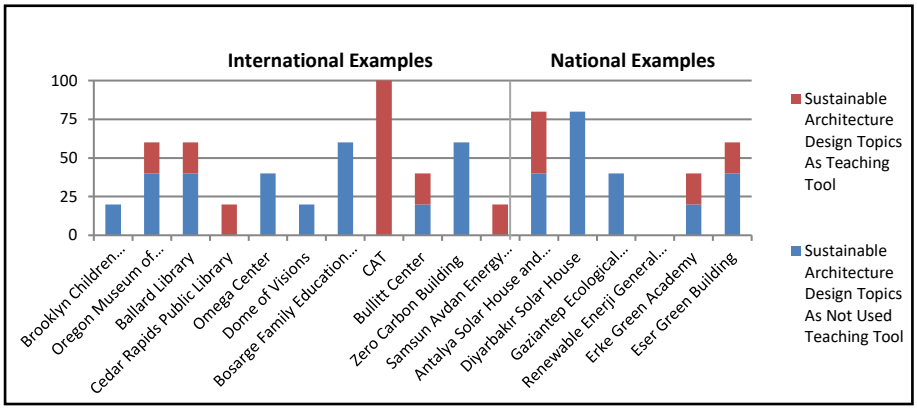


Figure 4. Sustainable design topics of international/national buildings on the scope of "site and transportation" and the usage of these topics as a teaching tool

According to Fig. 4, four out of the ten international samples in sustainability education does not benefit from the sustainable site and transportation characteristics, the four samples are also fairly partially

DOI: 10.15320/ICONARP.2025.332

utilized. It is seen that both site and transportation principals are available and each one is utilized as an educational tool in the Center for Alternative Technology (CAT).

Remarkable features of the international examples included in the case study are as follows;

- The use of industrial areas and/or brownfields for the community benefit,
- The use of bio swales which meets the need for irrigation of existing green areas, protect the natural vegetation, allows to be transmit clean water to the main water sources through the purification process - information boards containing the working principle and the environmental-friendly features of the bio swales,
- Easily accessible location by public transport, bicycle and/or on foot, no private car parking. Lockers and showers to support cycling access,
- The use of a green roof which is a sustainable roof system. For site inspection of the roof by visitors, observation from inside of the building with the periscope is possible. Recording the usage data of the roof. Information boards on the use and benefits of the green roof,
- Agricultural areas arranged in open areas of the building. Side-by-side gardens aiming to compare the yields of compost and fertilizer,
- Being every system and building used in open space a part of sustainability education.

Considering the examples of Türkiye, the table is similar. It has been shown that they don't benefit sufficiently from the available sustainable site and transport properties. Due to the fact that Samsun Avdan Recycling Museum exhibits the recycling process occur on the ground that takes place on, it is being used as an educational tool within the scope of "site and transportation" title. While Antalya Solar House, Erke Green Academy and Eser Green Building use some of the features they have as education tools, they have some potential features not yet been equipped with education functions. Although Diyarbakır Solar House and Gaziantep Eco Building have sustainable features within the title of site and transportation, these properties are not currently used as educational tools.

Water

It is observed that international examples widely and effectively benefit from architectural design features they have on the reuse of the wastewater, rainwater use and water conservation topics. As an ideal example of a wastewater treatment center; the "Omega Center for Sustainable Living" implements a wide range of methods to keep visitors informed about water treatment and conservation. (Figure 5)

ICONARP – Volume 13, Issue 2 / Published: 31.12.2025

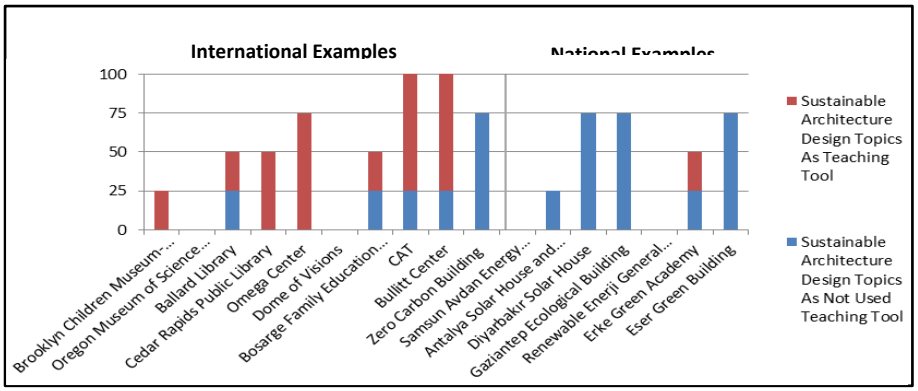


Figure 5. Sustainable design topics of international/national buildings on the scope of "water" and the usage of these topics as a teaching tool and transportation" and the usage of these topics as a teaching tool

International examples include a variety of positive features in the context of water efficiency, and able to reflect many of them to educational use. Some remarkable features are;

- Local plant selection without irrigation, water conserving plumbing equipment,
- Water station area where water conservation principles are described,
- Usage in various forms of the water obtained from the green roof and transferred to cisterns. Providing the energy required for irrigation with solar panels on the cisterns. All these systems are observable by the visitors. Recording the amount of water collected and spent in these systems and to present it to the visitors via the follow-up screen,
- The use of water treated in various forms by creating a biological pond within or outside the building, be able to be observed of the working principle of the pond by the visitors,
- Purification of rainwater by collecting and usage throughout the building. The collection areas of the rain waters, the process of purification and their transfer to underground waters can be observed by the visitors,
- Available warnings about the personal items used by visitors should be in non-environmentally harmful content in accommodation units. (?) Detailed presentation of the results that this situation cause in the water source and the treatment system in each unit,
- Gray and black water treatment throughout the building and use in appropriate functions. of Gray water treatment systems and tanks with stored waste for fertilizer purposes can be observed by the visitors.

National examples need to be developed both in terms of an architectural design standpoint and the transformation of the building into an educational tool about water conservation. Sustainable properties are not observed in Samsun Avdan Recycling Museum and General Directorate of Renewable Energy-Sample building in the scope of water efficiency. The other five examples have potential features that could be an educational tool in teaching sustainable water consumption.

DOI: 10.15320/ICONARP.2025.332

Especially Diyarbakır Solar House, Gaziantep Ecological Building and Eser Green Building have high potentials.

Energy

"Energy" is the design topic which has more architectural design features compared to other sustainable design topics and the most common use of these features as educational tools in international and national buildings. This situation is striking in all cases except "Samsun Avdan Recycling Museum" which focuses specifically on waste recycling and "Omega Center for Sustainable Living" which focuses on water conservation. (Figure 6)

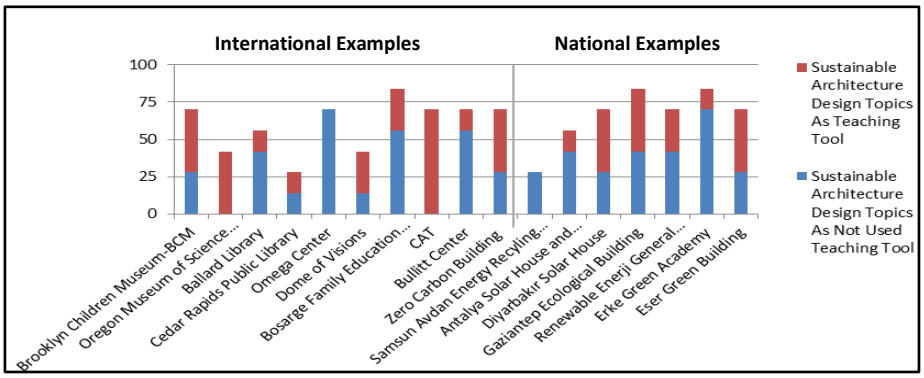


Figure 6. Sustainable design topics of international/national buildings on the scope of "energy" and the usage of these topics as a teaching tool

The remarkable energy conservation characteristics of the international examples and their educational use patterns are as follows;

- All passive and active energy systems used throughout the building can be observed, made interesting and informative by the visitors,
- Describing the relationships between the passive design features to reduce energy use of buildings and energy use to visitors through various trainings,
- The current and past energy data of the building can be traceable through the LED display at the entrance of the building. Presenting data of the electric energy generated from the solar energy to visitors through the indicators located on the windowsills. The use of the solar panels in the landscape as a design element without being hidden. Follow-up panels and informational boards near the solar panels in order to observe the energy provided by the solar panels and the conditions which the panels generate energy under,
- Making attractive the sustainable system components like geothermal heat pumps, air-to-air, air-to-water heat pumps, cooling towers, etc. used for heating-cooling by painting with bright colors. Explanation of working principles through electronic boards and schemes,

- Provision of visibility of the solar panels on the facade and roof. Explanation of the layout principles and the functions of the panels with the information boards to the visitors,
- Showing the insulation layers by making a certain part of the wall surface transparent,
- Explanation of applications like compressed soil wall, ceiling windows, heat pumps and etc. in which building they are used through schemes,
- Design of zero-energy accommodation buildings in order to be able to grasped the environmental effects of the consumption habits adopted in everyday life by individuals, the presentation of life experiences in these buildings to visitors,
- Implementing different systems and methods on the buildings and presenting their performances comparatively to the visitors.

National examples except the Samsun Avdan Recycling Museum use a certain part of their characteristics on the energy efficiency for education purposes. In national and international cases, systems for renewable energy sources which are used to meet the heating and cooling needs, are often utilized in educational context. However, innovative solutions such as tracking of energy generation-consumption quantities, reduction of available energy use (OMSI eco-vator, CAT water-based rail system and etc.) in the international examples are not yet available within national examples.

Material

It has been observed that the selection of sustainable materials and the effort to transfer these characteristics to visitors in international cases are much more advanced than national examples (Figure 7).

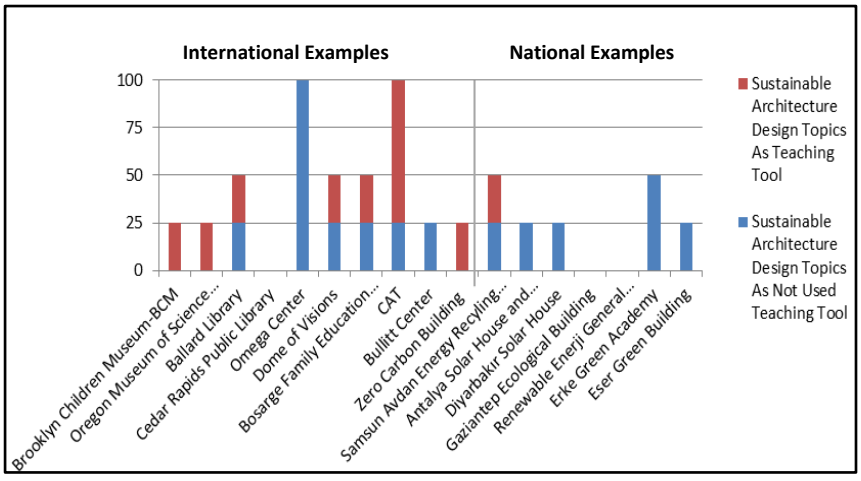


Figure 7. Sustainable design topics of international/national buildings on the scope of "material" and the usage of these topics as a teaching tool

The remarkable characteristics of the material efficiency of the international examples and their educational usage patterns are as follows;

DOI: 10.15320/ICONARP.2025.332

- Selection of materials with the properties of recycled/recyclable/low carbon content/local material used throughout the building. Informing visitors about the acquisition techniques, everyday use and the productions of these materials. The presentation of the resource and content information, selection criteria, usage and daily life effects of the used materials to the visitors through the screens during the building tours,
- Displaying the materials used in the interiors clearly without being hidden, to be observable of the connecting elements and the structural elements,
- To be observable of local materials and construction methods by the usage in different ways in the building in order to show the visitors different details.

Because of the sufficient awareness and lack of the principles such as the use of local materials, materials with recycled-recyclable content, waste management caused by material use in under the heading "material" in national examples, yet the usage of these criteria are limited both in the context of sustainability and as an educational tool. Material efficiency property used for design and education purposes is not observed in Gaziantep Ecological Building and Renewable Energy General Directorate Example Building. Characteristics of material use and recycling are rather limited in other national cases.

Indoor environmental quality

Sustainable architectural features about indoor air quality, thermal/visual/audio comfort and lighting/ventilation topics were almost not used in sustainability education in any international and national examples. (Figure 8)

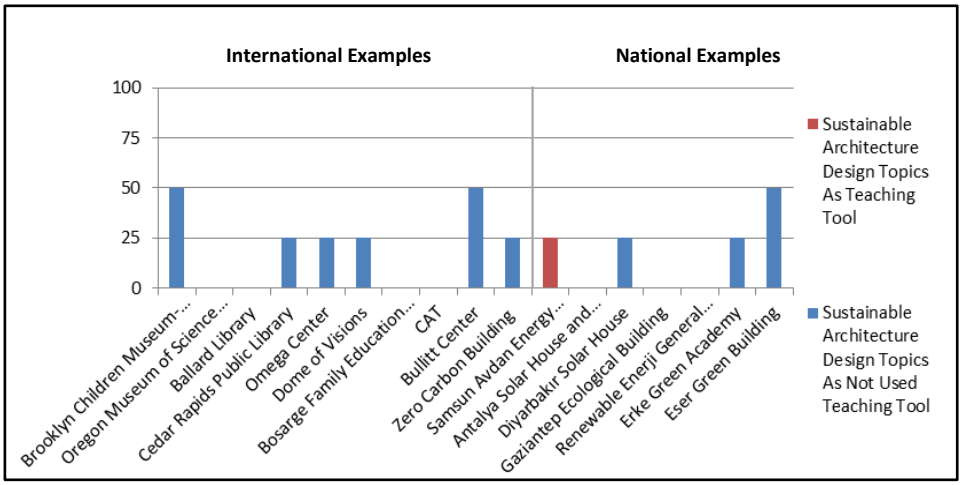


Figure 8. Sustainable design topics of international/national buildings on the scope of "indoor environmental quality" and the usage of these topics as a teaching tool

Remarkable features on the indoor environmental quality (but not integrate educational use) of international examples are as follows;

- The change of the city according to the seasons can be watched by the users by creating different points of views to the city on the buildings,
- The use of plant species that increase the amount of O2 while reducing the impact of CO2 and other harmful gases in the interiors,
- Measuring of temperature, humidity, lighting, CO2 and pressure data with sensors placed at different points of the building,
- Utilizing from the daylight in the interior at most with the use of high ceiling and large window surfaces. Determination of the locations of the eaves, skylights, roof windows and the solar tubes as a result of the daylight modeling.
- All these approaches and systems are made visible, observable and transferring to visitors.

Due to Samsun Avdan Recycling Museum being also aimed to exhibit the waste recycling area in which it is located, there is an effective use of the view in the context of serving sustainability education. The exhibition surfaces are gathered in the center of the building. Thus, there is the possibility of circulation around the building. Building which is entirely surrounded by glass; provides the observation of the recycling process described and examples in the museum throughout the solid waste field. Building is designed by bending of different surfaces and its location provides the points of view to the different points of the waste field.

Improvement Recommendations on National Examples

Studies towards the experimental buildings getting the mission to teach sustainability to community began to be developed after year 2000 and still continues in Türkiye. In this context, it is important to evaluate these buildings in this framework and carry out improvement works in order to put into potential features that can be used as educational tools from passive to active status. Each national sample was evaluated in the context of sustainable design topics. (Figure 9)

DOI: 10.15320/ICONARP.2025.332

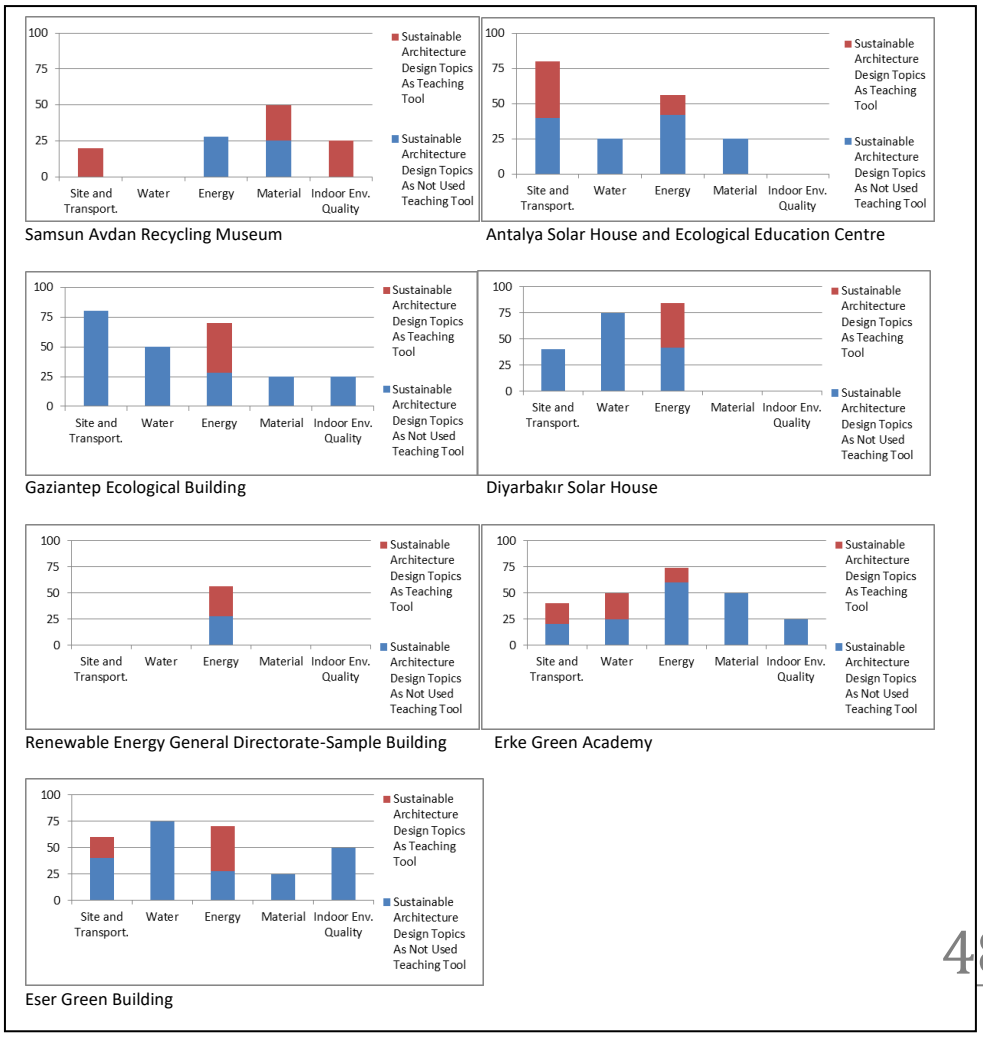


Figure 9. National Samples' features within the scope of sustainable design topics use for educational purposes

In the direction of the data presented in figure 9, the recommendations for the improvement of the national examples can be listed as follows;

While the traceability features of the land are utilized educationally in architectural design of Samsun Avdan Recycling Museum, there is no sensitivity to water efficiency. It has the potential features to be used for the purpose of sustainability education on energy and material topics (Figure 9). Creating outdoor walking/training routes that will allow monitoring the solid waste recycling process that takes place in the field as closely as possible can enrich the training mission of the building. The use of accumulated rainwater and its visualization to visitors are features that can be included in sustainable design. The building has passive features on daylight and ventilation with fringe and vented window design. These features can be passed on to visitors. In addition, solar panels that can be integrated can support the electricity needs consumed in the museum as well as informing visitors about renewable energy sources and energy conservation. Besides the information on the use of different material wastes and transformation methods are provided, it is possible to inform the visitors about why only concrete was used in the building, the positive and negative aspects of the construction. Facade and covering materials which can be transformed from different types of

waste can be introduced by applying for sample purpose in certain sections of the structure.

In addition to the sustainable features used for education in site and transportation and energy issues of Antalya Solar House and Ecological Education Center; there are different features that can be installed in the education function, improvement studies should be carried out especially in the context of indoor environmental quality (Figure 9). Observations and comparisons can be made to grow different plant species in different seasons on the green roof. Certain parts of the cistern system where the rainwater is deposited can be made visible. How the green roof provides insulation, positive and negative aspects can be examined together with the visitors and discussed by mutual question-and-answer method. Information on the concept of embodied energy, the recycling characteristics of materials used during construction and the presentation of sample materials can be given.

Diyarbakır Solar House has focused solely on the topic of "energy" and has only been able to integrate this title to education. However, it is an example of potential structural features that can be used educationally in all sustainability issues (Figure 9). The solar house uses its features as educational tools in the areas of insulation, the use of renewable energy sources, heating and cooling. The working principles, usage and structural characteristics of the Venturi chimney and wind catcher can be combined with open space usage. The building can express itself with the use of information boards and operating schedules in the open spaces at the points of observation of the available innovative systems. Building's potential features can be actively used by transferring the selection criteria of the building site and plant species can be used around the building in order to prevent overheating of the visitors. Tracking the data on the collection of rainwater, amount of water consumed and places of consumption and sharing with the visitors is important in terms of using the building more functionally. The basic characteristic of the building on the material topic is using the wood clearly. In this context, it is possible to establish sample systems which include comparison of wood with different building materials and address the touching and visual senses of the visitors by making use of different construction techniques, combination details and materials in certain parts of the building for comparison.

Gaziantep Ecological Building has sustainable design features that can be used for education in site and transportation, water and energy topics. However, currently only design features like renewable energy sources, heating and cooling are used for education purposes. Material and interior environmental quality is completely neglected in the design process (Figure 9). Sustainable system components such as solar panels, air chimneys and green roofs are observed outside the building. Location of information boards includes the features and the operational principals of these systems at appropriate points, can also provide a better understanding of the systems. The existing sensitivities like

DOI: 10.15320/ICONARP.2025.332

rainwater use, tracking of water conservation, reuse of waste water can be integrated into education by methods such as making the treatment systems visible, monitoring rainwater accumulation and utilization data. For example, the use of light and sound in different colors for the amount of accumulated rainwater can be reflected in the interior of the building. The building presents its features such as renewable energy, heat pump etc. through the models. In addition to this method, it will be beneficial to make certain insulation and joint points transparent on the building.

Renewable Energy General Directorate-Sample Building does not already have potential features that can be integrated to education in site and transportation, water, material and interior environmental quality titles. Features in terms of energy are often passed on to visitors via sample systems called training units (except Trombe Wall and greenhouse use), Most of all, the building needs to be improved in terms of sustainable architectural design (Figure 9). The building will be self-explanatory by using the sample systems that are exhibited independently in the structure as a component in the appropriate parts of the structure. For example, instead of the sample glass unit used to sense the insulation difference between single and double glazing in the structure, it is possible to obtain a much more educative result by replacing the glazes in a certain part of the building with single and double glazing and with attractive boards and graphic displays to be used in these areas.

Erke Green Academy uses some of the existing features on site and transportation, water and energy for the purpose of teaching sustainability. However, it also has design features that can be potential educational tools within the scope of other titles (Figure 9). Information boards, towards the use of green roof and different types of paving materials providing transition of rainwater to underground, can bring a new perspective to outdoor space use. It is necessary to use educational methods to introduce the principles and systems of available sustainable features in lighting, ventilation, heating-cooling, renewable energy use and insulation issues. For example, making the circulation lines of the heat pump visible in certain areas of the building will allow the system to be perceived. Examples of previous uses of materials with recycled content and local materials may be included in the building in order to transfer these properties to visitors. Thus, people can perceive different forms of use and transformation of materials concretely. Environmental advantages provided by the structure built with 60% protection of an existing structure, the environmental effects of construction and demolition activities, and the protected parts of the existing structure can also be explained by the visible and interesting items.

Eser Green Building is a building with a wide range of features that can be used as an educational tool within the framework of sustainable design topics, but it already takes the advantage of this potential at a quite low rate (Figure 9). Systems for alternative energy sources can be observed through a variety of examples located within the Energy Theme

Park, which is reserved for public use by the company at its own discretion. In addition, landscape elements such as native plant species without irrigation need, porous paving materials will also support outdoor space use in the park area. The building with water use and conservation features such as gray water treatment, water-saving faucets and the use of rainwater in irrigation does not have the educational characteristics of working principles for these systems. These features are included on the internet page of the company. For this purpose, providing information boards and animations in the building which will provide information on working principles of the systems and follow-up of the usage data will make the systems more attractive. Taking place of an educational department includes the selection criteria and the samples of sustainable materials used in the construction will trigger a sense of curiosity for users and the visitors.

CONCLUSION

While some features of buildings designed with sustainable architectural design can be integrated to sustainability education more easily, some features can be unfortunately more difficult to integrate. The inclusion of sustainable features that will vary in the direction of the priorities of the place in the design of such buildings will lead to a more accurate and objective understanding of the concept of sustainability. For this purpose, it is necessary to plan the early stages of the design process of how and in what way the environmental characteristics of the building will be used as an educational tool. In this context, researches in the interface between physical environment and educational theories which do not yet exist in sufficient and rich variety in the literature should increase. At this point, it is important for the building design team to be interdisciplinary including various engineering disciplines and educational scientists.

In the framework of information obtained in this study, suggestions are found towards improving the informal educational building examples tasked with the sustainability education in Türkiye. Guidelines for future designs to be carried out in this context can be summarized as follows:

- National cases are open for development both in terms of the duration of training, which is limited to "hours" and the qualifications and methods of the applied trainings compared with international cases. Persistent information can be obtained in individuals by constructing sample structures or systems in order to learn by doing and the information that is theoretically learned in the framework of daily and weekly activities. It is important that the centers with sufficient area are extended to include accommodation. Furthermore, community members of all age groups, not just children and young people in school age, should be encouraged to use such buildings.
- Teaching sustainability through buildings currently takes place in museums, education centers (eco-building) and some mixed-

DOI: 10.15320/ICONARP.2025.332

use buildings in Türkiye. Just as in the international arena, it is hoped that libraries will be added to these buildings in the coming years.

- Making sustainable systems and material usage as visible and traceable as possible throughout the building can be an important learning tool. Making various systems, floor, wall, roof and insulation details transparent will ensure permanent learning on visitors.
- Outside spaces of the buildings have great potential in the context of sustainability education. Importance should be given to open space usage designing the buildings inside and outside integrated. For example, approaches such as the use of open air classes, turning of information boards and directors for structural systems into landscape items can be quite useful.
- Sustainable features of the buildings regarding indoor environmental quality wasn't seen to be reflected in education. In order to solve this problem;
    - Individuals can understand the relationship between sustainability and interior environmental quality with different activities such as discussing the effects of thermal, auditory and visual comfort conditions on both the environment and the users, experiencing the effects of different conditions on the individual. The effect of sun shading elements on the visual comfort which can be used in the appropriate directions in the buildings can be explained.
    - Introducing harmful organic compounds that affect indoor air quality, sharing daily experiences in this regard. The use of plant species that increase the amount of O2 by reducing the influence of CO2 and other harmful gases in the interiors, explaining this property to the visitors by using suitable educational materials,
    - Measuring the temperature, humidity and air quality in spaces with CO2 sensors to be placed at various points of the buildings, connection of natural and artificial ventilation system in case of necessity, presentation of this equipment through screens,
- Improvements on the water conservation can be provided by methods such as supporting groundwater with the use of high water-permeable paving materials and the use of rainwater for irrigation purposes by accumulating. These features can also be beneficial for educational purposes.
- The choice and use of sustainable materials in buildings and explaining material properties to visitors are relatively easy to achieve than other titles. Especially, transparenting materials that have different functions such as floor, wall, ceiling,

ventilation, lighting in the building and presenting to the visitors is used in many international examples as a method of evoking curiosity. The use of such methods is not observed in national samples, material presentation and use are presented to visitors via building models.

Innovative solutions in the field of architectural design will be achieved by questioning the relationship between learning methods that are used in teaching sustainability and architecture. In this context, studies integrating educational sciences with architecture will be important to continue to develop the subject in the future.

REFERENCES

Adıgüzel Ö., (2006), "Okul Dışında Farklı Bir Öğrenme Ortamı Olarak Çocuk Müzeleri", Eğitim Bilim Toplum Dergisi, 4 (14), 32-41.

Arslan A., (2009), "Lefebvre'in Üçlü-Algılanan, Tasarlanan, Yaşanan Mekan Diyalektiği", Mimarlar Odası Ankara Şubesi, Aralık 2009, 7-17.

Barr Kay S., (2011), "Green School That Teach: Identifying Attributes of Whole-school Sustainability", Master Thesis, Colorado State University.

Bozdoğan A. E., (2011), "Müzeler", Laçin Şimşek C., Editör, "Fen Öğretiminde Okul Dışı Öğrenme Ortamları", 1. Baskı, Pegem Academy.

Colardyn D., Bjornavold J., (2004), "Validation of Formal, Non-Formal and Informal Learning: policy and practices in EU Member States", European Journal of Education, 39 (1), 69-89.

Cole B. L., (2014), "The Teaching Green School Building: A Framework for Linking Architecture and Environmental Education", Environmental Education Research, 20 (6), 836-857.

Dip C. Z., (1987), "Formal, Non-Formal and Informal Education: Concepts/Applicability", AIP Conference Proceedings, 173, 300-315.

Gramatakos A. L. and Lavau, S., (2019), "Informal Learning for Sustainability in Higher Education Institutions", International Journal of Sustainability in Higher Education, Vol. 20 No. 2, pp. 378-392.

Guarinello E., (2005), "Why We All Should Care: Building A Case for Sustainable Design In Museums, Exhibitions: Conceptual Design", George Washington University, USA.

Hopkinson, P., Hughes, P. and Layer, G. (2008), "Sustainable graduates: linking formal, informal and campus curricula to embed education for sustainable development in the student learning experience", Environmental Education Research, Vol. 14 No.4, pp. 435-454.

Jones J., (2010), "Guidelines for the Design of Sustainable Learning Laboratories that Teach Through Architecture", AIA Upjohn Award Final Report, College of Architecture and Urban Studies Virginia Tech, USA.

Lipscombe, B.P. (2008), "Exploring the role of the extra-curricular sphere in higher education for sustainable development in the United Kingdom", Environmental Education Research, Vol. 14, No.4, pp. 455-468.

Meredith J., Cantrell D., Conner M., Evener B., Hunn D., Spector P., (2000), "Best Practices for Environmental Education: Guidelines for Success", Ohio Environmental Protection Agency, Office of Environmental Education, USA.

Orr D., (1997), "Architecture as a Pedagogy II", Conservation Biology, 11(3), 597-600.

DOI: 10.15320/ICONARP.2025.332

Priest S., (1986), "Redefining Outdoor Education: A Matter of Many Relationships", Journal of Environmental Education, 17 (3), 13-15.

Laçin Şimşek, C. L.(ed.), (2011), Fen Öğretiminde Okul Dışı Öğrenme Ortamları, Pegem Academy.

UNESCO. (2022), Education for Sustainable Development; Berlin Declaration, https://unesdoc.unesco.org/ark:/48223/pf0000381228/PDF/381228eng.pdf.multi (accessed on: 16/04/2025).

United Nations, (1972), Report of The United Nations Conference on the Human Environment, http://www.un-documents.net/aconf48-14r1.pdf (accessed on: 25/04/2025).

United Nations, (1987), Report of the World Commission on Environment and Development: Our Common Future (Brundtland Report), http://www.un-documents.net/our-common-future.pdf (accessed on: 25/04/2025).

United Nations, (1992), Agenda 21, https://sustainabledevelopment.un.org/content/documents/Agenda21.pdf (accessed on: 25/04/2025).

Resume

Kutlu Sevinç Kayıhan began her academic career as a research assistant in the Department of Architecture at the Faculty of Architecture, Gebze Technical University (formerly Gebze Institute of Technology) in 1996, and she currently serves as a full-time professor in the same department. She has published articles in both English and Turkish in various academic journals on her main areas of interest, which include architectural design, architectural criticism, architectural education, sustainable architecture, and educational buildings. She also teaches a range of undergraduate and graduate courses related to these fields.

İrem Tunçbiz Özgür graduated from the Department of Architecture at Anadolu University, Eskişehir, in 2014. She completed her master's degree in Architecture at Gebze Technical University in 2017. She is pursuing her doctoral studies in the Building Science program at the Department of Architecture, Bursa Uludağ University. Her research focuses on the improvement of housing conditions for seasonal agricultural workers.

ICONARP
International Journal of Architecture and Planning
Received: 20.07.2024 Accepted: 30.10.2025
Volume 13, Issue 2/ Published: 31.12.2025
DOI: 10.15320/ICONARP.2025.333 E- ISSN:2147-9380
Research Article
ICONARP

Development of Energy Consumption Profiles of Common Household Appliances by Analyzing their Energy Consumption

Rajat Nainwal*
Aniket Sharma**

Abstract

Residential energy consumption constitutes a major share of overall electricity demand, and inefficient use of household appliances, including hidden standby loads, which contributes to higher energy costs, wasted resources, and barriers to sustainable energy management. Addressing this requires accurate insights into how appliances consume energy in real-time, enabling more efficient strategies for household, utilities, and policymakers. This study conducted a comprehensive analysis of residential energy consumption by monitoring the real-time energy usage of common household appliances. The primary goal was to develop detailed energy consumption profiles that could benefit both researchers and distribution companies. To achieve this, the energy consumption data of various household appliances were recorded over a period of one month with a high time resolution of one-second intervals, utilizing smart plugs for wireless energy measurement. A significant focus of the study was to understand the impact of standby power consumption on overall energy use and efficiency. By accurately measuring appliance-level energy consumption, the study was able to create detailed profiles, which were then used to predict the energy use for the following month. The predicted total monthly energy consumption was validated against actual energy bills provided by the state electricity board, demonstrating the reliability and accuracy of the predictions. The collected data from this study offers a valuable database for identifying and understanding energy consumption patterns of household appliances, which is essential for residential energy management research. Further, the findings emphasize the significance of real-time monitoring in crafting effective energy management strategies. Such strategies can lead to more sustainable energy use, benefiting both consumers and energy providers. On a broader scale, this method can support economic development by enhancing energy efficiency and reducing waste. The study underscores the potential of detailed, real-time energy monitoring to improve energy policy and household energy management, paving the way for more informed and sustainable energy practices.

Keywords: *Alternate energy source, Energy consumption profiles, Energy efficiency, Energy management, Sustainable development goals*

*Department of Architecture, National Institute of Technology, Hamirpur, India (*Corresponding author*)
Email: rajatn@nith.ac.in

** Department of Architecture, National Institute of Technology, Hamirpur, India
Email: aniket@nith.ac.in

To cite this article: Nainwal, R., & Sharma, A. (2025). Development of Energy Consumption Profiles of Common Household Appliances by Analyzing their Energy Consumption. *ICONARP International Journal of Architecture and Planning,* 13 (2), 494-523. DOI: 10.15320/ICONARP.2025.333

INTRODUCTION

The United Nations (UN) General Assembly, in its 70th Session held on 25th September 2015, adopted the document titled "Transforming our World: The 2030 Agenda for Sustainable Development consisting of 17 Sustainable Development Goals (SDGs) and associated 169 targets (*Sustainable Development Goals, Department of Economic and Social Affairs, United Nations*, 2015). SDGs are a comprehensive list of global goals integrating social, economic, and environmental dimensions of development. Realizing that energy is critical for people deprived of the opportunity of access to sustainable energy, Goal 7 with the aim to ensure access to affordable, reliable, sustainable, and modern energy to all was adopted as one of the 17 SDGs. The goal also stresses more focused attention to improve access to clean and safe cooking fuels and technologies, improve energy efficiency, increase use of renewable sources and promotion of sustainable and modern energy for all (*Sustainable Development Goals, Department of Economic and Social Affairs, United Nations*, 2015).

If the world is to develop sustainably, it has been recognized that it is necessary to secure access to affordable, reliable, sustainable, and modern energy services while reducing greenhouse gas emissions and the carbon footprint of the energy sector (*Energy Statistics India*, 2022). Energy systems capable of delivering to the ever growing and emerging needs of developing economies is the need of the hour (*Energy Statistics India*, 2022). Growing energy demands over the world and in the densely populated regions of Asia including India have driven the need of larger energy systems (*Energy Statistics India*, 2022). Thus, in India, there has been a thrust to increase installed generating capacity of electrical energy. The availability of and access to energy and energy sources are particularly essential for poverty reduction and further improvements in standards of living (*Energy Statistics India*, 2022).

Demand response was first intended to be a shift in normal consumption demand that took into account a rise or decline in electrical energy production (Beaudin & Zareipour, 2015). To address this, nations such as the United States have implemented demand response programs, which were designed to provide economic advantages to customers and utilities while also improving the dependability and sustainability of electrical energy networks (Hurley et al., 2013; Shakeri et al., 2017). Many governments provide direct or indirect incentives to promote the employment of demand response systems. The European Union has adopted dynamic demand response programs as a strategic instrument to meet its three primary goals of a 20% reduction in greenhouse gas emissions, a 20% increase in energy production from renewable energy sources, and a 20% increase in energy efficiency (Agnetis et al., 2013). Although the amount of energy used in buildings varies by nation, it accounts for 30-40% of total global electrical energy usage (Zhang et al., 2013). According to the Indian Energy Statistics 2022, the major electricity (henceforth called as

DOI10.15320/ICONARP.2025.333

'energy') consumption sectors in India are industrial sector (41% of the total electricity consumed in the country), followed by residential sector (26%), Agricultural sector (18%), and commercial sector (8%) (*Energy Statistics India*, 2022). It is to be noted that around 34% of the total electricity consumption in India is being done by the building sector. The great majority of residential structures are unable to take advantage of demand response possibilities, despite their widespread usage by industrial and commercial establishments (Shirazi et al., 2015). The largest barrier to the introduction of demand response technologies in households is the substantial reduction in housing comfort and energy consumption behavior (Faruqui & Sergici, 2010). Yet, with the rise of internet and computer technologies, intelligent home energy management systems have become more popular in recent years with the purpose of improving the comfort of the house (Tang et al., 2017; Wu et al., 2018). Therefore, home energy management studies are essential to deploy the demand response solutions successfully in homes (Kuzlu et al., 2012). To comprehend how final demand influences energy consumption, it is essential to research energy consumption patterns in all economies (Kuzlu et al., 2012). Additionally, data on several consumption activities, such as building space heating and cooling and other, are needed for this.

The reliability of demand response studies is affected by the method used to ascertain the profile of energy usage in homes. Information on energy usage is essential for designing efficient distribution networks and giving more accurate results. When planning local demand side management (DSM) measures or properly sizing the small-scale distributed energy technology into the local network, accurate understanding of the residential consumer loads is essential (Paatero & Lund, 2006). In this way, numerous techniques were employed to accurately produce the load profile and energy consumption of residential appliances (Ahmed et al., 2015; Bissey et al., 2017; Pipattanasomporn et al., 2014; Tewathia, 2014). In the literature (Capasso et al., 1994), actual energy usage data of a house is commonly generated using the bottom-up technique. The bottom-up method's primary drawback is its dependence on precise energy consumption data (Angioni et al., 2016). To date, this issue has been addressed in several publications via the use of representative data and statistical averages of the use of electrical equipment. Using an energy cost meter, the standby energy consumption of several domestic appliances was assessed. It was discovered that standby energy consumption was higher than operational energy consumption. However, how the appliance was used and how long it was left in standby mode rely on the user's behavior (Ajay-D-Vimal Raj et al., 2009). Using the bottom-up methodology, the buildings in Singapore were categorized according to their energy consumption, and mathematical models and load profiles were created in (Chuan & Ukil, 2015). The generated load models were

then compared to actual models, and homes were categorized according to the number of rooms within (Chuan & Ukil, 2015).

Using energy consumption data acquired of home appliances, electrical household equipment was quickly and accurately classified using machine learning methods in (Abeykoon et al., 2016). Although this modelling was successful for the great majority of devices, the devices with more complicated operating modes require more sample energy consumption and algorithm training to attain the same results. Using energy consumption data from 128 homes as training samples, a method was built in (Bennett et al., 2014) to predict residential building energy demand profiles. The system was created using information about typical energy consumption. The energy consumption data of two different houses for the typical household appliances was used to create energy consumption profiles in (Pipattanasomporn et al., 2014) and the potentials for energy demand management of these profiles were discussed. Although the study identified the primary energy consuming appliances in both homes, the sample size was not sufficient for the energy demand response research. The monthly energy consumption of household appliances was predicted using a multivariate regression analysis that took seasonality into account (Tewathia, 2014).

The study done by Czetany et. al. (Czétány et al., 2021) assessed the electric load dataset collected from more than the thousand households in Hungary, majorly single-family houses, and determined the energy consumption profiles using time series data of daily and annual electric load. Another study (Csoknyai et al., 2019) focuses on energy consumption habits in more than 150 residential buildings in France and Spain, using consumer feedback on smart metering. The study done by Cetin et. al. (Cetin K. S. et al., 2014) provides the energy consumption profiles of four major household appliances, i.e., refrigerator, clothes washing, clothes dryer, and dishwasher, through the data collected from 40 single family homes in Austin and concluded that the average load profiles of these appliances have the similar energy load distributions. The study done by Santin (Santin, 2011) determines the behavioural patterns associated with the energy consumption of space heating appliances. Another study done by Laskari et. al. (Marina et al., 2022) provided a quantitative assessment of the impact of different users and indoor environmental conditions on residential heating energy consumption. Another study (Firth et al., 2008) monitored the 72 residential units in 2007 in the five-minutes interval for a time-period of two years and the results showed that there was 4.5% increment in the overall energy consumption in second year because of the increase in standby time of the appliances. A measurement and control system for the electric energy consumption of home appliances was developed in (Kam et al., 2014). The study concludes that effective control of appliances can be done following the energy consumption prices. The above studies show the importance of energy consumption profiles of various appliances in the residential buildings sector. These profiles can

DOI10.15320/ICONARP.2025.333

extensively be used in energy demand management, achieving energy efficiency and formulation of time series data for further prediction.

There aren't many studies that concentrate on the data for energy consumption and particular energy consumption profiles of household appliances, even though they are needed in many places. This is the primary reason why, in past years, the standard energy consumption profile and average energy consumption of residential appliances were used. More accurate energy consumption profiles and statistics are required in the distribution system as new technologies and smart grids become more prevalent. The main objective of this study is to provide comprehensive information on residential energy consumption by monitoring the real time energy consumption data of typical household appliances and explain their energy consumption profiles, which will be useful for the researchers and distribution companies. Moreover, by evaluating the collected data, this research reveals the effect of standby consumption on overall energy consumption and efficiency.

For this, the energy consumption data of various household appliances used by a five-person family residing in Shimla, Himachal Pradesh, India, was recorded with high time resolution at one-second intervals during the month of December 2023, using smart plugs for wireless energy measurement. The exact energy consumption of household appliances was evaluated, and the energy consumption profiles of the equipment were developed. December was specifically chosen as the study period because Shimla, being a hilly region, experiences extremely cold weather and snowfall during winters. These climatic conditions lead to very high household energy consumption due to heating loads, whereas in summer the outdoor temperature is pleasant and only negligible lighting energy use occurs. Studying energy consumption during December therefore captures the period of maximum residential energy demand, making the results highly relevant for energy efficiency and demand management. The collected information is crucial since it may serve as a comprehensive database for the exact and correct identification of electrical household equipment for use in domestic energy management research. Therefore, a five-person family's energy consumption patterns in the climatic and geographic setting of Himachal Pradesh are shown in this study, which is a unique piece of research.

While previous studies have examined household energy consumption at varying scales, most have relied on aggregated consumption data, statistical averages, or low-resolution monitoring, which limits their ability to capture appliance-level variations and hidden loads. Moreover, limited attention has been given to cold climatic regions such as Shimla, where winter heating significantly alters residential energy demand. This study addresses these gaps by employing one-second interval monitoring of common household appliances, enabling the creation of highly detailed consumption profiles. Unlike prior work, the research explicitly quantifies the impact

ICONARP – Volume 13, Issue 2 / Published: 31.12.2025

of standby power consumption, an often overlooked but critical contributor to energy inefficiency. Further, the reliability of the developed profiles is strengthened by their validation against actual electricity bills from the state electricity board. Through this approach, the study contributes to existing literature by providing a granular, climate-specific, and validated dataset that can inform demand-side management, energy efficiency strategies, and policy interventions tailored to residential energy use in cold regions.

HOME APPLIANCES ENERGY CONSUMPTION AND METHODOLOGY

Home appliances

Typical electrical appliances used in the house where five persons reside were used in this study. These appliances were monitored and recorded for the month of December 2023 to determine the device usage schedule and energy consumption data. The details of the residents in the house are given in table 1. The appliances used in this analysis are found typically in homes such as dishwasher, geyser, hair drier, room heater, induction, iron, grinder, kettle, laptop, oven, refrigerator, speakers, television, and washing machine. An energy consumption profile was determined and analyzed for each device considering the device usage schedule and frequency. The details regarding the manufacturer company, model number and energy star rating of the appliances are presented in table 2.

Table 1. Details of residents of the surveyed house

User no.	User Sex	User Age (In Years)
1.	Male	68
2.	Female	63
3.	Male	41
4.	Female	38
5.	Male	19

Table 2. Details of the electrical appliances in home used in the energy consumption profile analysis

S. No.	Appliance	Manufacturer	Model No.	Wattage	Star Rating
1.	Dishwasher	Bosch	SMS46KI03I	2400	★★★★★
2.	Geyser (Washroom)	Marc	Neo Classic–B08HKMJ5TJ	2000	★★★★★
	Geyser (Kitchen)	Crompton	AIWH-3LRPIDJT3KW5Y	3000	★★★★★
3.	Hair Drier	Philips	HP8100/46	1000	
4.	Room Heater	Room 1	Bexco	Unicon - B09R1XK4BS	1500
		Room 2	V-Guard	EQT - 800	800
		Room 3	Bajaj	Minor - B009P2LK08	1000
5.	Induction	Prestige	41992	1200	

DOI10.15320/ICONARP.2025.333

6.	Iron	Bajaj	Majesty DX-8	1000	
7.	Mixer-Grinder	Sansui	Allure	500	
8.	Water Kettle	Milton	Go Electro - CELGELK007ASSR0001	1500	
9.	Laptop	Dell	Inspiron 15R	65	
10.	Oven	LG	MC3286BRUM	2500	
11.	Refrigerator	Whirlpool	IF INV CNV 278	190 KWH/Year	★★★
12.	Television	Samsung	UA32T4340BKXXL	60	★★
13.	Washing Machine	LG	P7010RRAZ	410	★★★★★

Proposed Methodology

A special energy consumption monitoring device was used to obtain the high-quality energy consumption data of these appliances. The energy monitoring device consists of a smart plug switch with energy meter and monitoring of Edimax company (model no. SP-2101 W – V3) and 16 and 10 Ampere smart plugs for energy monitoring of Wipro company (model no. DSP1160 and DSP1100, respectively). These devices were connected to each appliance manually with Wi-Fi connectivity to determine the energy consumption data. The value of consumed energy of each appliance was monitored by the computer with 11th gen intel core i5 processor, 8Gb of RAM, and 512 GB Intel optane H20 SSD storage device with Windows operating system - V11, with the aim of collecting data from the smart plugs. The data was processed in Microsoft Excel V-2021. Each plug was given with a name of the device that is connected to. The obtained values are formatted to 2 decimal places. The detailed methodology of this study is presented in figure 1.

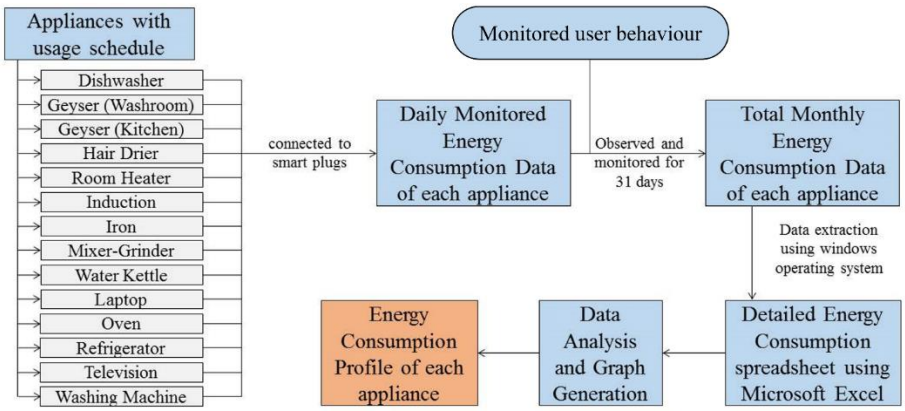


Figure 1. Proposed methodology for data collection

RESULT

In this section, the results of the energy consumption measurements of typical appliances used in home are discussed in detail considering the usage schedule of each appliance used for analysis in this study. The data monitored and recorded for the month of December 2023, when the outside temperature ranges from 4 to 18 °C.

Dishwasher

A free-standing dishwasher having 6 operating modes was used in the surveyed home. The usage schedule and frequency of usage was monitored, and the total energy consumption was determined. Although there were 6 operating modes in the dishwasher, but it was observed that the economy and intensive washing modes were generally preferred by the user. The monitored frequency of usage of dishwasher in economy mode was twice a week, whereas it was used three times in the respective month in the intensive mode. In the economy mode, the dishes were washed at 50 °C and the time taken by the device in this mode was 3h 30 min. The total energy consumed during the whole program was 960 Wh. The detailed energy consumption profile for a single usage period of dishwasher at economy mode is presented in figure 2. It is seen in figure 2 that the whole program consists of water heating and dishwashing cycles. The total time taken in water heating was 25 min and the energy consumed during this was 853.5 Wh.

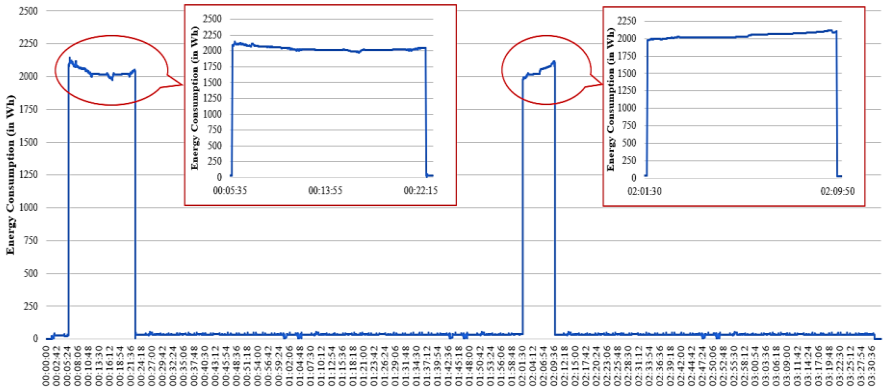


Figure 2. The energy consumption profile for a single usage period of dishwasher in economy mode

Another dishwashing mode used was intensive wash mode, in which the dishes were washed at 70 °C and the time taken by the device in this mode was 58 min. This mode was 4 times shorter than the economy washing mode. The total energy consumed during the whole program was 1093.5 Wh. The detailed energy consumption profile for a single usage period of dishwasher at intensive mode is presented in figure 3. It is seen in figure 3 that the energy consumption in intensive mode is higher than the economy mode, as the water temperature need to be at higher degree in 4 times shorter duration. The total time taken in water heating was 31 min. and the total energy consumed during this was 1062 Wh. As seen in figure 1 to 3, each operation was performed in either water heating mode or standby mode. The total energy consumption during stand by usage is 106.5 Wh in economy mode and 31.5 Wh in intensive mode. Considering the same usage schedule and user behavior, the ratio of energy consumption in heating is 88.9 % in economy mode and 97.1 % in intensive mode.

DOI10.15320/ICONARP.2025.333

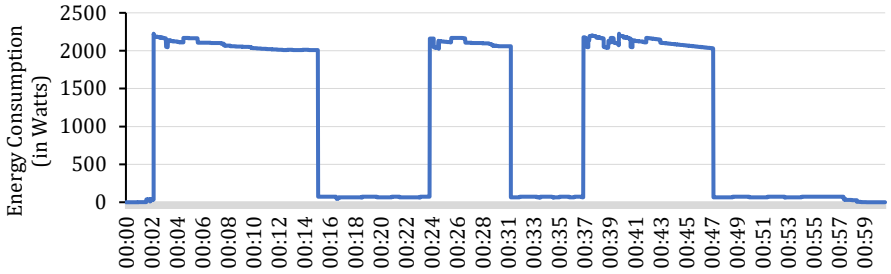


Figure 3. The energy consumption profile for a single usage period of dishwasher in intensive mode

Geyser

Different geysers (3 in no.) were used in the surveyed home, two were used in the washroom and one was used in the kitchen. The geyser was used daily and the frequency and schedule of usage along with the total energy consumption is discussed in the respective sub-parts.

a. Washroom: Two similar geysers were installed in the washrooms, and the different usage schedule was observed for them. Geyser 1 was switched on twice a day, whereas geyser 2 was switched on thrice a day during morning time. The average duration for which these geysers got switched on was 24 and 21 minutes (min.), respectively for geysers 1 and 2. The average energy consumption during each usage duration by geyser 1 was 687.4 Wh and 611.8 Wh by geyser 2. The output temperature of water was set at 75 °C. The total daily usage duration recorded for both the geysers was 1 hour (hr) 54 min., providing the average hourly consumption of 1,696.7 Wh. The detailed energy consumption profile and usage schedule of both the geyser of washroom is presented in figure 4 and table 3.

b. Kitchen: One geyser was installed in the kitchen and switched on thrice a day. The average duration for which it was switched on was 18 min. and the average energy consumption during each time was 811.9 Wh. The output temperature of water was set at 75 °C. The total daily usage duration recorded of this geyser was 54 min., providing the hourly energy consumption of 2,699.8 Wh. The detailed energy consumption profile and usage schedule of this geyser is presented in figure 5 and table 3.

Table 3. Usage schedule of geysers installed in the surveyed home (washroom and kitchen)

Geyser location	Usage schedule	Usage Duration	Energy Consumption (in Wh)	User age
1.	08:12:22 – 08:39:43	26 min 22 sec	1535.75	Female / 63 Years
2.	09:02:27 – 09:24:39	22 min 13 sec	1293.89	Male / 68 Years
	07:04:21 – 07:26:58	22 min 38 sec	1318.66	Male / 41 Years
3.	07:47:37 – 08:03:27	15 min 51 sec	923.15	Female / 38 Years
4.	08:21:53 –	26 min 27 sec	1541.08	Male / 19 Years

	08:48:19 – 08:43:22 08:59:31 – 14:03:47 14:23:27	16 min 10 sec	673.35	Female / 38 Years
		19 min 41 sec	819.20	Female / 38 Years
5.	21:49:33 – 22:07:49	18 min 17 sec	761.00	Female / 38 Years
6.	08:12:22 – 08:39:43	26 min 22 sec	1535.75	Female / 63 Years
7.	09:02:27 – 09:24:39	22 min 13 sec	1293.89	Male / 68 Years
8.	07:04:21 – 07:26:58	22 min 38 sec	1318.66	Male / 41 Years

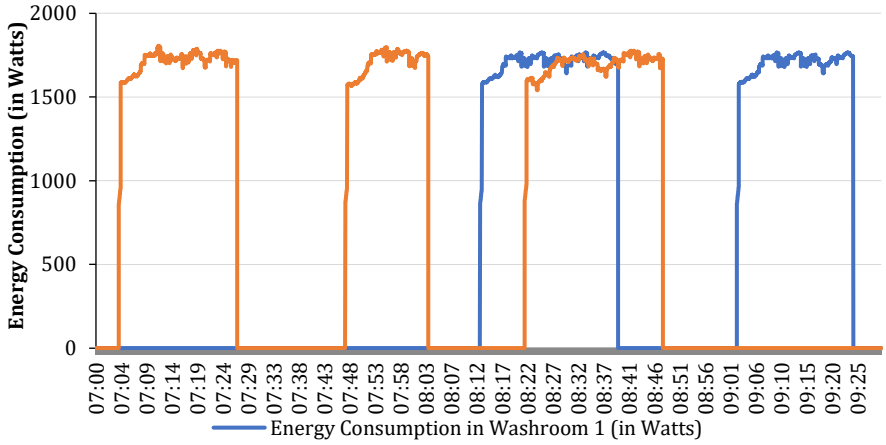


Figure 4. The energy consumption profile of geysers installed in washrooms.

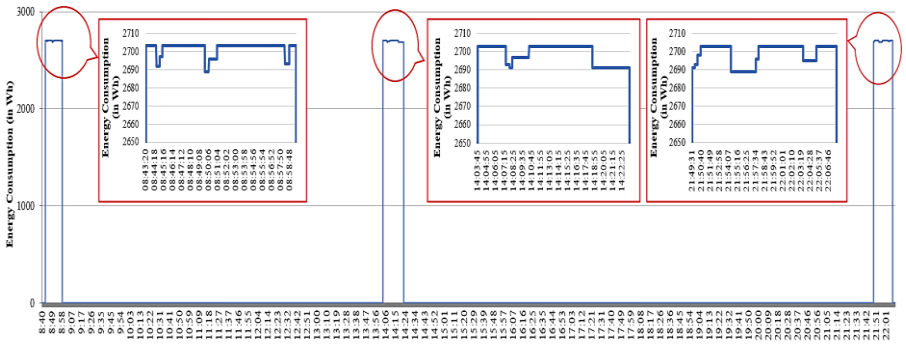


Figure 5. The energy consumption profile of geyser installed in kitchen.

Geyser

A 1000 W power rated hair dryer having two operating modes was used in the surveyed home. The energy consumed was determined and the usage schedule was monitored. It was observed that the dryer was used for nearly 5 min in the high-speed mode and the usage in slow speed mode was negligible, as the dryer comes in this mode while switching on and off, and not for the hair drying purpose. The total energy consumed during this duration was determined as 82.41 Wh. It was used two times a week for nearly the same duration. The weekly total duration of usage of hair dryer was determined to be nearly 11 min., through which the weekly energy consumption of hair dryer was determined as 165 Wh. The energy consumption profile of the hair dryer for a single usage period is presented in figure 6.

DOI10.15320/ICONARP.2025.333

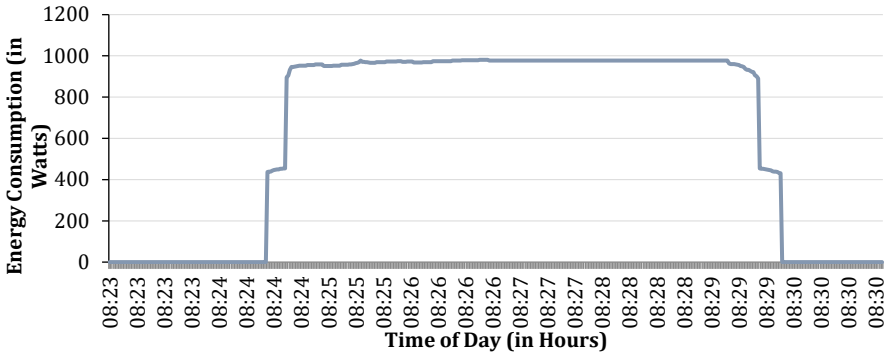


Figure 6. The energy consumption profile of single usage period of hair dryer used in the surveyed home.

Room Heater

Different room heaters (3 in no.) of different wattage were used for space heating in different rooms of the surveyed home. These heaters were used daily, and the frequency and schedule of usage were monitored.

First heater was used in the room of the old age people of the house. It was a radiant heater of 1500 W power rated having double quartz rods. The usage schedule was monitored, and it was observed that the heater in this room was switched on thrice a day for the duration of 1 hr 46 min, 1 hr 3 min, and 3 hr 2 min. The energy consumption during switched on was 2505.2 Wh, 1493.9 Wh, and 4309.78 Wh. The average duration of switched on each time was 1 hr 57 min and the average energy consumption each time was 2,769.6 Wh. The total energy consumption per day and the average hourly consumption of a first heater were determined as 8,308.9 Wh and 1,413 Wh respectively.

Second heater was used in the room of the elder people of the house. It was also a radiant heater of 800 W power rated having double quartz rods. The usage schedule was monitored, and it was observed that the heater in this room was switched on twice a day for the duration of 1 hr 23 min, and 5 hr 16 min. The energy consumption during switched on was 1074.3 Wh, and 4095.8 Wh. The average duration of switched on each time was 3 hr 20 min and the average energy consumption each time was 2,585 Wh. The total energy consumption per day and the average hourly consumption of a second heater were determined as 5,170 Wh and 776.5 Wh respectively.

Third heater was used in the room of the child of the house. It was also a radiant heater of 1,000 W power rated having double ceramic coil rods. The usage schedule was monitored, and it was observed that the heater in this room was switched on thrice a day for the duration of 1 hr 6 min, 21 min, and 4 hr 40 min. The energy consumption during switched on was 1065.6 Wh, 347.75 Wh and 4476.6 Wh. The average duration of switched on each time was 2 hr 2 min and the average energy consumption each time was 1,963.3 Wh. The total energy consumption per day and the average hourly consumption of a third heater were determined as 5,889.9 Wh and 962.4 Wh respectively.

The detailed usage schedule of all the three heaters is presented in table 4 and the energy consumption profile is presented in figure 7.

Table 4. Usage schedule of room heaters used for space heating in the surveyed home.

Heater location	Heater Type and wattage	Usage schedule	Usage Duration	Energy Consumption	Heater location
Room 1	Radiant Heater with double quartz rods (1500 W)	07:37:21 – 09:23:47	1 Hr 46 min 27 sec	3533.8	Female/ Years 63 Male/ Years 68
		13:19:07 – 14:22:29	1 Hr 3 min 23 sec	2106.2	
		09:02:27 – 09:24:39	3 Hr 2 min 40 sec	6074.4	
Room 2	Radiant Heater with double quartz rods (800 W)	07:17:04 – 08:39:57	1 Hr 22 min 54 sec	1104.8	Female/ Years 38 Male/ Years 41
		18:41:29 – 23:58:03	5 Hr 16 min 35 sec	4218	
Room 3	Radiant Heater with double ceramic coil rods (1000 W)	06:37:43 – 07:44:09	1 Hr 6 min 27 sec	1106.8	Male/ Years 19
		08:28:11 – 08:49:51	0 Hr 21 min 41 sec	361.2	
		19:03:18 – 23:42:21	4 Hr 39 min 04 sec	4649.0	

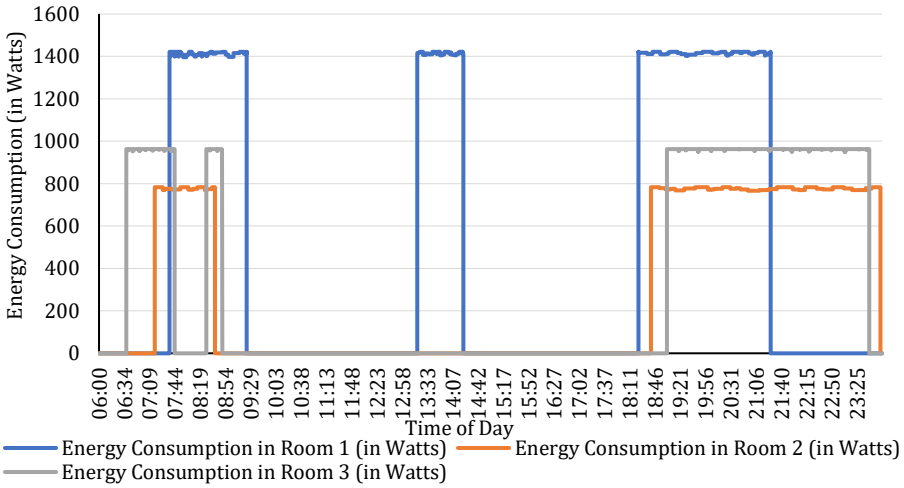


Figure 7. The energy consumption profile of room heaters used for space heating in the surveyed home.

Induction

A 1200 W power rated induction with seven standard operating modes for cooking different eatables was used in the surveyed home. The usage schedule was monitored and the user behavior towards different operating modes was observed. It was noticed that the user preferred to use it in two modes majorly (i.e., mode 5 and 7). The average power rated of mode 5 was 80 W and 1200 W of mode 7. On an average, the device was used twice a day at operating mode 5 for 48 min each time and thrice a day at operating mode 7 for 37 min each time. It was also noticed that even after the induction was switched off, the fan continued to remain on until the device reaches an adequate temperature level. The detailed energy consumption profiles of induction in operating mode 5 and 7 for single usage period are presented in figure 8 and 9, respectively. It is seen in figures 8 and 9 that the induction performs the operation in heating and standby cycles. The total energy consumed during a single usage period of the device was 34.4 Wh at mode 5 and 452 Wh at mode 7. Out of the total energy

DOI10.15320/ICONARP.2025.333

consumption, it was calculated that the heating time in a single usage period was 23 min 9 sec and 24 min 55 sec, in operating mode 5 and 7, respectively, and the energy consumed during this was 23.6 Wh in mode 5 and 444 Wh in mode 7. When the induction was at standby mode, the energy was consumed by the fan. The total energy consumption during stand by usage is 10.8 Wh in mode 5 and 8.0 Wh in mode 7. Considering the same usage schedule and user behavior, the ratio of energy consumption in heating is 68.7% in mode 5 and 98.2% in mode 7.

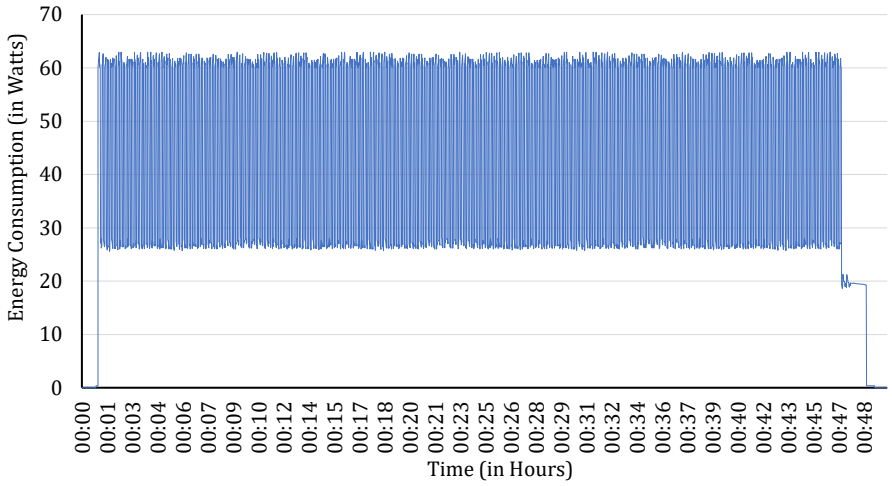


Figure 8. The energy consumption profile of induction for a single usage period at operating mode 5 (i.e., at 80 Watt-hour rated energy consumption)

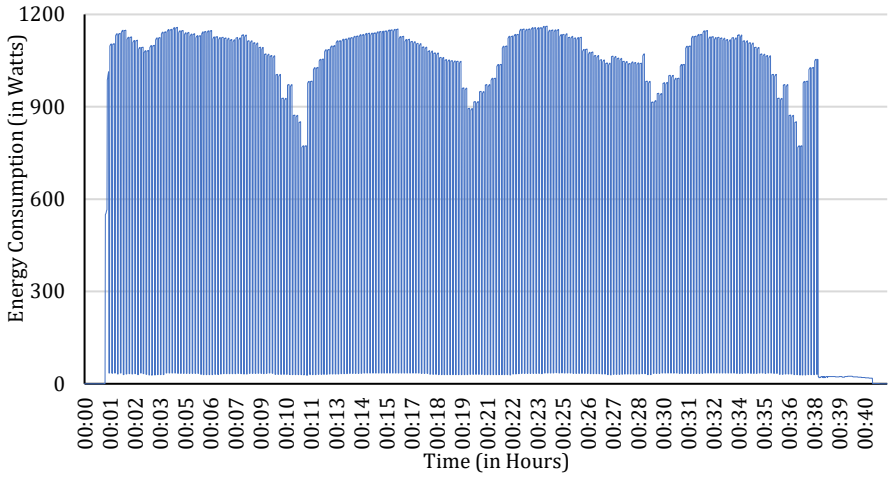


Figure 9. The energy consumption profile of induction for a single usage period at operating mode 7 (i.e., at 1200 Watt-hour rated energy consumption)

Iron

An 800 W power rated iron with three temperature modes for the ironing of different cloths was analysed, and the user generally preferred to use it at temperature mode 2, which was suggested for woollen and silk clothes. It was observed that the iron was used once a week and the average duration for single ironing period was monitored as 1 hr 8 min. The detailed energy consumption profile for single ironing period is presented in figure 10. The heating mode and the standby mode can be observed in figure 10 and the duration for each mode was determined as 29 min and 39 min, respectively. The energy consumed during the heating mode was calculated as 328.15 Wh. It was also

observed that during the standby mode of the above-said duration, the iron consumed a negligible amount of energy, i.e., 0.03 Wh, which gives an average weekly energy consumption of iron as 328.18 Wh.

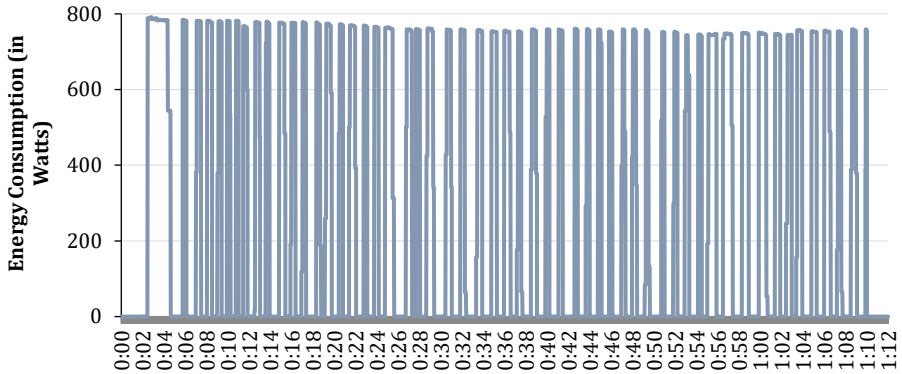


Figure 10. The energy consumption profile of iron for a single usage period at operating mode 2

Mixer-Grinder

A mixer-grinder of 500 W power rated motor having three operating modes was used in the surveyed home. The energy consumption in the mostly used mode was determined and the usage schedule and frequency were monitored. Although, there were three operating modes in the mixer-grinder, but it was observed that the user used it in the first mode only. Also, the mixer-grinder was used once in a day. The average duration of usage was 33 sec and the energy consumed during this duration was calculated as 3.75 Wh. The total duration of usage in a month was determined as approximately 17 min 3 sec. and the total monthly energy consumption was calculated as 116.25 Wh. The detailed energy consumption profile of mixer-grinder for a single usage period in mostly used operating mode (i.e., first mode) is presented in figure 11.

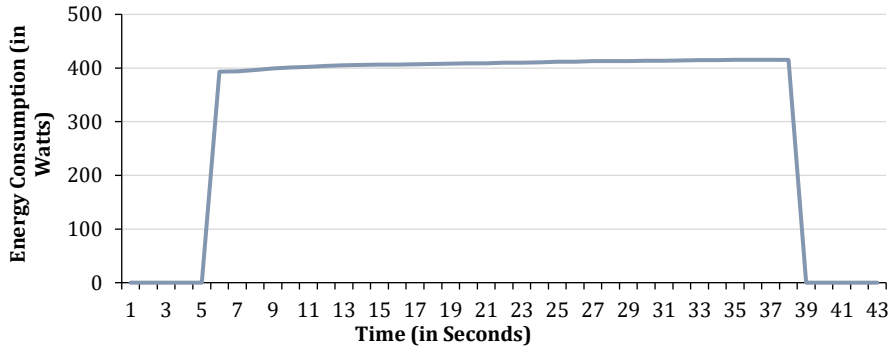


Figure 11. The energy consumption profile of mixer-grinder for a single usage period in first operating mode

Water Kettle

A 1500 W power rated water kettle of 1.5 litres water heating capacity having single operating mode was used in the surveyed home. The energy consumption with different water levels was determined and the usage schedule and frequency were monitored. Inspite of 1.5 litres capacity, it was observed that the kettle was generally used for heating 1 litre of water at a time. The time taken for boiling 0.5,1, and 1.5 litres of water was approximately 4 min 53 sec, 7 min 39 sec and 9 min 11 sec respectively. The energy consumed during this duration was

DOI10.15320/ICONARP.2025.333

120.18 Wh, 189.59 Wh and 228.64 Wh for 0.5,1.0, and 1.5 litres of water, respectively. The detailed energy consumption profile of water kettle with different water levels is presented in figure 12.

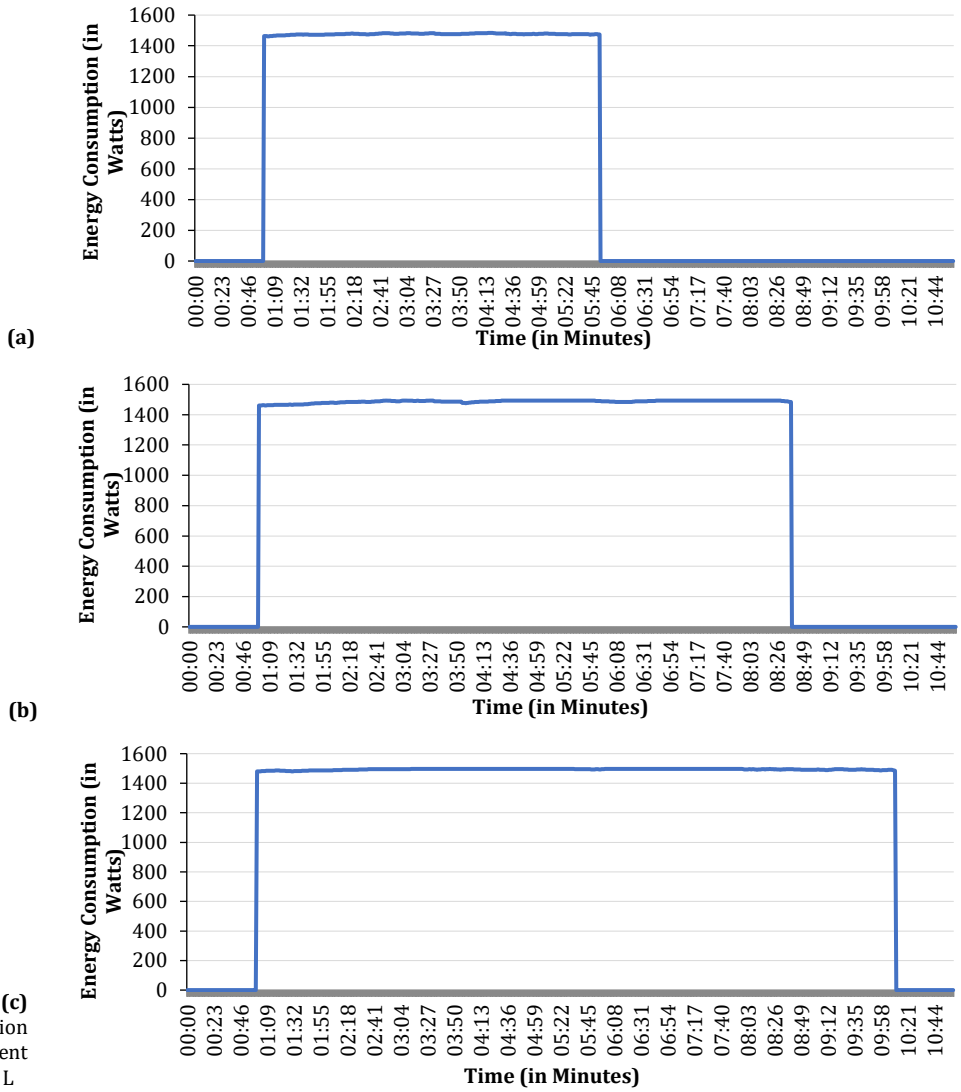


Figure 12. The energy consumption profile of water kettle at different levels (a) 0.5 L, (b) 1 L, and (c) 1.5 L

Laptop

A 15" screen size laptop with 65 W power rated charger was another device which was used frequently in the surveyed home. The usage schedule of laptop was observed, and the energy consumption was determined. The average daily usage duration of laptop was monitored as 3 hr 22 min, out of which 57 min was used while charging and then on the 2-cell lithium-ion inbuilt battery of the laptop. It was observed that as soon as the battery of the laptop was fully charged, the charger was disconnected by the user. The energy consumption during this duration was determined as 57.95 Wh. The laptop was used daily and in the evening time only. According to this assumption that the user behavior towards switching-off the charger does not change, the monthly energy consumption of laptop was calculated as 1796.45 Wh.

The detailed energy consumption profile of laptop during a single charging period is presented in figure 13.

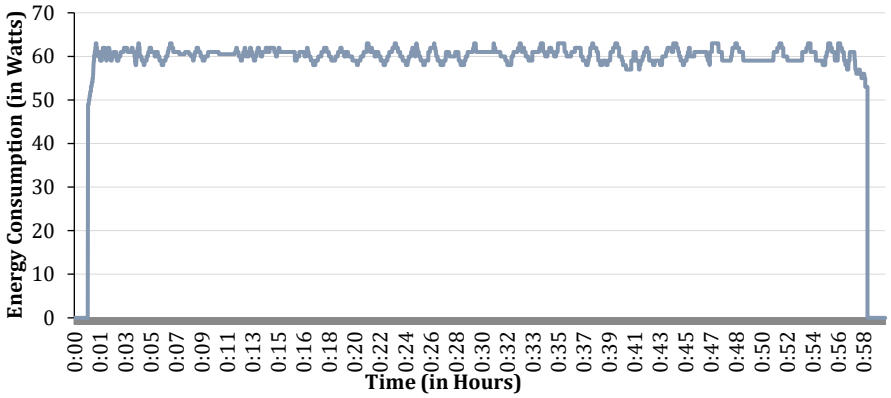


Figure 13. The energy consumption profile of laptop for a single charging period

Oven

Oven was another appliance that was considered in this study, as it plays a significant role in the overall energy consumption in the surveyed home. The usage schedule was monitored, and the energy consumption was determined. It was observed that the oven was used twice a day at 120 °C, thrice a week at 150 °C, and twice a week at 180 °C. It was also noted that even after the oven was switched off as per timer, the fan continued to remain on until the device reaches an adequate temperature level. The average duration for which oven was used was 1 min at 120 °C, 8 min at 150 °C, and 53 min at 180 °C. The detailed energy consumption profiles of oven for a single usage period at 180 °C is presented in figure 14. It is seen in the figure 14 that the oven performs the operation in heating and standby cycles. It was observed that when the oven was at standby mode, the energy was consumed by bulb and fan of the oven. The total energy consumed during the single usage period at 120 °C was 29.3 Wh. Out of this, the heating time was determined as 47 sec and the energy consumed during this was 28.6 Wh. The fan remains on till 31 sec after the timer switched off the device. The ratio of heating in a single usage was determined as 97%. Similarly, the total energy consumed during the single usage period at 150 °C and 180 °C was 159.6 Wh and 907 Wh, respectively. Out of this, the heating time was determined as 4 min 32 sec and 22 min at 150 °C and 180 °C, respectively, and the energy consumed during this was 150 Wh at 150 °C and 790 Wh at 180 °C, respectively. The fan remains on till 4 min 19 sec at 150 °C and 15 min 51 sec at 180 °C, after the timer switched off the device. The total energy consumption during stand by usage is 1.3 Wh while using at 120 °C, 9.6 Wh while using at 150 °C, and 117 Wh while using at 180 °C. The ratio of heating in a single usage period was determined as 93 % at 150 °C and 87 % at 180 °C.

DOI10.15320/ICONARP.2025.333

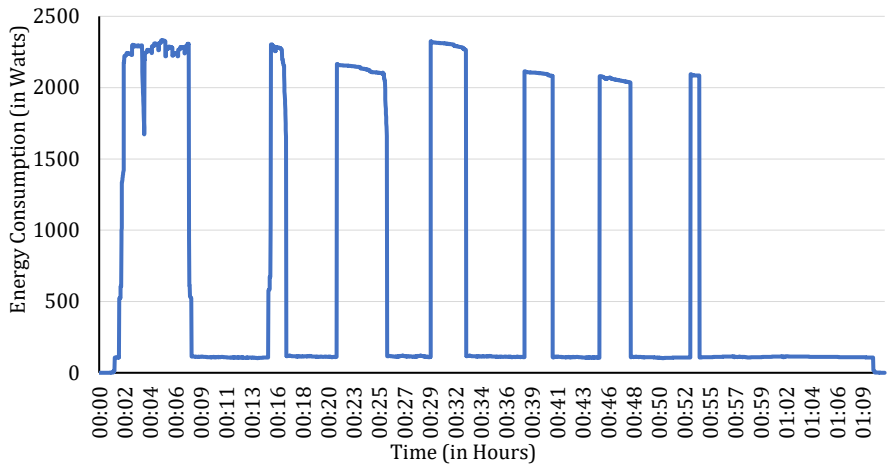


Figure 14. The energy consumption profile of oven for a single usage period at 180 ℃

Refrigerator

A frost-free refrigerator of 265 litres capacity was used in the surveyed home which was switched on for the whole day and night and its daily energy consumption is presented in detail in figure 15. There were cooling cycles of refrigerator at certain intervals of the day and the total cooling time for the day was monitored as 13 hr 4 min. The energy consumption during this cooling process was determined as 62.04 Wh. The door of refrigerator was opened 23 times in the whole day and the average door opening duration was measured as 15 sec. The cooling control was kept at the maximum level. As it is a frost-free refrigerator, it defrosts automatically when required. The same can be observed in the detailed energy consumption profile presented in figure 15 that it performs defrosting twice a day for approximately 18 min each time and the energy consumption during the defrosting process was determined as 276 Wh. The hourly and daily average energy consumption by the refrigerator was determined as 40.74 Wh and 977.87 Wh, respectively. The energy consumption data during the door opening duration of refrigerator was also determined and the change in energy consumption was observed during this. To determine the exact change in energy consumption during this process, the door opening during the standby time of refrigerator was considered. The detailed energy consumption profile during this process is presented in figure 16. The door was opened for 32 sec and 12 sec on the first and second opening respectively and the average energy consumption during this process was determined as 6.74 Wh for the first time and 6.14 Wh for the second time. The door of refrigerator was opened 25 times in the whole day and the average door opening duration was measured as 19 sec. in the surveyed home. Due to the door opening process in the whole day, the refrigerator consumed 0.34 W of energy during each time, which corresponds to 8.5 Wh of daily energy consumption.

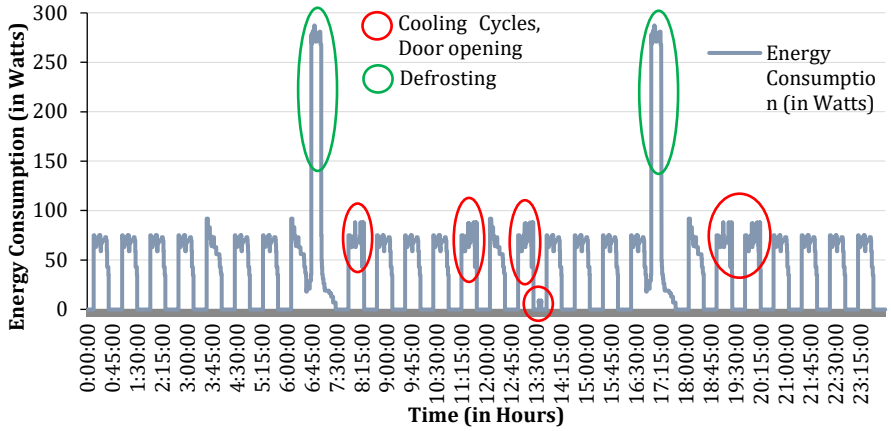


Figure 15. The energy consumption profile of refrigerator used in the surveyed home.

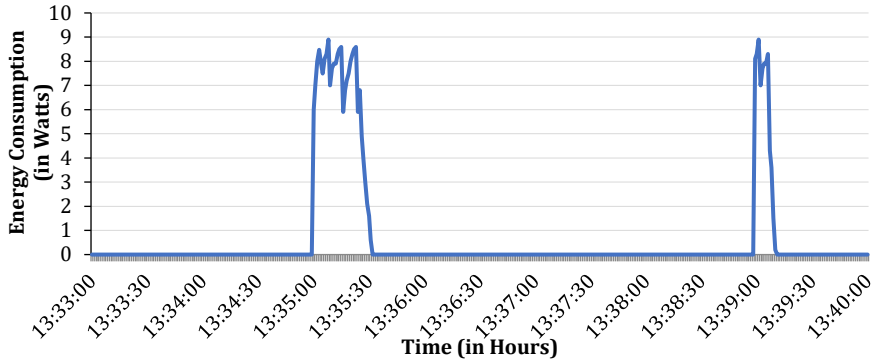


Figure 16. The energy consumption profile of refrigerator during the door opening

Television

A 32" screen size television was another device which was used frequently in the surveyed home. The usage schedule of television was observed, and the energy consumption was determined. It was observed that the usage of the device was different for weekdays and weekends. The daily average usage of television during weekdays and weekends was determined as 4 hr 29 min and 9 hr 30 min, respectively. The detailed energy consumption profiles of television for a respective weekday and weekend are presented in figure 17 and 18. The average daily energy consumption of television during weekdays and weekend was calculated as 182.6 Wh and 362.3 Wh, respectively. The hourly average energy consumption of watching period of television was calculated as 40.6 Wh. It was observed that changing the channels also affects the energy consumption of the television. Also, the negligible amount of energy was consumed by television while it was switched off from the remote control only.

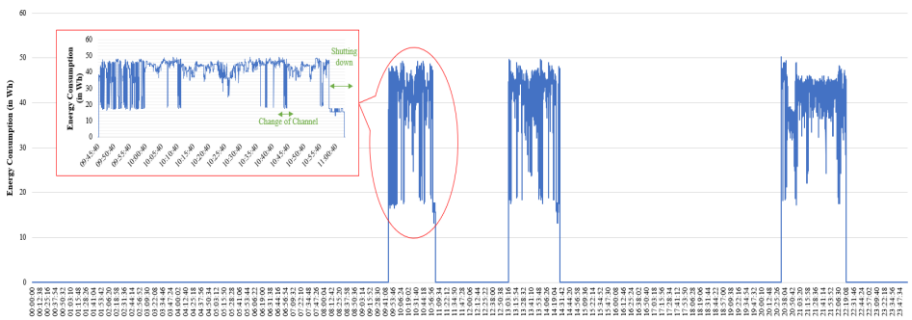


Figure 17. The energy consumption profile of television for a respective weekday

DOI10.15320/ICONARP.2025.333

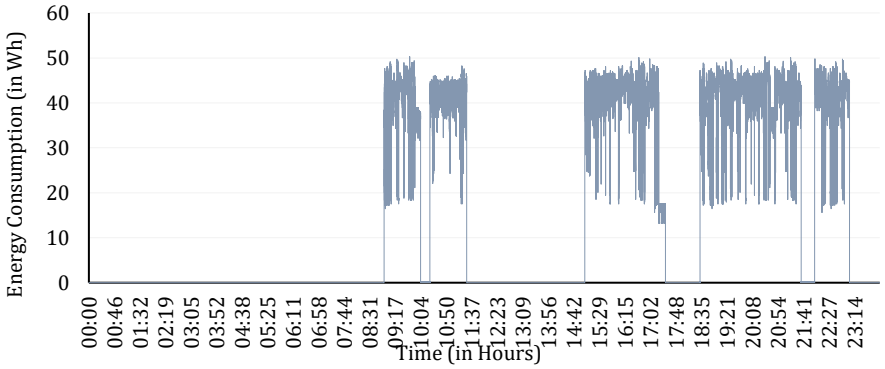


Figure 18. The energy consumption profile of television for a respective weekend

Washing Machine

A top load washing machine having 7 Kg load capacity was used in the surveyed home. The energy consumption of the device was monitored, and the usage schedule and user behavior were observed. The device has 3 washing modes (i.e., gentle, normal, and strong mode) for different types of clothes and was used 4 times a week. To develop the energy consumption profile, the energy consumption was monitored in a way that each time the device was used in a week, it was used in a different washing mode. For example, for the first time, the device was used in the gentle wash mode. Similarly, for the second and third time, the device was used in the normal and strong washing mode. The detailed energy consumption profiles of strong washing mode for a single washing period of 15 min are presented in figure 19. It was observed while analysing the recorded data that each washing period of 15 minutes is comprised of washing and standby cycles for 5 min 2 sec and 9 min 58 sec, respectively in gentle wash mode, 8 min 37 sec and 6 min 23 sec, respectively in normal wash mode, and 12 min 30 sec and 2 min 30 sec, respectively in strong wash mode. The energy consumption by the washing machine in single washing period of 15 min was calculated as 39.96 Wh in gentle mode, 60.4 Wh in normal mode, and 82.4 Wh in strong mode. The ratio of wash time in a single wash cycle was 33.5% in gentle mode, 57.4% in normal mode, and 83.3% in strong washing mode. The spin mode was used for drying the clothes and the average usage duration of spin was 5 min. The energy consumption by the washing machine in spinning mode was calculated as 29.9 Wh and the energy consumption profile of washing machine for a single spin cycle of 5 minutes is presented in figure 20. It was observed that the user always used it in the strong washing mode with water of normal room temperature. The gentle and normal modes were used just for developing the energy consumption profile of the device. Also, it was observed that as per user satisfaction of the washed clothes, 12, 7, and 3 numbers of washing periods were required for each gentle, normal and strong washing mode, respectively. Hence, the total washing period including spin cycle was calculated as 3 hr 5 min, 1 hr 50 min, and 50 min in gentle, normal, and strong washing mode, respectively. The total energy consumed by washing machine was calculated as 509.4 Wh when used in gentle wash mode, 452.7 Wh when used in normal wash

mode, and 277.1 Wh when used in strong wash mode, out of which 319.2 Wh in gentle mode, 179.9 Wh in normal mode, and 41.4 Wh in strong mode is consumed in standby mode.

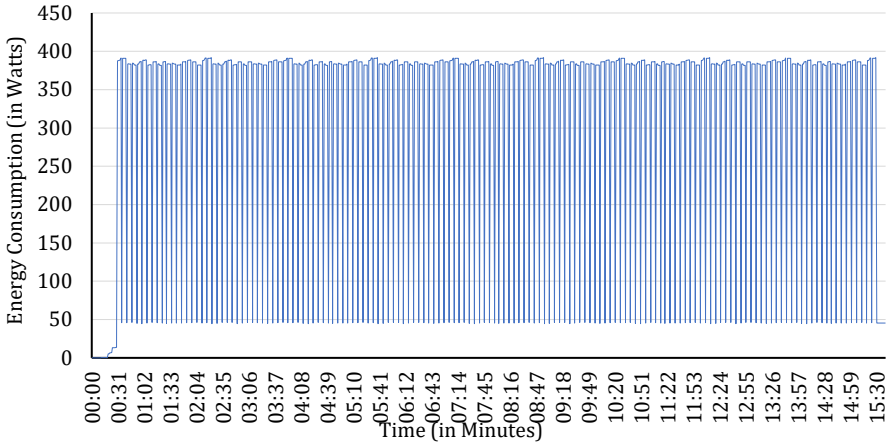


Figure 19. The energy consumption profile of washing machine for a single wash cycle of 15 minutes in strong wash mode

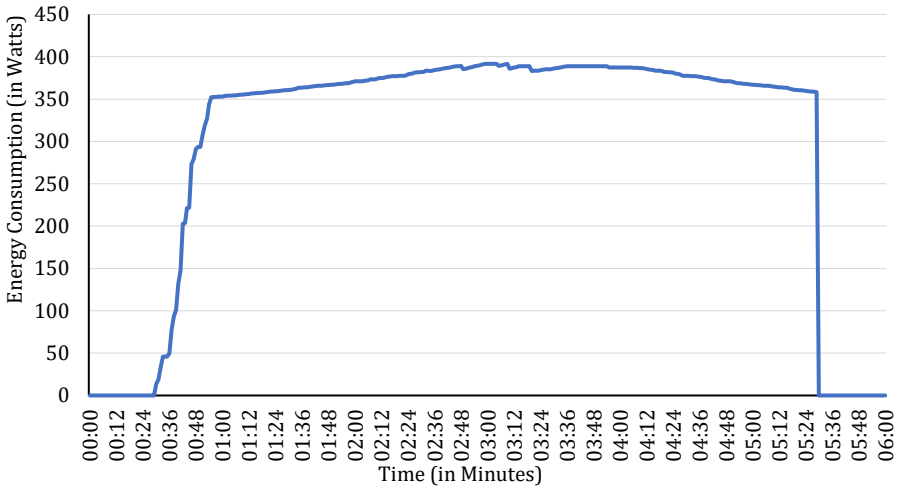


Figure 20. The energy consumption profile of washing machine for a single spin cycle of 5 minutes

DISCUSSION

The detailed appliance-level monitoring conducted in this study provides fresh insights into residential energy consumption in the cold climate of Shimla, Himachal Pradesh. While the results confirmed expected patterns, such as the dominance of room heating and water heating, the discussion requires broader contextualization within the literature, along with an analysis of how climatic conditions, household size, and user behavior shape energy demand. The energy consumption of typical appliances was recorded at one-second intervals, with usage schedules and frequencies monitored on a daily, weekly, and monthly basis. Based on this data, the consumption ratios of different appliances were determined considering user behavior and operating frequency and presented in table 5. The total monthly energy consumption derived from these profiles was further validated against the electricity bill provided by the state electricity board, confirming the accuracy of the measurements.

DOI10.15320/ICONARP.2025.333

Table 5. Usage frequency and total monthly energy consumption of typical household appliances for the month of December 2023

Appliance	Operating Mode	Average Usage Duration		Single Usage Energy Consumption (in Wh)	Usage Frequency	Total Monthly Energy Consumption (in Wh)	Remarks		% of energy wasted due to Standby mode
Dishwasher	50°C Economy	3 hr 30 min		960	9 per month	11,920.5	Heating energy consumption ratio	88.9 %	11.1%
	70°C Intensive	58 min		1093.5	3 per month			97.1 %	2.9%
Geyser (Washroom)	75°C	Geyser 1	24 min	687.4	2 per day	99,516.2	-	-	-
		Geyser 2	21 min	611.8	3 per day				
Geyser (Kitchen)	75°C	18 min		811.9	3 per day	75,506.7	-	-	-
Hair Drier	High speed	5 min 30 sec		82.41	2 per week	741.7	-	-	-
Room Heater	With both rods	Heater 1	1 hr 57 min	2769.6	3 per day	6,00,429.7	-	-	-
		Heater 2	3 hr 20 min	2585	2 per day				
		Heater 3	2 hr 2 min	1963.3	3 per day				
Induction	Mode 5	48 min		34.4	2 per day	44,168.8	Heating energy consumption ratio	68.7 %	31.3%
	Mode 7	37 min		452	3 per day			98.2 %	1.8%
Iron	Mode 2	1 hr 8 min		328.18	1 per week	1,640.9	Heating time ratio	74.3 %	25.7%
Mixer-Grinder	Mode 1	33 sec		3.75	1 per day	116.25	-	-	-
Water Kettle	0.5 L	4 min 53 sec		120.18	4 per week	15,061.02	-	-	-
	1.0 L	7 min 39 sec		189.59	2 per day				
	1.5 L	9 min 11 sec		228.64	1 per week				
Laptop	On charging	57 min		57.95	1 per day	1,796.5	-	-	-
Oven	120 °C	1 min		29.3	2 per day	12,054.4	Heating resistor ratio	97%	3%
	150 °C	8 min		159.6	3 per week			93%	7%
	180 °C	53 min		907	2 per			87%	13%

				week				
Refrigerator	Level 7	24 hours	977.87	24 hours	30,313.97	Defrosting energy consumption ratio	14.2 %	-
Television	Weekday	4 hr 29 min	182.6	22 per month	7,277.9	-	-	-
	Weekend	9 hr 30 min	362.3	9 per month				
Washing Machine	Gentle (12 turns)	Each cycle is of 15 min	39.96 W in each cycle	1 per month	5,395.7	Spin cycle is of 5 min and consumes 29.9 W in each usage. Total energy consumption includes spin.	-	66.5%
	Normal (7 turns)		60.4 W in each cycle	1 per month				42.6%
	Strong (3 turns)		82.4 W in each cycle	16 per month				16.7%

As it is already mentioned that the energy consumption data of these appliances were recorded in the interval of one second and the usage frequency was monitored. The average energy consumption data in a single usage period was calculated. The monthly energy consumption of each appliance was determined using equation 1.

$$\textit{Monthly energy consumption (in KiloWatt Hour)} = \frac{(\textit{Average usage duration} * \textit{single usage energy consumption} * \textit{usage frequency}}{1000} \quad \textbf{Equation 1}$$

The same usage duration, single usage energy consumption was considered, and the user behavior, & the usage frequency of each device was monitored in the month of January 2024, and the energy consumption has been determined and presented in table 6. The obtained value of total monthly energy consumption was later validated with the monthly energy consumption bill monitored by the state electricity board.

Table 6. Usage frequency and total monthly energy consumption of typical household appliances for the month of January 2024

Appliance	Operating Mode	Single Usage Energy Consumption (in Wh)	Usage Frequency	Total Monthly Energy Consumption (in Wh)
Dishwasher	50°C Economy	960	11 per month	13,840.5
	70°C Intensive	1093.5	3 per month	
Geyser (Washroom)	75°C	687.4	2 per day	99,516.2
		611.8	3 per day	
Geyser (Kitchen)	75°C	811.9	3 per day	75,506.7
Hair Drier	High speed	82.41	11 per month	906.51

DOI10.15320/ICONARP.2025.333

Room Heater	With both rods	2769.6	3 per day	6,00,429.7
		2585	2 per day	
		1963.3	3 per day	
Induction	Mode 5	34.4	2 per day	44,168.8
	Mode 7	452	3 per day	
Iron	Mode 2	328.18	6 per month	1,969.08
Mixer-Grinder	Mode 1	3.75	27 per month	101.25
Water Kettle	1.0 L	189.59	94 per month	17,821.46
Laptop	On charging	57.95	22 per month	1,274.9
Oven	120 °C	29.3	71 per month	8,051.7
	150 °C	159.6	9 per month	
	180 °C	907	5 per month	
Refrigerator	Level 7	977.87	24 hours	30,313.97
Television	Weekday	182.6	22 per month	7,277.9
	Weekend	362.3	9 per month	
Washing Machine	Strong (3 turns)	82.4 W in each cycle	21 per month	5,221.1

The total energy consumption of the appliances used in this study was calculated as 905.9 kWh for the month of December 2023 and 909.4 kWh for the month of January 2024. This value was then validated by the energy consumption bill monitored by the state electricity board and the actual energy consumption of the surveyed home for December 2023 was 933 kWh and January 2024 was 958 kWh. The difference of 27 kWh and 48.6 kWh in the actual and measured energy consumption values for the month of December and January, respectively, represents the energy consumed by the rest appliances such as lighting, mobile charging, ceiling fans (used after room cleaning), speakers, exhaust fans (washroom and kitchen), which were excluded from the study. This validated the accuracy of the measured data and the data monitoring methodology. It is to be noted that the difference in actual and measured energy consumption values for the month of January 2024 is higher, which occurs due to the change in actual and assumed usage duration of each device. The total energy consumption of various appliances and their energy consumption ratios for December 2023 and January 2024 are presented in table 7 and figure 21.

Table 7. The total energy consumption of various appliances and their energy consumption ratios for December 2023

S. No.	Appliance	Energy Consumption (in Wh)		Energy Consumption Ratio	
		December 2023	January 2024	December 2023	January 2024
1	Dishwasher	11,920.5	13,840.5	1.28 %	1.45%
2	Geyser (Washroom)	99,516.2	99,516.2	10.67 %	10.42%
3	Geyser (Kitchen)	75,506.7	75,506.7	8.09 %	7.91%
4	Hair Dryer	741.7	906.51	0.08 %	0.09%
5	Room Heater	6,00,429.7	6,00,429.7	64.35 %	62.87%

6	Induction	44,168.8	44,168.8	4.73 %	4.63%
7	Iron	1,640.9	1,969.08	0.18 %	0.21%
8	Mixer-Grinder	116.25	101.25	0.01 %	0.01%
9	Water Kettle	15,051.5	17,821.46	1.61 %	1.87%
10	Laptop	1,796.5	1,274.9	0.19 %	0.13%
11	Oven	12,054.4	8,051.7	1.29 %	0.84%
12	Refrigerator	30,313.97	30,313.97	3.25 %	3.17%
13	Television	7,277.9	7,277.9	0.78 %	0.76%
14	Washing Machine	5,395.7	5,221.1	0.58 %	0.55%
15	Others	27,069.98	48600.23	2.9 %	5.09%

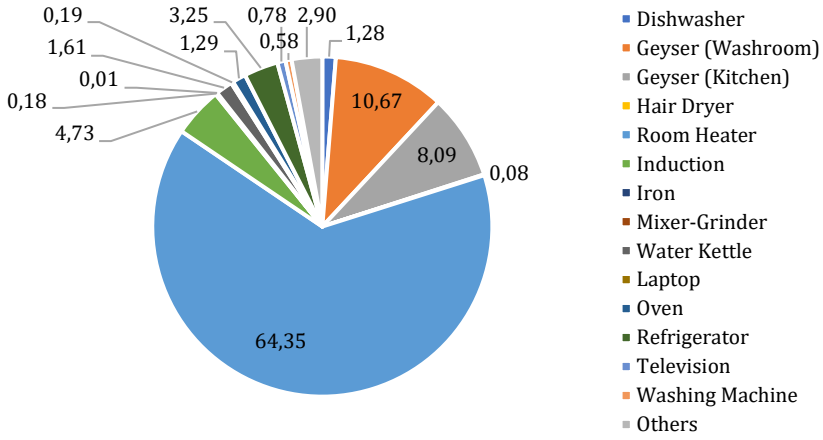


Figure 21. The energy consumption ratios (in %) of different appliances for December 2023

It is seen in table 7 and figure 21 that the room heaters and geysers accounted for the highest share of household electricity consumption during December (i.e., 83.11 %). This outcome is consistent with research on households in cold-climate regions, which report that space heating and water heating dominate residential electricity demand during winter (International Energy Agency, 2017; Nainwal & Sharma, 2024). However, the proportion of electricity devoted to heating in this study was higher than that reported in metropolitan or composite climate regions, where cooking, cooling, and lighting loads form larger shares of consumption (Maurya et al., 2023). This distinction underscores how Shimla's climatic context, marked by extreme low temperatures and reliance on electric appliances due to the absence of centralized heating systems, shapes appliance uses differently from other parts of India and the world. These findings suggest that energy-efficiency policies for hilly regions must emphasize thermal insulation and efficient heating systems rather than focusing solely on cooling technologies, as often seen in national-level policy frameworks.

Beyond climate, user behavior significantly affected the energy consumption profiles observed. For example, the intermittent cooking patterns on the induction cooktop, the choice to keep refrigerators continuously running, and standby consumption from devices such as the microwave oven fan and induction system cooling added hidden but measurable loads. Previous studies on standby power consumption

DOI10.15320/ICONARP.2025.333

confirm that while individual standby loads are small, they cumulatively account for a substantial proportion of household electricity demand (Boegle et al., 2010; Meier, 2001). Similarly, the presence of a five-member family in this study amplified overall appliance usage compared to smaller nuclear families, a finding also observed by (Ekholm et al., 2010), who reported household size as a significant predictor of residential energy intensity in Indian contexts. These results highlight the need for considering demographic and behavioural factors when designing appliance-level interventions.

Previous work in composite and warm-humid climates (Maurya et al., 2023) shows seasonal shifts in demand, where cooling and ventilation dominate in summer, whereas in Shimla's mild summers, demand is restricted mainly to lighting and small appliances. This seasonal variation suggests that the annual energy profile of Shimla households would look drastically different from the winter-dominated profile captured here. Future work should therefore extend monitoring across multiple seasons to develop a more representative year-round dataset.

The appliance-level profiles generated in this study have direct implications for both households and utilities. At the household level, they highlight opportunities for reducing consumption, such as replacing conventional geysers with solar water heaters or heat pump-based systems and minimizing reliance on inefficient electric room heaters through better building insulation. These strategies align with recommendations from the Bureau of Energy Efficiency (Efficiency, 2020) on household efficiency improvements. At the utility level, the data provides a basis for more accurate demand-side management. By anticipating winter peak loads in hilly regions, utilities can design time-of-use tariffs, promote efficient appliances, and integrate smart metering strategies. These applications resonate with global literature, which shows that detailed monitoring of household appliances enables utilities to manage peak demand and promote energy savings (Hong et al., 2020; International Energy Agency, 2017; Xu et al., 2020).

CONCLUSIONS AND RECOMMENDATIONS

This study determines the actual energy consumption profiles of typical home appliances in one second interval. A wireless smart plug was used for monitoring energy consumption and a computer with the specific requirements was used for data extraction and graph generation. The energy consumption data of various household appliances typically used in home with a family size of 5 people was monitored along with their usage schedule and frequency for one month. By analysing the monitored data, the duration and energy consumption by usage and standby cycles along with the overall energy consumption ratios of these appliances were calculated in detail. The following can be concluded:

- Although, the energy consumption units for each month will vary with the variation in usage schedule of appliances, number of persons living, and occupancy schedule of the house, but the ratio of energy consumption during operation and standby mode of appliances at different operating modes, as determined & presented in table 5 of this study, will remain same. Further, using these ratios, per-hour energy consumption value, and by monitoring the usage schedule for each appliance, the hourly, daily, as well as monthly energy consumption can be determined, as shown in this study.
- The amount of energy being wasted in different operating modes of an appliance in a single operation cycle has been determined in this study. The wastage is due to the user-behavior of keeping the device into standby mode. Therefore, the findings of the study also provide an idea of the amount of energy wastage because of user behavior of keeping the device into standby mode. Thus, this waste can be reduced by altering the user behavior.
- It has been observed that the higher/stronger the operating mode of the appliance is, the better is the energy consumption ratio and less is the energy wasted in standby mode of the appliance.
- The percentage share of energy consumption by each device determined in this study can be useful for the energy distribution companies in predicting the energy demand in the respective geographical area.
- Similar research on gas and water consumption can be conducted. Also, the scope of research can be extended to the non-residential buildings and different climatic zones.

Accordingly, the appropriate measures for reducing the energy wastage and energy bill can be taken and energy efficiency can be enhanced. Also, the energy consumption profiles developed in this study will be useful for the researchers working on Smart Grids and Energy Prediction Models as it provides the data at one-second interval.

ACKNOWLEDGEMENTS/NOTES

No funding has been received for this work.

REFERENCES

Abeykoon, V., Kankanamdurage, N., Senevirathna, A., Ranaweera, P., & Udawalpola, R. (2016). Electrical devices identification through power consumption using machine learning techniques. *International Journal of Simulation: Systems, Science and Technology*, *17*(32), 1–9. https://doi.org/10.5013/IJSSST.a.17.32.13

Agnetis, A., De Pascale, G., Detti, P., & Vicino, A. (2013). Load scheduling for household energy consumption optimization. *IEEE Transactions on Smart Grid*, *4*(4), 2364–2373. https://doi.org/10.1109/TSG.2013.2254506

Ahmed, M. S., Mohamed, A., Homod, R. Z., Shareef, H., Sabry, A. H., & Bin Khalid,

DOI10.15320/ICONARP.2025.333

K. (2015). Smart plug prototype for monitoring electrical appliances in Home Energy Management System. *2015 IEEE Student Conference on Research and Development, SCOReD 2015*, 32–36. https://doi.org/10.1109/SCORED.2015.7449348

Ajay-D-Vimal Raj, P., Sudhakaran, M., & Philomen-D-Anand Raj, P. (2009). Estimation of standby power consumption for typical appliances. *Journal of Engineering Science and Technology Review*, *2*(1), 71–75. https://doi.org/10.25103/jestr.021.14

Angioni, A., Schlösser, T., Ponci, F., & Monti, A. (2016). Impact of pseudo-measurements from new power profiles on state estimation in low-voltage grids. *IEEE Transactions on Instrumentation and Measurement*, *65*(1), 70–77. https://doi.org/10.1109/TIM.2015.2454673

Beaudin, M., & Zareipour, H. (2015). Home energy management systems: A review of modelling and complexity. *Renewable and Sustainable Energy Reviews*, *45*, 318–335. https://doi.org/10.1016/j.rser.2015.01.046

Bennett, C. J., Stewart, R. A., & Lu, J. W. (2014). Forecasting low voltage distribution network demand profiles using a pattern recognition based expert system. *Energy*, *67*, 200–212. https://doi.org/10.1016/j.energy.2014.01.032

Bissey, S., Jacques, S., & Le Bunetel, J. C. (2017). The fuzzy logic method to efficiently optimize electricity consumption in individual housing. *Energies*, *10*(11). https://doi.org/10.3390/en10111701

Boegle, A., Singh, D., & Sant, G. (2010). Energy Saving Potential in Indian Households from Improved Appliance Efficiency. In *Prayas Energy Group* (pp. 1–36). Prayas Energy Group. https://prayaspune.org/girish-sant/images/pdf/energy_saving_potential_from_indian_households_from_appliance_efficiency_108a01.pdf

Capasso, A., Lamedica, R., Prudenzi, A., & Grattieri, W. (1994). A bottom-up approach to residential load modeling. *IEEE Transactions on Power Systems*, *9*(2), 957–964. https://doi.org/10.1109/59.317650

Cetin K. S., Tabares-Velasco, P. C., & Novoselac, A. (2014). Appliance daily energy use in new residential buildings: Use profiles and variation in time-of-use. *Energy and Buildings*, *84*(December), 716–726.

Chuan, L., & Ukil, A. (2015). Modeling and Validation of Electrical Load Profiling in Residential Buildings in Singapore. *IEEE Transactions on Power Systems*, *30*(5), 2800–2809. https://doi.org/10.1109/TPWRS.2014.2367509

Csoknyai, T., Legardeur, J., Akle, A. A., & Horváth, M. (2019). Analysis of energy consumption profiles in residential buildings and impact assessment of a serious game on occupants' behavior. *Energy and Buildings*, *196*, 1–20. https://doi.org/10.1016/j.enbuild.2019.05.009

Czétány, L., Vámos, V., Horváth, M., Szalay, Z., Mota-Babiloni, A., Deme-Bélafi, Z., & Csoknyai, T. (2021). Development of electricity consumption profiles of residential buildings based on smart meter data clustering. *Energy and Buildings*, *252*. https://doi.org/10.1016/j.enbuild.2021.111376

Efficiency, B. of E. (2020). *Star Label Homepage of Bureau of Energy Efficiency*. https://beeindia.gov.in/star-label.php

Ekholm, T., Krey, V., Pachauri, S., & Riahi, K. (2010). Determinants of household energy consumption in India. *Energy Policy*, *38*(10), 5696–5707. https://doi.org/https://doi.org/10.1016/j.enpol.2010.05.017

Energy Statistics India (pp. 10–12). (2022). Ministry of Statistics and Program Implementation, Government Of India. https://mospi.gov.in/web/mospi/reports-publications/-

/reports/view/templateFive/27201?q=RPCAT

Faruqui, A., & Sergici, S. (2010). Household response to dynamic pricing of electricity: A survey of 15 experiments. *Journal of Regulatory Economics*, *38*(2), 193–225. https://doi.org/10.1007/s11149-010-9127-y

Firth, S., Lomas, K., Wright, A., & Wall, R. (2008). Identifying trends in the use of domestic appliances from household electricity consumption measurements. *Energy and Buildings*, *40*(5), 926–936. https://doi.org/10.1016/j.enbuild.2007.07.005

Hong, J. H., Hong, D. Y., Yao, L. H., & Fu, L. C. (2020). A demand side management with appliance controllability analysis in smart home. *Proceedings -of the 2020 International Conference on Smart Grids and Energy Systems, SGES 2020*, 556–561. https://doi.org/10.1109/SGES51519.2020.00104

Hurley, D., Peterson, P., & Whited, M. (2013). Demand Response as a Power System Resource. *Synapse Energy Economics Inc*, *May*, 81. http://www.synapse-energy.com/Downloads/SynapseReport.2013-03.RAP.US-Demand-Response.12-080.pdf

International Energy Agency. (2017). *World Energy Outlook*.

Kam, M., Suryadevara, N. K., Mukhopadhyay, S. C., & Gill, S. P. S. (2014). WSN based utility System for effective monitoring and control of household power consumption. *Conference Record - IEEE Instrumentation and Measurement Technology Conference*, 1382–1387. https://doi.org/10.1109/I2MTC.2014.6860973

Kuzlu, M., Pipattanasomporn, M., & Rahman, S. (2012). Hardware demonstration of a home energy management system for demand response applications. *IEEE Transactions on Smart Grid*, *3*(4), 1704–1711. https://doi.org/10.1109/TSG.2012.2216295

Marina, L., Masi, R.-F. de, Karatasou, S., Santamouris, M., & Assimakopoulos, M.-N. (2022). On the impact of user behaviour on heating energy consumption and indoor temperature in residential buildings. *Energy and Buildings*, *255*(January), 111657.

Maurya, S., CGS, G., Garg, V., & Mathur, J. (2023). Summer Electricity Consumption Patterns in Households Using Appliance Load Profiles. *Proceedings of the 10th ACM International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation*, 485–490. https://doi.org/https://doi.org/10.1145/3600100.3627027

Meier, A. K. (2001). A worldwide review of standby power use in homes. In *Lawrence Berkeley National Laboratory* (DE-AC03-76SF00098). http://escholarship.org/uc/item/03m799xz.pdf

Nainwal, R., & Sharma, A. (2024). Comparison of energy prediction models for residential buildings: a case study in Himachal Pradesh, India. *Progress in Energy*, *6*(4). https://doi.org/10.1088/2516-1083/ad87a3

Paatero, J. V., & Lund, P. D. (2006). A model for generating household electricity load profiles. *International Journal of Energy Research*, *30*(5), 273–290. https://doi.org/10.1002/er.1136

Pipattanasomporn, M., Kuzlu, M., Rahman, S., & Teklu, Y. (2014). Load profiles of selected major household appliances and their demand response opportunities. *IEEE Transactions on Smart Grid*, *5*(2), 742–750. https://doi.org/10.1109/TSG.2013.2268664

Santin, O. G. (2011). Behavioural Patterns and User Profiles related to energy consumption for heating. *Energy and Buildings*, *43*(10), 2662–2672.

Shakeri, M., Shayestegan, M., Abunima, H., Reza, S. M. S., Akhtaruzzaman, M., Alamoud, A. R. M., Sopian, K., & Amin, N. (2017). An intelligent system

DOI10.15320/ICONARP.2025.333

architecture in home energy management systems (HEMS) for efficient demand response in smart grid. *Energy and Buildings*, *138*, 154–164. https://doi.org/10.1016/j.enbuild.2016.12.026

Shirazi, E., Zakariazadeh, A., & Jadid, S. (2015). Optimal joint scheduling of electrical and thermal appliances in a smart home environment. *Energy Conversion and Management*, *106*, 181–193. https://doi.org/10.1016/j.enconman.2015.09.017

Sustainable Development Goals, Department of Economic and Social Affairs, United Nations. (2015). https://sdgs.un.org/goals

Tang, S., Kalavally, V., Ng, K. Y., & Parkkinen, J. (2017). Development of a prototype smart home intelligent lighting control architecture using sensors onboard a mobile computing system. *Energy and Buildings*, *138*, 368–376. https://doi.org/10.1016/j.enbuild.2016.12.069

Tewathia, N. (2014). Determinants of the household electricity consumption: A case study of Delhi. *International Journal of Energy Economics and Policy*, *4*(3), 337–348.

Wu, X., Hu, X., Yin, X., & Moura, S. J. (2018). Stochastic Optimal Energy Management of Smart Home With PEV Energy Storage. *IEEE Transactions on Smart Grid*, *9*(3), 2065–2075. https://doi.org/10.1109/TSG.2016.2606442

Xu, Z., Gao, Y., Hussain, M., & Cheng, P. (2020). Demand Side Management for Smart Grid Based on Smart Home Appliances with Renewable Energy Sources and an Energy Storage System. *Mathematical Problems in Engineering*, *2020*, 1–20. https://doi.org/10.1155/2020/9545439

Zhang, D., Shah, N., & Papageorgiou, L. G. (2013). Efficient energy consumption and operation management in a smart building with microgrid. *ENERGY CONVERSION AND MANAGEMENT*, *74*, 209–222. https://doi.org/10.1016/j.enconman.2013.04.038

Resume

Rajat Nainwal is an Architect by profession and received his Master of Architecture Degree in Sustainable Architecture from NIT Hamirpur in 2019 and currently as a Research Scholar in the Department of Architecture at NIT Hamirpur. He has 1-year professional experience. His current research interest includes Energy Efficiency, Energy Conservation in Operational energy of Residential and Commercial Buildings, Sustainable techniques in Building Constructions, expertise in building energy simulations and use of Artificial Intelligence in Building Energy Analysis. He is registered with the Council of Architecture, India.

Aniket Sharma received a degree of Doctor of Architecture in 2017 from NIT Hamirpur and presently an Assistant Professor, Department of Architecture, NIT Hamirpur has an experience of 13 years in the field of Architecture- Teaching and research and 2 years in architectural consultancy and Project Management. He has published 2 Books, 11 Research Papers in National and International Journals, and 19 papers in National and International conferences. His current research interests are in Life Cycle Energy and Cost Analysis, embodied energy indexing materials, energy efficient residential buildings and adaptive use of vernacular architecture. He has also delivered invited expert lectures in many national and international forums and has completed several consultancy projects. He has been awarded a Certificate of Appreciation by Birla White Yuvaratna Awards, 2015 for mentoring a student to win Yuvartna Awards 2015, a national level design competition. He was a Subject Expert- Board of studies

(Architecture) for Himachal Pradesh Technical University and a Member- Board of Studies, Lovely professional University, Jalandhar.

DOI10.15320/ICONARP.2025.333

ICONARP
International Journal of Architecture and Planning
Received: 01.05.2025 Accepted: 17.10.2025
Volume 13, Issue 2/ Published: 31.12.2025
DOI: 10.15320/ICONARP.2025.334 E- ISSN:2147-9380

Research Article

ICONARP

Étienne-Louis Boullée and Pierre Chareau: Two Approaches to an Emerging Utopian Idea in Interior Design

Nevzat Ruhi Eryılmaz*
Emre Demirel**

Abstract

The idea and concept of Utopia have been widely discussed in the contemporary world, and there is a wide post-utopic discussion regarding it. Furthermore, throughout history, the idea of utopia and its relation to architecture has also been discussed in many studies and can be observed in many resources. In other words, the idea and concept of Utopia and its relation to architecture and design thus have been widely discussed. A point of view to consider, however, is that there has been little discussion about how Utopia has changed the way of handling the design of interior spaces and perceived the emergence of new ideas about modern interior spaces. This paper aims to observe and gain insight into the idea of Utopia in interior design through the lens of two different designers and see the change of approach to how the Utopian Idea in interior spaces has evolved throughout the centuries. To achieve this, the architect Étienne-Louis Boullée (1728-1799) and the designer Pierre Chareau (1883-1950) have been analysed and their works observed through the lens of searching for an emerging utopian idea in interior architecture/ design. This study thus spanned throughout centuries, focusing especially on the 17th and 19th Centuries to analyse specific works done by the designers mentioned above, either in drawings or finished projects, and focusing especially on their interiors. It has been observed that the idea of Utopia offered a new way of considering spaces from a humanistic perspective, and that it has changed throughout centuries, manifesting possibly new different views of Utopia in interior spaces.

Keywords:
Étienne-Louis Boullée, Interior Architecture, Interior Design, Pierre Chareau, Utopia

*Department of Interior Architecture and Environmental Design, TED University, Ankara, Türkiye (*Corresponding author*)
Email: nevzat.eryilmaz@tedu.edu.tr

** Department of Interior Architecture and Environmental Design, Hacettepe University, Ankara, Türkiye
Email: emre.demirel@hacettepe.edu.tr

To cite this article: Eryılmaz, N.R., & Demirel, E. (2025). Étienne-Louis Boullée and Pierre Chareau: Two Approaches to an Emerging Utopian Idea in Interior Design. *ICONARP International Journal of Architecture and Planning,* 13 (2), 524-543. DOI: 10.15320/ICONARP.2025.334

INTRODUCTION

The late 19th Century is regarded as one of the most dynamic time periods in the history of Europe. The Industrial Revolution resulted in the invention of many technological advancements. This shift and the sudden, violent creation of technology and intellectual approaches also changed humanity in general. People have used this advancement to define themselves, their immediate environment, and consequently, other areas of their life. This created a leap, with changes occurring on systems of thought, systems of governance, of production, and political systems. Among these, one idea is crucial to the human psyche: That of Utopia. How did Utopia affect the human psyche, their immediate environment and their way of perceiving interior spaces? This is the main query.

In 1516, renowned writer Thomas More used the word 'Utopia' to describe an island where the highest republic existed (Britannica, 2024: paragraph 1), an ideal society that had solved all its human problems. This key starting point describes the word Utopia fundamentally with the word 'human' and 'problem'. Utopia, then, must be in relation with humanity and its myriad societal problems. Additionally, its translation in terms of architectural and interior architectural design elements and principles also started to appear with these new notions. As the idea of Utopia marched on through centuries, various meanings were attributed to it. The field of architecture and design were no different in this regard, and two distinct names especially come forth to mind, one at the start of the 18th Century, and the other at the start of the 19th, both of whom tackled the idea of Utopia in interior architecture and design. Their works are well woven into Utopia in interior spaces because they are distinct in how they tackled Utopia in interior spaces, bringing new ideas into the discussion, and consequently capturing the metamorphosis of Utopia throughout the centuries. the crucial touchstones are Étienne-Louis Boullée and Pierre Chareau: They are prominent architects/ interior designers who brought the idea of Utopia into interior spaces, translating a Utopic vision into interior architecture/ design with various design fundamentals. While there have been other designers who have used similar techniques and styles, both Boullée and Chareau have produced unique oeuvres that have influenced later generations to search for utopia in interior spaces. Étienne-Louis Boullée produced a series of drawings between 1873 and 1875 that would influence the designers of subsequent centuries, while Chareau's 'Maison de Verre', finished in 1932, would become a focal point in understanding early modern architecture and how novel materials (for their time) were used in juxtaposition to each other. Utopia, as a concept and idea in architecture, has been widely discussed in the field of architecture, and has many post-utopic discussions regarding it. However, not much has been written in depth about the concept of Utopia itself, as a translation to interior /design and how it is presented in it.

Thus, providing a base framework to understand and analyse how Boullée's and Chareau's interior design projects influenced the human

DOI:10.15320/ICONARP.2025.334

physiology and human psyche is paramount. Based on French philosopher Paul Ricœur's ideas, architectural practice is structured on two main parts: Narration (thinking) and Doing (constructing) (Ricœur, 2016: 36-37). This research will focus on how the idea of Utopia translated into Boullée's and Chareau's design process, their projects and their interior architectural iterations. For this purpose, the architects' sketches, drawings, and texts were analysed and subsequently compared to each other. To achieve this, specific case studies were chosen, and analysed according to two distinct aspects: The experiential aspect that focused on analysis points such as Perception, Scale, Light, Material, and Colour, while the social aspect focused on how these interiors were perceived after being experienced, and how communal/ gathering areas were designed and moulded into the interiors to create areas that would lead to communication and engagement. Finally, further questions related to these names were asked: Where do they converge/ diverge in terms of tackling Utopia? What are the different interior experiences they offer to their users? How did the word Utopia gain its meaning in the field of interior design through the works of two different architects/ designers?

THEORETICAL DISCUSSIONS REGARDING UTOPIA

The word Utopia has to do with human beings and their specific political and thought systems. To relate it to interior architecture and design, it is important to understand what characteristics of Utopia can be translated into design and how they can be perceived in interior spaces.

According to Coleman, '*(...) a discernible utopian dimension of architecture or urbanism (no matter how partial the claim to Utopia may be) entails a sustained consideration of both social process and spatial closure'* (Coleman, 2014: 17). This statement implies that while interior architecture/ design does create spatial closures, it cannot be related to Utopia without a connotation to either experiential or social encounters, possibly needing both. This point is crucial in understanding how a space can be related and translated to Utopia.

Green states, *'The affinity of architecture and Utopian thought is easy to understand. When visionaries define the ideal life, they lay out a physical setting to establish and enhance its existence'* (Green, 1993: 1). But what about the interior of these proposed physical settings? And what about their effect on the human mind as it experiences said interior settings? Coleman proposes that both a social and a spatial setting is necessary. Thus, a physical setting is not enough to understand how Utopia can be translated into interior spaces. These settings need experiential aspects as well as social aspects, as humans exists by being physically present (the physical setting) and mentally aware (the cognitive and social aspect).

Balot, quoting from Kateb, explains '(..) *by "utopia" we mean a rationally ordered society that aims at social unity or wholeness and*

individual happiness; and by "happiness" Utopians have typically meant pleasure, peace, material bounty, perhaps virtue, and perhaps the intellectual life' (Balot, 2008: 75). This quote can also be related and attributed to interior architecture and design, as it has counterparts in the form of design principles. Rationality, order, unity, wholeness are all examples. However, the social setting, the setting that provides 'pleasure' or 'social unity', is above all necessary to observe and understand Utopia in interior design.

Greene explains the importance of architecture and how it plays a leading role in the narrative of utopian efforts as '*From (...), to the late-eighteenth-century French visionary architecture of Étienne-Louis Boullée and Claude-Nicolas Ledoux, implicit in the thoughtful construction of space is the urge to change and better society*' (Greene, 2011: 6). Bettering society is both an idea and a question. How can society be bettered? How far can betterment be pushed? Can there be a point of reaching Utopia by this betterment? The translation of different concepts and ideas into other areas of human existence is of crucial importance here. Ricœur, in a text provided by the Editorial Committee, provides a parallel between architecture and narrativity, citing that architecture is to space what narrative is to time (Ricœur, 2016: 31). The skill and craft involved in relating these elements within an analogy is important here, for Utopia, in the same vein, also shows a parallel with social aspects.

The advent of technology and the usage of new materials in the architectural field led to major shifts in how architecture was viewed. This shift led to a new perspective on how architecture and interior architecture/ design could be perceived and experienced. Renowned 20th Century author Scheerbart states that closed rooms are the places where most humans live, and the environment in which culture grows. He proposes that for the culture to 'rise' to a higher level, architecture must change, and that this can only be done if its closed nature is removed, and glass is introduced. (Scheerbart, 2020: 17). The idea of rising or elevating oneself or something to reach a higher level was already translated into architecture and design as early as 1914. The theoretical conceptualization of Utopia was being discussed; however, it was not being defined or named properly.

These discussions show that Utopia has a physical and formalist aspect but is also related to social and spatial experiences. By translating these theoretical discussions into a concrete and observable state, it becomes possible to perceive the existence of the experiential and social aspects of Utopia in interior architecture / design. These aspects have elements that guide us to understand how Utopia is embodied in interior architecture/ design. The experiential aspect focuses on how data is primarily cognized, while the social aspect focuses on how data is perceived. The experiential aspect is primarily focused on human physiology, while the social aspect is focused on the human psyche. This work will focus on how this argument will find a body in the work of these two architects/ designers. Creating this frame of reference, with

DOI:10.15320/ICONARP.2025.334

experiential and social aspects is an important origin point. According to Allen and Tate, '*Interior design, as we must constantly bear in mind, is an applied art, not a fine art. It has a program of requirements for physical function, for psychological function that are or should be part of the goal of a designer'* (Tate and Smith, 1986: 562). The concept of Utopia must also find a translation of both these aspects in interior architecture and design. Another important discussion regarding Utopia is the concept of space theorised by Henri Lefebvre, who posits that spaces are constructed, and they form a conceptual triad. These are 'Spatial practice', 'Representations of Space' and 'Representational Space'. This triad provides a way of reading spaces (Lefebvre, 33, 1991).

METHOD

How can Utopia be translated into interior design through design elements and principles? This query was defined as the research question of the study, with the point of view of the designer taken into consideration. Within this scope, the research is grounded upon case studies, and the method of the research is determined as document analysis that aims to gain insights into how Utopia could exist in or be translated to interior architecture/ design. In the analysis, drawings or projects were analysed according to two major aspects defined above. According to Tate and Smith, '*An interior is a space that is enclosed by walls, floors, and ceilings. It has one or more entries/ exits, and usually one or more openings, such as windows, for light and ventilation. Those enclosing elements may be composed of any number of materials and formed of countless shapes*' (Tate and Smith, 1986: XIV). The experiential aspect has thus different principles that focus on 'Scale, Light, Material, Colour, Circulation, and Perception', all principles defined as essential to interior architecture/ design. The social aspect focuses on how the interior is primarily perceived, followed by what types of convergence and common areas the spaces provide. Pile and Gura state, '*The new paradigm of the interior designer is no longer the decorator who simply chooses fabrics and arranges furniture. In fact, the latter term is gradually falling out of use, with increased efforts to establish standards that elevate the status of interior designers to that awarded to other professions, such as architecture and engineering*' (Pile and Gura, 2018: 470). Pile and Gura continue to explain that interior designers have evolved into multitalented and respected professionals who can plan intricate configurations and reconfigurations (…) (Pile and Gura, 2018: 470). The social aspect, thus, has principles that focus on how these spaces are configured to create interior areas that facilitate the desired effect. The conclusion provides observable insights into how the idea of Utopia could relate to the interiors. These principles can be briefly defined and presented below as:

Table 1. Framework for understanding utopia in interior areas.

EXPERIENTIAL ASPECTS	SOCIAL ASPECTS
SCALE	PERCEPTION
LIGHT	CONCEPTUAL UNDERSTANDING
MATERIAL	CONVERGENCE AREAS
COLOUR	APPEALING, INVITING AREAS
CIRCULATION	COMMON AREAS
COGNITIVE RELATIONS	

The experiential aspects focus mainly on how the interior is cognized. This first step is important as it provides insight into what the designer aimed to give the user as a first impression. How did the designer consider the idea of bodily experience and experientiality? This also includes cognitive relations, which in this regard, relate to how the interior space is learned and understood. The social aspect is crucial in understanding what the designer aimed for its user to experience after having spent time in it. It should be noted once again that this aspect is not from the perspective of the user, but rather the designer's perspective. How did the designer consider the social aspects? What were the configurations in the interior architectural design that formed the spaces? How were spaces meant to be perceived? Which spaces were meant to be used as gathering or congregating points? Which areas were meant to guide the user towards it? In this framework, the materials of the study are the works of the architects/ interior designers Etienne Louis Boullée and Pierre Chareau. Boullée's drawings, consisting mainly of public spaces designed for governmental interiors, were primarily used, and Chareau's widely considered masterwork, The 'Maison de Verre', was used. Boullée's drawings, in this regard, reflect an idea that emerges from interiors, while Chareau's building is a reflection of the same idea through technology and constructed interiors.

ÉTIENNE LOUIS BOULLÉE AND HIS VISION/ STYLE

At the turn of the 18th century, a different approach to architectural theory was emerging: Risebero explains that architectural theorists of the 18th Century were caught up by the dynamism of the '*philosophes*'. It was thought that buildings should express the essential grandeur of man both by their sublimity and by their reference to his dignified past (Risebero, 2001: 185). This thought process also meant that buildings should have a specific form and character: Risebero continues that what was expected of buildings was for them to be large, simple, sombre, cavernous and mysterious (Risebero, 2001: 185). Louis Etienne Boullée was one such architect. His projects and drawings paved the way to create a window to the idea of utopia as an interior space (Risebero, 2001: 185). Boullée never committed himself to a political point, nonetheless the connection between Utopia and the characteristics related to it are observable in his work. This connection presents itself chiefly in the form of social aspects and the importance given to the interior areas in his drawings. The idea of discourse, discussion and the flow of information play an important

DOI:10.15320/ICONARP.2025.334

role in his interiors and the idea of congregation towards a central point is paramount.

His ideas regarding the experiential aspect, on the other hand, rested chiefly upon light and scale, which would influence other elements heavily.

According to Duchêne, Boullée is an architect and brilliant theorist, inspired by the progressive ideas of the 18th Century, who pushes the evocative force of art very far. His building projects with pure, straight lines that still astonish with their gigantism and solemnity, have multiple vocations: aesthetic, of course, but also pedagogical (Duchêne, 2021).

A final question then presents itself: Did the search for a utopia also bring the search for new buildings and interiors? Was this search created not only by new advances in technology, but also by advances in schools of thought? Risebero puts it as '*As social awareness increased, new building-types were required; everywhere architects were inventing forms for buildings designed to promote health, welfare and social responsibility: hospitals, prisons, schools, model factories, housing estates, monuments and Temples of the Moral Values*' (Risebero, 2001: 185).

His style focused heavily on the sphere, symmetry and scale. Frampton explains this vision as '*(...) he remained obsessed with imagining the monuments of some omnipotent state dedicated to the worship of the Supreme Being*' (Frampton, 2020: 17). His cenotaphs and drawings promised grandiose buildings, far above the human scale, with light emanating into interiors and permeating gently through them. His views, as summarized by Duchêne, are '*Bathed in the ideas of the Enlightenment, he considers that humans must be led to understanding, for the progress of society and those who compose it'* (Duchêne, 2021). Duchêne explains that Boullée believed an enlargement of the horizon of thought was necessary for humans (Duchêne, 2021). His works were about leading the human collective towards an enlightened, superior form of being. To achieve this, architecture and interior design needed to play an important role.

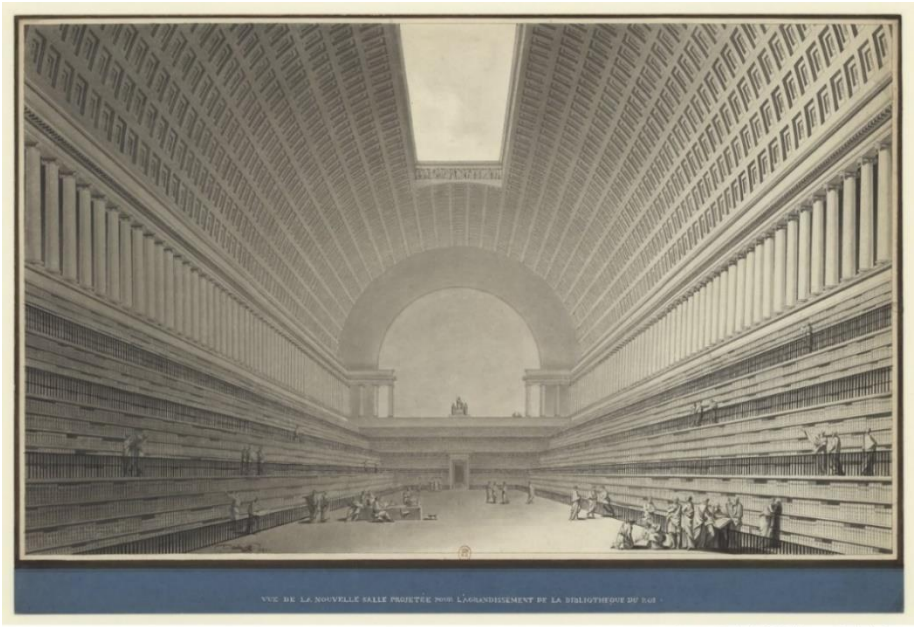
Boullée mostly produced drawings, but they paved the way to understand how utopia could be present in interiors and how it could be perceived through interior design elements. In the library drawing made for the king (Figure 1), Boullée explains his view as 'A *library, is, indisputably, the most precious Monument of a Nation, because it encloses acquired knowledges*' (Boullée, 1785, gallica.bnf.fr). How Boullée approached this interior project is important. With a very strong middle axis dominating the drawing, the space is symmetrically divided into two, with columns supporting a vast vault-like ceiling that takes inspiration from the Pantheon, with a similar opening in its middle. While in the Pantheon, this would be the Oculus, here the form it takes is much more rectangular and allows for the interior to be bathed in light. Boullée also comments on this in his treatise with '*We have cited the advantages of the Library of Rome, whose galleries start from a common centre, with the assurance that, from this very centre, we can see everyone who is in the library*' (Boullée, 1785, gallica.bnf.fr). Boullée, then, takes inspiration

from the old, classical buildings present in Western Europe. In his treatise, he continues with *'My design would transform a courtyard, 300 meters long and 90 meters wide, into an immense basilica lighted from above'* (Boullée, 1785, themorgan.org). This is an important point, as Boullée's predominant feature in this building suggestion would be the idea of it being bathed from above with sunlight. In this interior light plays a crucial role in the design. Another important experiential aspect of it is the symmetry and scale. His scale dramatically increases both horizontally and vertically compared to human proportions. A rough calculation reveals that the ceiling height is designed at around 15 to 20 meters. The cognitive aspect then, is that of light and scale foremost.

The perception of the space is of a large, imposing building that nonetheless offers easy access to its main service, which are books, and provides gathering spaces for discussion and socialization. Boullée explains this aspect with '*A simple inspection of the plans will allow the observance of a distribution where marching becomes easy, noble, and henceforth vast beyond anything one could hope for*' (Boullée, 1785, gallica.bnf.fr). Boullée also mentions the ease of usage once again, citing '*Service would be quick as the request, not to mention that this would avoid the dangers that often result from the use of ladders'* (Boullée, 1785, themorgan.org).

Duchêne also explains, '*(…) His lines are smooth, without flourish: The purity of his lines evoke that of the spirit*' (Duchêne, 2021). Numerous architectural elements exist gently in this austere interior, without much ornamentation. There is an austere look despite all the architectural elements present in it. The white present in the drawing is only partially changed into a darker grey to the left of the drawing, where books are highlighted. This lack of colour is very reminiscent of a classical style. This leads to the material usage in the drawing. The space seems to use a white, polished marble, with hints of grey. This material choice, would, in effect, emphasize the light falling into the space and bathing the whole interior. Usage of such a marble would also emphasize the books and their cover, allowing them to be more easily seen amongst the gigantic space while also providing smooth surfaces. Kauffmann elaborates on how the materials emphasized the scale with 'Extreme *frugality of ornament contributes also to the impression of size. Thus, Boullée preferred quite smooth wall surfaces*' (…) (Kauffmann, 1939: 224).

DOI:10.15320/ICONARP.2025.334



Source gallica.bnf.fr / Bibliothèque nationale de France

Figure 1. Vue de la nouvelle salle projetée pour l'agrandissement de la bibliothèque du roi (Boullée, 1785)

Searching for a utopian public interior in this regard leads to some specific design elements that emerge continuously. Scale and the importance given to light are predominant. Other design choices, then, would all lead to support these two elements and emphasize them where possible. In this project, Boullée placed a major importance on light and how it affected the large, imposing interior. Another important aspect he placed on was the idea of transparency: The ability to perceive all the users inside the library was important, as he mentions it in his treatise (Boullée, 1785: 43). This also directly ties to the social aspect: The drawing shows congregations, discussing freely and existing inside the space, with a clear line of sight on all users inside the space.

In his next drawing (Figure 2), the interior view changes from that of a library to that of a metropole, a centre of power where the state demands and exerts its power and influence over the land.

Light rays are emphasized, bathing the interior space. Following the shape the rays create, one could also surmise the dimension of the oculus needed to produce such a light effect. The scale of this interior is vaster than the library: Here, the ceiling seems to reach well into 30 or 40 meters, and in proportion, humans seem minuscule and overwhelmed by the grandeur of the building rather than a higher being.

The circulation is solved with a heightened central area and steps to reach it. The sheer scale of all the elements in this hypothetical interior give way, by extension, to easily accessible areas. However, the circulation is also designed effectively.

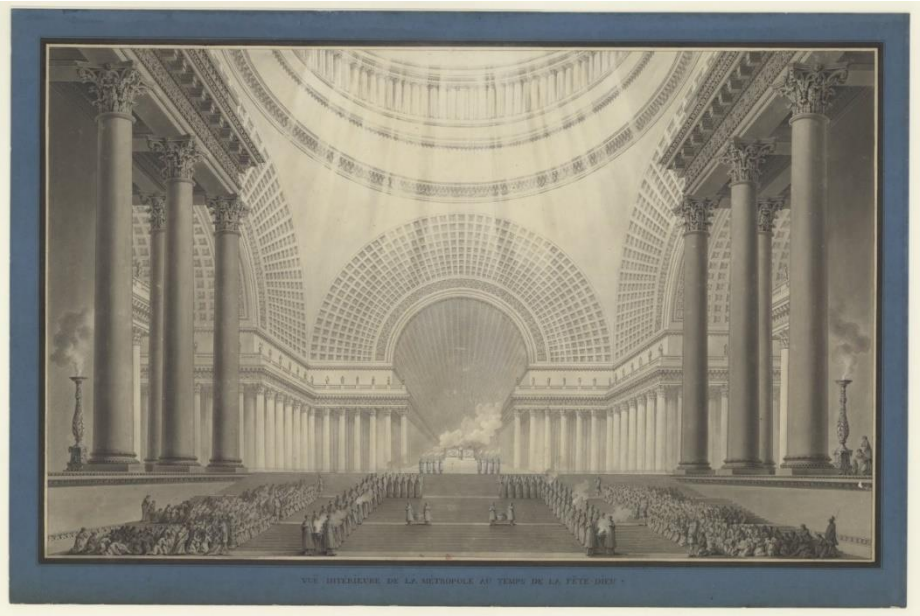


Figure 2. Vue intérieure de la métropole au temps de la Fête-Dieu (Boullée, 1781-1782)

In terms of colour, a white to grey smooth marble or stone dominates the interior. This would allow light to permeate the interior and put a stronger emphasis on the idea of purity via association.

In terms of social aspect, it can be observed that either vast spaces for gathering and discussion are present, or there are pockets of areas where congregation is possible. This is, by design, the 'revolutionary' aspect of Boullée: His interiors are vast, he is well above the human scale, but still, he specifically designs areas where discourse and communication are made possible, and approaches interiors as places where congregations should be held. The central focal point of the drawing is where all the direction, and consequently, circulation is moving towards. This is further elaborated by the height difference between the spaces and the steps. One will be looking at the focal point from a height disadvantage and to reach it, one must exert himself, or give something from itself.

This drawing of a museum, made by Boullée in 1783 (Figure 3), presents another gigantic building, with an immense vault held by columns, and a central dome with an oculus. The sheer scale of the interior again catches the eye, and the multitude of steps all coalesce one into the other, as if to form bigger, larger steps made for a larger being. Rosenau adds that Boullée here is loosely using the term of museum and is drawing a precinct devoted to the arts rather than a repository for arts (Rosenau, 1976: 10-11). The light operates differently compared to his other drawings, as here, it is directed primarily towards the centre of the drawing instead of permeating slowly. Colours are muted, and the material feels like marble or stone.

Boullée's ideas towards Enlightenment and the betterment of the individual with the guidance of the State have been plain to see from his drawings. According to him, '*The Grand Princes have always favoured the means which could contribute to improving the Arts and Sciences*' (Boullée,

DOI:10.15320/ICONARP.2025.334

1785: 1). These drawings, show, in effect, the idea of reaching towards a unique interior, where natural sunlight is slowly permeating, where many steps must be taken to reach it, an interior designed with the idea of having bigger beings in it. These all are, in effect, allegories to reach utopia.

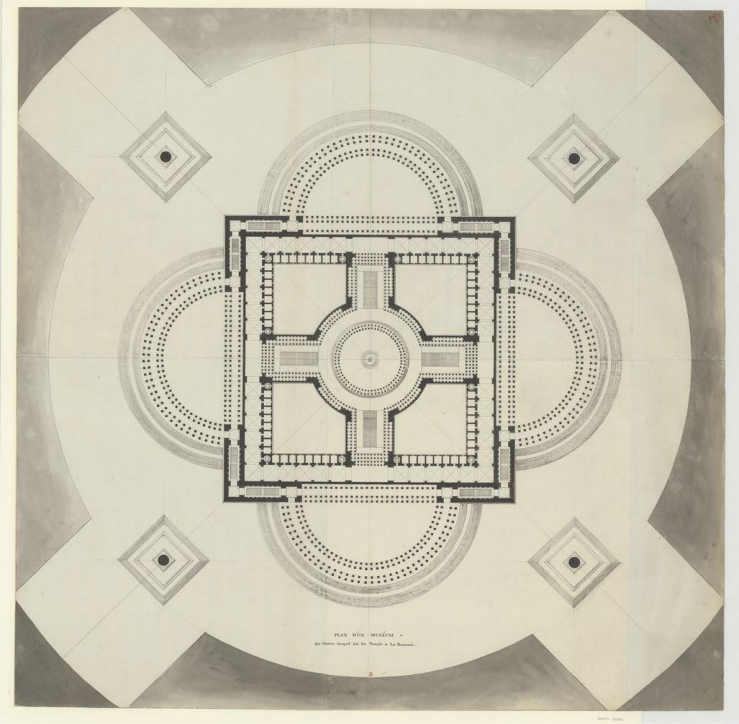
This drawing perhaps is the one that conveys the idea of Utopia the most: A multitude of human figures, all vying to reach the middle area, with imposing columns separating the space and a central light once again drifting towards the centre. According to Rosenau, '*His philosophical interests were centred on the concept of analogy which to him illuminated the relationship between art and nature*' (Rosenau, 1976: 10). Reaching towards a utopia might have been one of those analogies. Perceiving it is possible. This possibility presents itself in the form of several specific interior design elements and common relationships have emerged in terms of both experiential and social aspects. Scale is one such element. According to Laroque, '*Obviously, Boullée's drawings achieve a measure which no longer has Man as its matrix. The violent contrast of colossal buildings and tiny men (...)*' (Laroque, 2007: 121). This scale discrepancy represents an idea as strong as Utopia.

Figure 3. Vue intérieure d'un Muséum prise à un autre niveau, coupe géométrale (Boullée, 1783)

The sphere specifically is another element. Boullée, here, presents the idea of a sphere as such '*The conclusion of all these observations is that a sphere, is, in all respects, the image of perfection. It combines strict symmetry with the most perfect regularity and the greatest possible variety*' (...) (Boullée, 1797, Rosenau, 1976). For Boullée, the sphere was the perfect element, and reaching that perfection was paramount.

This idea of perfection naturally flourishes towards symmetry and can be observed in his plan as well (Figure 4). Boullée here quotes Montesquieu, who suffixes that symmetry is pleasing to the eye because it is the image of clarity and that the mind easily grasps it while seeking understanding. Boullée adds to this that symmetry is pleasing because it is the image of perfection and order, as incorporated into Rosenau's book (Rosenau, 1976: 87-89). Rosenau explains that this plan is a quatrefoil

and inspired by Roman architecture (Rosenau, 1976: 14-15). Symmetry is related to order, and order invites social interactions by defining the environmental setting, which Boullée amply provides. This, in effect, is the translation of Utopia into interior spaces. In terms of existential and social aspects, these drawings show a real analogy of utopia to interior design. Boullée's drawings and designs exhibit a clear sense of purpose and distinct interior architectural elements that offer an emergence of Utopia. He aspires to create interiors where humans interact, discuss, and above all, experience it together. His drawings all present a collective movement towards an area bathed in light, usually on a higher surface that can be reached through steps.



Source gallica.bnf.fr / Bibliothèque nationale de France

Figure 4. Plan d'un Muséum au centre duquel est un temple à la Renommée (Boullée, 1783)

PIERRE CHAREAU AND HIS VISION/ STYLE

At the turn of the 19th century, a second utopian emergence takes places: That of Pierre Chareau and Bijvoet. The 'Maison de Verre', a house composed of a glass façade, with an austere interior, evokes the calmness and tranquillity of a private, silent space while still maintaining a human scale that welcomes the user into it and envelops them serenely. According to Frampton, 'Maison de Verre' is a key interior space in that it is the first designed house in France made of steel and glass (Frampton, 1969: 77). The 'Maison de Verre' would become a strong and crucial translation of Utopia into interior architecture/ design.

An apt description of the house can be given as '*The house's design emphasized three primary traits. Honesty of materials, variable transparency of forms, and juxtaposition of 'industrial' materials and fixtures with a more traditional style of homes décor*' (Wikiarquitectura, 2024).

DOI:10.15320/ICONARP.2025.334

Chareau created a unique interior environment. Unlike his peers at the time, he had no formal education as a designer, but worked with other architects to pursue a career in design. According to Frampton, '*He studied in Paris and at 17 hesitated between painting, music and architecture. He decided in favour of a career as a decorator* (...)' (Frampton, 1969: 84). He collaborated with Bernard Bijvoet to design and produce the Glass House.

The idea of utopia evolved as the century changed: The scale diminished to human proportions, the space became welcoming, warmer, and useable, while also losing its grandeur and sense of magnificence. This led to a different understanding of the space, but the translation of utopia into interiors was still strongly present without losing any meaning. In this regard, the emergence of the idea of utopia was enriched and it introduced various changes without losing its utopian essence.

In stark contrast to Boullée, Chareau was mostly interested in the 'new'- new materials, new interiors, new forms, new ways of incorporating light. The 'Maison de Verre' is considered his masterwork and is known internationally. Frampton explains how, during that time, there were no structures which used glass lenses as the primary, exterior protective skin, except for the '*Maison de Verre*' and the '*Deutsche Werkbund Ausstellung*', and that especially as a walling technique, glass lenses were incorporated into 20th Century architecture rather late (Frampton, p.77, 1969). However, the most important point of the building along with its unique walling technique is its interior and how the exterior shell feeds into it.

Figure 5. Exterior view of the 'Maison de Verre', (François Halard/ Trunk Archive)

Vallye explains '*His approach was premised on deft and daring juxtapositions of nominally industrial forms and materials (cast iron, hammered-steel plates, ball-bearing hinges) with elegant detailing and luxury materials (brocade, lacquer, exotic wood veneers) that bespoke conspicuous consumption*' (Vallye, 2017: 406). This juxtaposition created a dynamic yet very modern feel, and it also allowed the structure to become alive, as if its interior elements were accoutrements. Pile and

Gura, more succinctly, state that Chareau is best known for his House of Glass, a building that made use of steel framing and large areas of glass block and plate glass (Pile and Gura, 2018: 366).

The hall viewed from the interior paints quite a different picture compared to the exterior. Here, the naked steel structure is observable, placing its back to the large, imposing glass brick wall that refracts the light and allows for a suffusion of sunlight into the interior. This effect dominates the interior and is the focal point of the space, but other structural elements that have been moulded into the interior space should also be noted. Each observable furniture in this photograph has been designed to fit the interior space, forming a holistic whole with the overall design approach. According to Pile and Gura, '*His furniture designs included both chairs of rich woods with heavy upholstery and simple folding seating with metal framing and wicker seats and backs, (…)*' (Pile and Gura, 2018: 366).

An imposing element that dominates the space is still present. The main focal point is the suffusion and diffusion of light into the interior via the glass façade. Antonini explains the Maison de Verre as '*the façade was made of a wall of translucent glass while interiors could be continuously modified thanks to sliding and rotating screens in glass, sheet metal, and perforated metal'* (Antonini, 2024). Frampton explains this translucency as '*The walls of the Maison de Verre are predominantly translucent. Hence its composition is ordered primarily through a transparency which is phenomenal rather than literal*' (Frampton, 1969: 80).

In Figure 7, the usage of strong constructional elements contrasting a rich wood material can be observed. Perhaps the importance given to circulation seems lessened, but it is important to note that this is mainly the grand hall, a 'general use' space in which every user had to pass through if they entered. This main hall, also sitting next to the glass

Figure 6. Interior hall view of the 'Maison de Verre', (François Halard)

DOI:10.15320/ICONARP.2025.334

façade, proposes an interior bathed in light, filtered through the glass bricks. This 'filtered transparency' is essential in how the experiential aspect of the house is viewed. According to Scheerbart, '*With this type of lighting the whole glass house becomes a big lantern which, on peaceful summer and winter nights, shines like fireflies and glow-worms*' (Scheerbart, 2020: 49). While this is not the perfect glass house that Scheerbart posits about, it does offer a similar experience with its emphasis on light. Scheerbart also continues, '*One could easily become poetic*' (Scheerbart, 2020: 49). It is exactly this impulse that is important for an interior to have. To sway or influence the human psyche to behave in a specific manner.

Another point to consider is the openness the space provides. Here, the interior is not comprised of small boxes, but rather interior spaces that flow one into another, quite resembling the design philosophy of Lloyd Wright. This social aspect of the interior is another way of influencing behaviour.

The comparison between Boullée and Chareau is compelling, as Boullée produced mainly drawings instead of finished works, while Chareau is chiefly known for one singular finished work. The focal point in which they converge is light. While their approaches to apply light can vary in materials used, both gave heavy emphasis to natural light in their designs, allowing it to diffuse into the interior and bathe the space with it. This approach seems intrinsic: Human beings cannot live without sunlight, but the manner in which both presented their solution points towards a similar aim. Both designers viewed sunlight as a being that would envelop the user or compel the user to be drawn to it. Just as the idea of Utopia would draw the human intellect towards it like a moth to a flame, so did their light usage do in interiors. The light, in those settings, is like an appendage, or an extension, of a higher being that is extending it towards the experience of the interior. The controlled use of it is also of note as the light is always controlled either from the ceiling, or the wall. It doesn't just enter the interior; it is either directed or refracted.

Figure 7. Interior aerial view of the hall of 'Maison de Verre', (François Halard)

The main divergence point, however, is scale. In Boullée's case, the sheer scale and grandeur of the interior is domineering, while in Chareau's Glass House, the scale is much more human and inviting. Here, the scale of the interior does not provoke awe or prostration, rather a gentle warmth that surrounds the user. While in both, the scale of the space envelops the user, in Boullée's case, it crushes, in Chareau, it blankets. This is a major divergence, and possibly also how the idea of Utopia changed throughout the century. This change did not occur only in this space, but in many other fields and schools of thoughts. The rigidity and sheer strength of the Utopian Ideal was much more humanized, changing from being a towering force to an equal friend.

This main divergence is also the origin of many other points of change. The materials used also changed accordingly, with the stone and marble giving way to wood, glass and steel, and muted greys and whites gave way to different hues of accent colours. This colour change also shifts the perception of how a Utopian Idea is viewed: It is not cold and distant, it is now close, with warmth to give. It is not a destination point anymore, but part of the journey.

FINDINGS

A notion that did not change from the 18th to the 19th century as how utopia could be perceived in interiors over these two designers is the idea of light and how it affected the interior space. Indeed, this aspect is the most prominent one: Architectural elements, interior designs and furnitures all contributed to the ease and permeation of light throughout the interior space. This could indicate a close relation of utopia and light, and the association that light is part of Enlightenment as well. In any case, allowing either direct or indirect sunlight into the spaces was an important aspect. What was different, however, was that for public spaces, direct light was chosen over indirect light, while in a personal setting, indirect sunlight was favoured over direct sunlight. Beyond privacy concerns, this also allowed for a more controlled approach in design towards working the light into interiors. Nevertheless, the permeance of light and its presence throughout the spaces is observable and it transforms the spaces considerably. Boullée and Chareau may not have operated on the same scale, but the experiential effect they gave to their spaces was still similar in how light operated within.

Another poignant aspect would be the change of scale. The public interiors, even for their usage, had a gigantic scale that would dwarf any human in it, while later, this scale changed considerably to reflect living in a personal space and to accommodate, unwind and ease the user into the space.

The usage of colours and materials, and how they differ between the two designers is also important. For Boullée, the materials and colours were austere, and in his drawings, he focused on the light and especially on shadow play that the architectural elements created. Boullée himself stated, '*This type of architecture based on shadows is my own artistic*

DOI:10.15320/ICONARP.2025.334

discovery' (Boullée, 1968: 90). While for Chareau, colour and material were essential and had to have character in order to create a modern, unique atmosphere that was welcoming. He used mostly glass, supplemented it with iron, and finished with wood. His strength came from using materials in ways that were not combined or used together previously, without making them feel as intruders. Paul Scheerbart's ideas about a utopian project for a future '*culture of glass'*, for a '*new glass environment which will completely transform mankind'* seem to have translated into Chareau's interior (Scheerbart, 1914: 9-10).

The comparison between Boullée's and Chareau's works are distinct in almost all the experiential aspects used to analyse them: Boullée focuses on grandeur, while in Chareau, the space is very modest. This also affects the scale in which the spaces are designed, as in Boullée, the scale is not of a humane proportion while Chareau deliberately focuses on this aspect. However, both interiors mostly use the same approach when it comes to light, as both spaces have ample light usage that bathes the interior in it, and both spaces use light as an important element of the interior. In terms of material, while the spaces use different materials (Boullée's polished stone to Chareau's glass and wood) they both use the same characteristic that the materials have, and that is their smoothness and honesty. The materials used form simple combinations as opposed to complex, compound materials and exuberate an austere feeling.

All these experiential aspects, when combined, form distinct cohesive wholes: They generate a sense of serenity and calmness inside their interiors, as if an ephemeral presence is inside them. This is further compounded in how the spaces use light once again to create rays of sunshine or light in them.

In terms of social aspects, it can be observed that both have designed either grand, vast spaces where convergence is possible, or designed areas where amassment was possible. Boullée, with his immense scale, nevertheless still had drawn small pockets where people could gather, or he had large, empty areas away from the main circulation areas where people could gather. Chareau's main hall also is an example of this, with several areas that would allow social interactions and communal gatherings such as the piano or the bookshelf area. Although on a smaller scale, the effect is still present.

CONCLUSION

Observations have yielded that the re-imagination of light in a controlled manner seems to be paramount to experience a space that aims to express the idea of Utopia. The suffusion and diffusion of light into interior spaces seems to create an atmosphere that lends itself to this feeling. There exists quite an observable relationship between light and utopia, and using light in this controlled manner seems to reinforce the idea of utopia. This, in turn, may lead to emotions or a state of understanding that could open new futuristic possibilities in the pursuit of the creation and design of new interior spaces. This has been especially

observed in the 18th and 19th Centuries, with new interior spaces being thought of and created as ideas, to then be translated into the physical world. This state of renewal and the creation of new spaces/ interiors is still possible and forms the basis of interior architecture and design.

Another observable point is the scale. While the scale changed from immense to human-sized, the idea of Utopia did not. In this way, conveying Utopia with different scales was still possible, even if this drastic change led to more different approaches in other major elements.

Material, and subsequently colour also shifted considerably from cold, distant, and high, to warm, close, and equal. This shift in interior design also paralleled the changing intellectual thought towards Utopia as well. The idea of Utopia changed from never being able to reach it to becoming a part of human life. This shift in perspective is very important. In one understanding, it is imperative that it must be reached, but in the second, it must be nurtured. This is an important distinction in how the perception changed and evolved. The materials used changed from marble and stone, referencing the neoclassical approach, to glass, steel, and wood, referencing the modern approach. This shift, subsequently, also changed the colour usage. The muted and cold colours also shifted to warmer tones. Paralleling the Utopian Idea, these divergences nonetheless were able to present the Idea of Utopia successfully. Both experiential and social aspects were skilfully mixed to create interior spaces that were presenting a utopia in themselves subconsciously. In doing so, two translations of Utopia into interiors were present.

This leads to the final understanding that things which can be transferred into the future regarding architecture and interior design are the atmosphere/ bodily and emotional experience of the spaces along with their social messages. The re-embodiment of these messages carries a potential for the re-imagination of new interiors. While their body of work are vastly different from each other, each of them showed, in their projects and artefacts, that Utopia was present in them.

In conclusion, the major element Utopia addresses is the social and experiential aspects of interior spaces. It is crucial to understand that anything that can be thought about the futuristic side of architecture and design cannot be independent from the humanism charged with the social and experiential associations. To think about these two elements as independent is not possible. Only in correctly attributing these two elements together can one perceive how the idea of Utopia emerged in interiors and subsumed itself into the profession and the discipline of interior architecture/ design. In this regard, Utopia is now not unreachable; it is a part of design and of the human intellect. Paul Ricœur states, '*In sum, the first step of living in a community starts with the narratives of life that we exchange*' (Ricœur, 2016: 33). This is, then, the narrative of Utopia: It is the first step of a commune, it is ever present, it must be reached, but it must also be nurtured.

DOI:10.15320/ICONARP.2025.334

ACKNOWLEDGEMENTS/NOTES

I would like to sincerely express my gratitude and acknowledge G. Cankız Elibol for her unwavering support and mentorship, and Emre Demirel for his patience, insight, wisdom and support.

REFERENCES

R Antonini, C. D., (2018). Pierre Chareau, The Modern Man Behind The Maison De Verre. Access Adress (27.06.2024): https://www.elledecor.com/it/best-of/a22654255/pierre-chareau-maison-de-verre-biography/

Balot, R. K., (2008). Utopian and Post-Utopian Paradigms in Classical Political Thought. *Arion: A Journal of Humanities and the Classics*, *16*(2), 75–90. Access Adress (27.06.2024): http://www.jstor.org/stable/29737396

Boullée, É. L., (1785). *Mémoire sur les moyens de procurer à la Bibliothèque du Roi les avantages que ce monument exige*. Access Adress (27.06.2024): https://gallica.bnf.fr/ark:/12148/btv1b531923450/f1.vertical

Britannica, T. Editors of Encyclopaedia, (2024). *utopia*. *Encyclopedia Britannica*. Access Adress (27.06.2024): https://www.britannica.com/topic/utopia

Coleman, N., (2014). The Problematic of Architecture and Utopia. *Utopian Studies*, *25*(1), 1–22. Access Adress (27.06.2024): https://doi.org/10.5325/utopianstudies.25.1.0001

Dept. of Drawings and Prints, (2018). Access Adress (05.07.2024): http://corsair.themorgan.org/vwebv/holdingsInfo?bibId=247385

Duchêne, D., (2021). Étienne-Louis Boullée, architecte: le Beau et le Bien. Access Adress (27.06.2024): https://www.paj-mag.fr/2021/02/12/etienne-louis-boullee-architecte-le-beau-et-le-bien/

Frampton, K., (1969). Maison de Verre. *Perspecta*, *12*, 77–128. Access Adress (27.06.2024): https://doi.org/10.2307/1566961

Frampton, K., (2020). *Modern Architecture: A critical History (World of Art)*. London: Thames & Hudson.

Green, E. J., (1993). The Social Functions of Utopian Architecture. *Utopian Studies*, *4*(1), 1–13.Access Adress (27.06.2024): http://www.jstor.org/stable/20719143

Greene, V. (2011). Utopia/Dystopia. *American Art*, *25*(2), 2–7. Access Adress (27.06.2024): https://doi.org/10.1086/661960

Kaufmann, E., (1939). Étienne-Louis Boullée. *The Art Bulletin*, *21*(3), 213–227. Access Adress (26.06.2024): https://doi.org/10.2307/3046639

Laroque, D., (2007). Sur Boullée. *Revue Des Deux Mondes*, 118–127. Access Adress (26.06.2024): http://www.jstor.org/stable/44194179

Lefebvre, H., (1991). *The Production of Space*. Oxford UK. Blackwell Inc.

Pile, J., Gura, J. (2018). *A History of Interior Design, Fourth Edition*. London. Laurence King Publishing.

Ricoeur, P., (2017). Architecture and Narrativity. *Études Ricoeuriennes / Ricoeur Studies*. 7. 31-42. 10.5195/ERRS.2016.378.

Risebero, B., (2001). *The Story of Western Architecture*. London: A&C Black.

Rosenau, H., (1976). *Boullée & Visionary Architecture*. London: Academy Editions. Access Adress (27.06.2024): https://archive.org/details/boulleevisionary0000rose/mode/2up

Scheerbart, P., (2020). *Glass Architecture*. Istanbul: Arketon Yayınları.

Tate, A., Smith, R. C., (1986). *Interior Design in the 20th Century*. New York: Harper & Row Publishers.

Vallye, A., (2017). Reviewed Work(s): Pierre Chareau: Modern Architecture and Design. *Journal of the Society of Architectural Historians*, *76*(3), 405–407. Access Adress (27.06.2024): https://www.jstor.org/stable/26419031

Vellay, D., (2007). *La Maison De Verre: Le chef-d'oeuvre de Pierre Chareau*. Arles: Actes Sud.

Figure References

Figure 1: Boullée, É. L., (1785). *Deuxième projet pour la Bibliothèque du Roi*. Drawing. Access Adress (01.07.2024) : https://gallica.bnf.fr/ark:/12148/btv1b53164584q#

Figure 2: Boullée, É. L., (1781-82). *Vue intérieure de la métropole au temps de la Fête-Dieu*. Drawing. Access Adress (0701.2024) : https://gallica.bnf.fr/ark:/12148/btv1b531720563

Figure 3: Boullée, É. L., (1783). *Vue intérieure d'un Muséum prise à un autre niveau, coupe géométrale*. Drawing. Access Adress (07.07.2024): https://gallica.bnf.fr/ark:/12148/btv1b53172050d.r=Boull%C3%A9e%20Etienne%20Louis%20%20museum?rk=21459;2

Figure 4: Boullée, É. L., (1783). *Plan d'un Muséum au centre duquel est un temple à la Renommée*. Drawing. Access Adress (07.01.2024) : https://gallica.bnf.fr/ark:/12148/btv1b53172048k.r=Boull%C3%A9e%20Etienne%20Louis%20%20museum?rk=85837;2

Figure 5: Halard, F. (2007). *PHOTOGRAPHY / MAISON DE VERRE*. Photography. Access Adress (01.07.2024): https://www.worldofinteriors.com/story/maison-de-verre-by-alex-michaelis

Figure 6: Halard, F. (2007). *PHOTOGRAPHY / MAISON DE VERRE*. Photography. Access Adress (01.07.2024) http://francoishalard.com/photography/maison-de-verre/

Figure 7: Halard, F. (2007). *PHOTOGRAPHY / MAISON DE VERRE*. Photography. Access Adress (01.07.2024) http://francoishalard.com/photography/maison-de-verre/

Resume

Research Assistant Nevzat Ruhi Eryılmaz graduated from Izmir Ekonomi University, Department of Interior Architecture and Environmental Design in 2013. He completed his master's at Hacettepe University in 2019. He is currently continuing his doctorate at Hacettepe University. He is interested in the history of the profession of interior design and how it evolved throughout the historical process.

Associate Prof. Dr. Emre Demirel graduated from Hacettepe University, Department of Interior Architecture and Environmental Design in 1998. He completed his Ph.D. at the Department of Architecture at Newcastle University in the UK and a post-doctoral program at Columbia University in 2020. Dr Demirel is interested in the architectural theories of the 19th and 20th centuries.

DOI:10.15320/ICONARP.2025.334

Research Article

ICONARP
International Journal of Architecture and Planning
Received: 20.08.2024 Accepted: 20.09.2025
Volume 13, Issue 2/ Published: 31.12.2025
DOI: 10.15320/ICONARP.2025.335 E- ISSN:2147-9380

ICONARP

Semiotic Study of the Relationship between the Screen and Historical Reality: The Bodies Series

Dilek Aybek Özdemir*

Abstract

This study delves into the intricate relationship between cinema and architecture by analyzing how architectural space is transformed into cinematic space, particularly within the framework of historical reality. Both cinema and architecture are mediums through which social and cultural meanings are conveyed. In architecture, spaces are shaped by historical processes and carry layers of social- cultural significance, while in cinema, these spaces are depicted as structures that encapsulate symbolic and cultural signs. Using Roland Barthes' semiotic theory with a focus on the concepts of meaning, connotation and myth, this research focuses on Bodies, an 8-part British miniseries adapted by Paul Tomalin from Si Spencer's graphic novel. The series spans four distinct time periods—1890, 1941, 2023, and 2053—and is examined for its representation of historical reality through the lens of architectural elements, technological advancements, and everyday practices of these eras. The architectural styles explored in this study include Victorian architecture, particularly Gothic revival and Queen Anne styles, as well as modernism, post-modernism, and dystopian futuristic designs that depict the evolution of space over time. This study explores how cinema constructs and reimagines historical reality through architectural representation, emphasizing the polysemic nature of cinematic images and the role of audience interpretation. Drawing on Roland Barthes' semiotic concepts of denotation, connotation, and myth as articulated in Mythologies, The Death of the Author, and The Pleasure of the Text, the research examines how filmic representations of space render historically constructed meanings as natural and inevitable. In this context, the research presents a semiotic framework for understanding the relationship between cinema and space in social, temporal and cultural contexts and the relationship between cinematic space and historical periods. The study draws attention to the importance of spatial design in visual media and emphasizes how architectural spaces are not only a backstage plan but also function as a historical and ideological narrative tool. The findings contribute to interdisciplinary debates by demonstrating how cinematic space becomes a tool of historical ideology, offering a new semiotic lens to architectural and visual analysis.

Keywords: *Cinema and architecture, Historical reality, Roland barthes, Semiotics, TV series*

*Department of Architecture, Bingöl University, Bingöl, Türkiye (*Corresponding author*)

Email: dilekozdemir@bingol.edu.tr

To cite this article: Aybek Özdemir, D. (2025). Semiotic Study of the Relationship between the Screen and Historical Reality: The Bodies Series. ICONARP International Journal of Architecture and Planning, 13 (2), 544-569. DOI: 10.15320/ICONARP.2025.335

INTRODUCTION

Architecture and cinema, as creative fields, both deal with the design of space and the creation of meaning through visual elements (Güzer, 2023). While architecture is the art of designing spaces (Weinel, 1982), which constructs physical spaces that reflect social and cultural realities, cinema reinterprets these spaces within a narrative framework, using elements such as light, framing, and camera angles to create emotional resonance. The relationship between cinema and architecture is widely discussed, as both disciplines involve design processes and the creation of new meanings (Sözen & Boyacıoğlu, 2020). This intersection of disciplines provides a unique opportunity to analyze how historical realities are constructed on screen.

Space plays a crucial role in film and series production, enhancing the audience's connection to the narrative and creating a sense of authenticity (Erk, 2023). Directors, like architects, carefully choose and manipulate spaces to convey their storytelling vision (Allmer, 2010). By framing locations from various angles and highlighting key elements, filmmakers can create a unique spatial reality that enriches the overall viewing experience. This strategic use of filming locations is essential for a cohesive and immersive narrative.

Cinematography, or "writing with movement," is vital for conveying techniques and their impact on perception (Pezzella, 2006). Key elements such as photographic scope, framing, and duration are controlled by the director to create visual harmony. Framing, which involves collaboration between the director, cinematographer, and art director, shapes on and off-screen space and directs the viewer's attention, guiding their interpretation of the film (Bordwell & Thompson, 2011; Brown, 2014). It offers a distinct perspective on reality and shapes how the audience perceives the narrative (Yıldız, 2014), with factors like lighting and editing contributing to the cinematic image (Algan, 1996; Güngör, 2014).

Cinema reinterprets urban spaces and architecture, offering new meanings through its framing (Güzer, 2023). By representing urban environments, films help us better understand and analyze architectural and urban spaces (Erk, 2023). While film architecture is often fictional, it still conveys meaningful ideas about architecture, whether it reflects reality or not (Schaal, 2000). These fictional spaces come together in the viewer's mind to create a greater whole (Hacıömeroğlu, 2023). Understanding how these images are processed reveals the connection between representational and architectural space, and the context of each representation holds potential for future interpretations (Shojaee & Saremi, 2018). For a representation to resonate in the viewer's mind, it must be perceptible (Akin & Weinel, 1982). Thus, the relationship between the representational spaces in cinema and reality plays a crucial role.

In other words, space in cinema functions not only as a background but also as a carrier of social and cultural meanings. In cinema, time functions as a moving memory that bridges the past, present, and future

DOI: 10.15320/ICONARP.2025.335

(Deleuze, 2006; Sütcü, 2015). The interaction between space and the perceiving subject creates a spatial experience that reflects these temporal layers (Aydınlı, 2008). Bergson describes movement as static segments of instantaneous images forming the cinematographic process (Bergson, 2007), while editing reshapes spatial perception by introducing new temporal relationships (Aslan & Arıdağ, 2023). The narrative structure and sequence of shots play a key role in storytelling, with time acting as a core element that organizes and gives meaning to the film's events (Deleuze, 1989; Mascelli, 2007). This dynamic process places human experience at its center, maintaining the linear flow between past, present, and future (Beşgen & Güner, 2023).

This reframed discussion highlights the interplay of space, time, and narrative in cinema, positioning time as a central element in shaping spatial and experiential understanding within the cinematic medium. This study focuses on the series Bodies to explore the cinematic representation of space across different historical periods. By applying Roland Barthes' semiotic theory, this research seeks to uncover the layers of meaning embedded in the architectural, technological, and social elements of the series.

BACKGROUND

The visual, cultural and ideological representation of space in cinema has emerged as an interdisciplinary field of research that intersects with contemporary architectural discourse (Sarai et al., 2024). As Chandran and Jagadisan note, semiotic elements and culturally informed strategies in set design are essential components of storytelling (Chandran & Jagadisan, 2024). In this context, studies reveal that cinema is not only a narrative medium, but also a tool that reveals the symbolic, social and psychological layers of space.

Tasbolatuly and Ismagambetova's study analyzes the constructive effect of cultural symbols on cinematic language at a theoretical level by addressing the relationship between culture and cinema on a semiotic level (Tasbolatuly & Ismagambetova, 2024). This is a fundamental reference in terms of showing how the signs used in cinematic narratives acquire meaning through culturally rooted forms of coding. Kiessel and Stubbs show how modern architecture serves to produce class distinctions in cinematic narratives through the representation of mass housing in science fiction dystopias (Kiessel & Stubbs, 2025). This study, in which the critique of modernization is produced through the spatial structure of mass housing, reveals how urbanization is constructed through cinematic metaphors. Gezer Çatalbaş and Akpınar focus on the cultural and ideological representations of Istanbul's elite neighborhood Nişantaşı in Turkish television series (Gezer Çatalbaş & Akpinar, 2025). The codification of Nişantaşı as a "lifestyle" is an important example in terms of producing spatial class representations and the perception of urban elitism through the media. Fontes and Vieira analyze the representations of rural and urban space in Smallville in the context of

character identity, showing how scenographic architecture is synchronized with the transformation process of the individual (Fontes & Vieira, 2025). Analyses based on neuroarchitecture and the gestalt approach reveal how audience perception can be manipulated through space. Sevindik's analysis of the film Perfect Days evaluates the relationship of nature and light with architectural space within the framework of the Japanese concept of "komorebi". This approach shows that nature, light and rhythm offer an aesthetic layer of meaning in the formation of cinematic atmosphere (Sevindik, 2025). Niazi et al. on the other hand, examines the relationship between media and the environment through the film So Far, So Close and discusses the role of cinema in creating environmental awareness. It focuses on the distribution of nature and industry indicators in the film, how the human-nature relationship is represented, and the impact of these representations on the audience (Niazi et al., 2025). Finally, Tseng, van Leeuwen and Djonov's study focuses on the "fragmentary" and "plastic" nature of cinematic space, analyzing how audience perception is manipulated through the fragmentation of space. This approach reveals that space is not only a physical construct, but also a dynamic building block in the construction of narrative (Tseng et al., 2025). These studies (Table 1) show that representations of space in cinema are not only visually aesthetic but also have class, ideological, cultural and emotional layers. This literature, which deals with the relationship between architecture and cinema at the level of semiotic and spatial analysis, offers ways of analyzing the "language of space" from an interdisciplinary perspective; it emphasizes that architectural space is not only a design but also a narrative actor. As can be seen in the literature review, the semiotic exploration of architectural styles of different historical periods within cinematic storytelling is an under-addressed topic. This study not only builds on existing research in the field of cinema, architecture and semiotics, but also departs from it by incorporating Roland Barthes' later post-structuralist views, in particular his notions of myth and plurality of meaning. In contrast to studies that treat space as a neutral backdrop, this research examines how historical representations are naturalized through cinematic codes, inviting viewers to accept constructed narratives as inevitable or real.

DOI: 10.15320/ICONARP.2025.335

Table 1. Literature Review

YEAR	AUTHOR(S)	NAME OF THE STUDY	PURPOSE-SCOPE	METHOD	FINDINGS	RESULT-CONTRIBUTION
2024	**Tasbolatuly, A., & Ismagambetova, Z. N. (Tasbolatuly & Ismagambetova, 2024)**	Semiotic Concepts of Culture and Cinema Language	To examine the effect of cultural symbols on the language of cinema semiologically.	Theoretical and historical analysis; analysis of cultural symbols through the interpretations of theorists such as Saussure, Cassirer and Bakhtin.	Signs in cinema carry multi-layered systems of meaning; symbols convey cultural coding.	Film language is a powerful media tool in the production of meaning through cultural symbols.
2025	**Kiessel, M., & Stubbs, J.(Kiessel & Stubbs, 2025)**	Narratives of class and home: the visualization and meaning of mass housing complexes in urban science-fiction dystopias in film and TV	Examining the relationship between mass housing complexes and class and home representation in science fiction dystopias.	Semiotic analysis on 22 films and 2 TV series.	Modern architecture is presented with dystopian imagery; spaces represent class distinction.	The capacity of urban architecture to produce symbolic class distinctions in visual narratives is emphasized.
2025	**Gezer Çatalbaş, Z. C., & Akpinar, I. (Gezer Çatalbaş & Akpinar, 2025)**	Staging Nişantaşı: cultural conflicts and ideological representations of urban space in Turkish TV culture	Analysis of Nişantaşı district in Turkish television series with its cultural conflicts and ideological representations.	Cultural geography and spatial semiotic analysis.	Nişantaşı is coded as a class and ideological symbol.	Television series transform urban spaces into stages of cultural representation.
2025	**Fontes, M. M., & Vieira, L. R. C.(Fontes & Vieira, 2025)**	Urban Metaphors Depicted Through the Scenographic Architecture of the TV Series Smallville	Analysing the relationship between urban space and character identity in the TV series "Smallville".	Scene analysis with semiotics, gestalt and neuroarchitecture approaches.	Rural and urban spaces symbolize character transformation.	Scenographic architecture cinematically reflects the individual's environmental identity evolution.
2025	**Sevindik, S. M. (Sevindik, 2025)**	Reflections of Light and Nature in Cinematic Space:"Komorebi" in Wim Wenders'perfect Days	To examine the effect of natural light and nature on the production of spatial meaning in the movie "Perfect Days".	Qualitative content analysis and semiotic scene analysis.	Komorebi is presented as an atmospheric element that reflects the inner world of the character and the spirit of the place.	The use of nature and light creates both aesthetic and narrative depth in cinema.
2025	**Niazi, M., Helali Sotoodeh, M., Afzali, A., & Goodarz, Z. (Niazi et al., 2025)**	The Influence of the Media on the Understanding of the Relationship Between Modern Man and the Environment: Semiotics of the Movie" So Far, So Close"	To evaluate the relationship between modern man and environment in the film as a semiotic with the influence of the media.	Film analysis and qualitative semiotic analysis.	Nature and industry symbols form the semantic map of the human-nature relationship.	Environmental representation in cinema has the potential to shape the audience's perception of nature.
2025	**Tseng, C. I., van Leeuwen, T., & Djonov, E.(Tseng et al., 2025)**	The fragmentation and plasticity of space in film	Examining the fragmentation and reconfigurability of space in cinema.	Plan analysis and multimodal review.	The space is presented through a system of fragments that support narrative events.	The cinema space is not fixed; it is a structure that can be fragmented, manipulated and redesigned.

Cinema and Historical Reality

Films recreate the past, vividly portraying buildings, landscapes, and objects that shape our perception of history. By presenting period costumes, cars, and tools, films highlight how these elements define people's identities (Rosenstone, 2018). Cinema blurs the line between reality and fiction, crafting mythical spaces and non-linear timelines to create new realities (Emir & Diler, 2011; Oktuğ, 2008). While not always historically accurate, films provide a unique way to understand history and identity, akin to memory and oral tradition (Rosenstone, 2018). Cinema captures both material conditions and the emotions, values, and thoughts that define human experience, offering a dynamic portrayal of life (Kracauer, 1997).

Cinematic space is not merely a backdrop; it is an active participant in the storytelling process. The interaction between time, space, and human bodies creates a layered narrative that reflects historical, social, and cultural realities (Deleuze, 2006). In Bodies, this dynamic is explored through architectural elements that change with each time period, from the Gothic Revival styles of 1890s London to the dystopian future of 2053.

Filmmakers navigating physical existence have infinite continuity options. To process continuity effectively, tools like gradual opening and fading are utilized to connect different parts smoothly. Films can capture vast areas of reality due to these techniques (Kracauer, 1997). Television plays a vital role in daily life, turning it into a spectacle with television series holding a significant place in program schedules (Erginbaş, 2012). Cinematography, the art and science of recording images for cinema, is crucial for creating visual narratives in both cinema and television series (Goodridge & Grierson, 2014). Elements such as storytelling, camera usage, location selection, lighting, color, costume, hair design, and makeup must all work harmoniously to create a visually appealing product (Yıldız, 2014). The constructed external reality in cinematography is an abstraction of natural life, requiring a balance between abstraction and concrete reality. John Dewey emphasizes the importance of experiencing things within their concreteness to combat the abstraction that often occurs in the modern world. Perceiving concrete reality requires both distance and intense participation, similar to those who participate in its taste and production in art, as highlighted by Kracauer (Kracauer, 1997).

According to Barthes, semiotic analysis allows for the dissection of how these spaces communicate meaning through signs and symbols (Barthes, 1977). In this context, Bodies uses architectural space not only to convey historical authenticity but also to explore broader social and political themes, such as power, control, and the evolution of technology.

Semiotic Analysis of Space and Technology

The theatrical narrative form, emphasized in photography and film, highlights characters and human relationships, making it ideal for the stage, though theater cannot fully capture physical reality (Kracauer,

DOI: 10.15320/ICONARP.2025.335

1997). In contrast, cinema must balance reality with visual interpretation in an image-saturated society (Ieta, 2010), where understanding the role of visual images is critical (Kellner, 2002). Films do more than reflect reality; they construct representations within cultural systems (Ieta, 2010; Ryan & Kellner, 2010). Maintaining a connection to life is essential for cinema to avoid becoming self-contained and purely theatrical (Kracauer, 1997). Films communicate ideas through representational elements and formal conventions, shaping social values (Ryan & Kellner, 2010). The "flow of life" motif stands out for capturing fundamental reality and human experience on screen (Kracauer, 1997). Art, including cinema, is shaped by societal technology, politics, and economy (Monaco, 2001), and adaptations from novels to films often shift their storytelling function to bridge plot gaps and emphasize themes (Kracauer, 1997). The series discussed in this work is based on a comic book and, like novels and films, aims to reflect life in its entirety.

Episodic films often focus on transient spaces, like train stations, which represent fleeting life patterns (Kracauer, 1997). Cinema integrates utopian and dystopian visions through technology, with contemporary films frequently depicting dystopian cities (Yalım, 2023). Tanyeli suggests that utopia is not a future expectation but a projection of the future within a specific social activity area, serving as a forecast system (Tanyeli, 1993). Both utopian and dystopian narratives in cinema emphasize architecture, as the environment plays a crucial role in shaping human happiness or oppression in any social model (Bezel, 1984).

In Bodies, the architectural depiction of different eras reveals the interplay between space, time, and technology. For instance, the Victorian era is characterized by Gothic Revival architecture, which reflects the rigid social hierarchies and industrial advancements of the time. In contrast, the 2053 segments of the series depict a highly futuristic world where technology dominates the spatial experience, with holographic interfaces and LED-lit facades transforming the urban environment into a dystopian landscape.

Barthes' semiotic theory provides the framework to analyze how these architectural elements function as signifiers of historical and cultural realities. The progression of architectural styles—from the ornate, decorative structures of the 1890s to the cold, sterile environments of the future—mirrors the series' exploration of societal change and technological advancement.

METHOD

In this study, the post-structuralist semiotic approach developed from Roland Barthes' Mythologies (Barthes, 1991), Death of the Author (Barthes, 1986) and The Pleasure of the Text (Barthes, 2007) is adopted as the main theoretical framework for analyzing the multi-layered production of meaning and the audience experience at the intersection of cinema and architecture.

The binary sign system (denotative, connotative, mythic plane) put forward by Barthes in Mythologies shapes the logic of analysis of this study (Barthes, 1991). According to Barthes, myth is not only a means of communication but also an ideological structure that naturalizes cultural meanings. By concealing historical intention, myth presents cultural codes as universal and inevitable (Barthes, 1991). In this context, the visual and structural elements used in film and architecture have been evaluated not only in terms of their first-level meanings, but also in terms of how they are ideologically selected and by which analogical arrangements they are reproduced in the form-concept relationship (Barthes, 1991). Myth does not fix meaning; on the contrary, it both detaches it from its historical context and universalizes it (Barthes, 1991). Therefore, according to Barthes, the political burden of an object or image lies not in its meaning but in how its signifier is structured and abstracted (Barthes, 1991).

In line with the views developed by Barthes in his text The Death of the Author (Barthes, 1986) the production of meaning in this study is based on the experience of the reader/viewer, not the creative authority. To attribute the author's (and director's/architect's) intentions to the text is to fix meaning and prevent multiple readings. However, according to Barthes, writing begins with the destruction of the voice, the origin, the subject (Barthes, 1986); just like the movie stage or the architectural structure, the space of meaning is not a surface to be “pierced” but a surface to be “traversed” (Barthes, 1986). In Barthes' thought, a scene or a building gains meaning not only through the meaning of its producer, but also through the cultural contexts, sensory accumulation and individual reactions of the audience. In this context, cinematic and architectural space becomes a place of interpretive pleasure, not merely aesthetic or narrative. As Barthes puts it, the unity of a text (or scene) is found not in its origin but in its destination, which is no longer personal but plural and anonymous (Barthes, 1986).

Barthes' The Pleasure of the Text (Barthes, 2007) is included in the framework in order to add a sensory and aesthetic dimension to the analysis of cinema. Here, Barthes evaluates the text through the relations established with pleasure. Pleasure is established not only by content, but also by rhythm, form, space and structural tensions. The viewer must become a subject who not only receives the meaning conveyed, but also produces his or her own meaning and pleasure (Barthes, 2007). As Barthes states, a mutual sharing of pleasure in cinema or architecture creates an unforeseen space of play between the creator and the audience. This space is positioned as a neutral language space free from the dynamics of social relations (Barthes, 2007). Barthes' statement “The eye through which I see God is the same eye through which he sees me” (Barthes, 2007), quoted by Angelus Silesius, reflects the bidirectionality of the gaze and the mutual interaction of meaning production in cinema and architecture.

DOI: 10.15320/ICONARP.2025.335

As Huppatz notes (Huppatz, 2011), according to Terry Eagleton, myth is “a particular register of ideology that elevates certain meanings to a sacred status” and while ideology can take various forms, myth is typically narrative in form (Eagleton, 2007). While this narrative nature of myth appeals to Barthes' literary sensibility, the mythic status of objects or systems designed for contemporary design studies is rarely addressed. In this context, the methodology of the study is not only a semiotic analysis, but also an analysis of how meaning is produced, shifted and reconstructed on historical, cultural, ideological and aesthetic levels. Barthes' theoretical framework addresses the relationship between cinema and architecture from an interdisciplinary perspective that recognizes that meaning emerges not from fixed sources but from the experience of the viewer and the polysemantic structure of representation.

Open works of art are dynamic and invite viewer engagement with the artist, revealing internal relationships based on the interpreter's perception and experience (Bircan, 2022). Each work, whether open or closed, allows countless interpretations based on the interpreter's background (Eco, 1986). The artist intends for viewers to derive pleasure from their work, with viewers adding personal interpretations based on their environment and cultural interactions, enriching the artwork without changing its originality (Bircan, 2022). Structural linguistics and semiotics create hypotheses on underlying and surface realities (Buckland, 1999).

The study analyzes the TV series Bodies through semiotic analysis, focusing on the relationship between signs, signifiers, and collective consciousness. To increase methodological transparency, scenes were selected according to three main criteria: (1) visual emphasis on spatial features (architecture, technology, and clothing), (2) richness of representation suitable for semiotic analysis, and (3) historical diversity across the four different timelines of the series. A flow diagram (Figure 1) summarizes the steps from data collection to interpretation, highlighting how the signs were decoded in their cinematic and socio-historical contexts. Semiotics, as defined by Greimas, is a theory of meaning that helps create perceptions of space and geography in literature and cinema (Barthes, 1979; Yalım, 2023). The study discusses how cinema spaces contribute to our collective consciousness by reflecting historical reality through elements such as clothing, technology and architecture. Barthes expanded semiotics to include various domains that carry meaning, viewing it as a tool for analyzing communication in areas such as clothing, fashion, and film (Bircan, 2022).

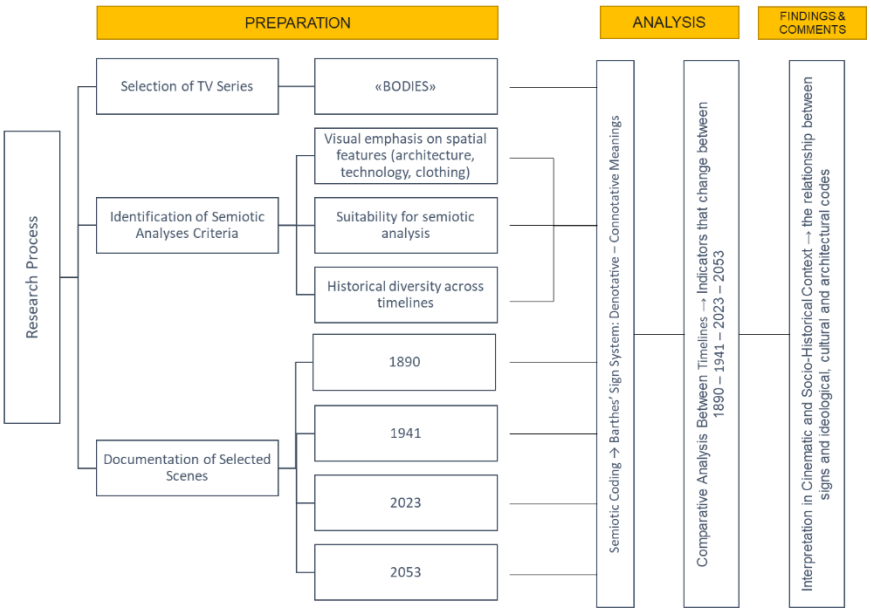


Figure 1. Methodological framework of the study

Eco argues that in order to understand a film, its social and aesthetic functions must be analyzed through semiotics (Bircan, 2022). The interaction between character and space in cinema provides insight into social life, as space influences individuals and vice versa. Space plays a crucial role in shaping meaning and reflecting historical processes. De Certeau et al. suggests that space is a product of society's construction (De Certeau et al., 1998). Symbols in space, such as accessories and architecture, represent social realities and can be interpreted through semiotics. In cinema, symbols are often used to convey historical reality, with Roland Barthes' principles of semiotics serving as a framework for analysis. This dual construction of space and user highlights the importance of understanding symbols in space and their social implications in film interpretation.

Architecture involves semantic tools that influence behaviors (Eco, 1986), with space being the crucial element. Signs like color, light, and texture within space play a significant role in conveying meaning. Semiotics views culture as a form of communication, making architecture a part of cultural expression. The physical characteristics of objects within spaces create mental images, establishing a connection between the signifier and the signified (Eskandani, 2020). Signs can replace something for someone, creating an equivalent in their mind (Barthes, 1979). Cinematic spaces in films carry deeper meanings and become subjects for semiotic analysis. Architectural signs, through specific codes, express definite functions and can be categorized (Eco, 1986). Eco suggests examining signs beyond their literal meanings, incorporating cultural and social elements for a more comprehensive understanding (Bircan, 2022).

This article discusses the communicative possibilities of architecture in a semiotic universe, focusing on the meaning and function of architectural objects. It emphasizes that architecture should be read as meaningful forms, with objects serving as signifiers of expressed

DOI: 10.15320/ICONARP.2025.335

meanings. The true meaning of a building is seen as the tasks needed to live in it, reflecting a way of life. Even non-functional elements, like fake windows, play a communicative role in architecture, conveying a certain understanding of lifestyle. The shapes, numbers, and arrangements of architectural features on a building's facade imply a comprehensive ideology that guides the architect's design choices. Ultimately, architectural elements can serve both practical functions and symbolic meanings, contributing to a broader understanding of the built environment (Eco, 1986).

Understanding the symbolic functions of cinema spaces helps us grasp how cultural codes are communicated through the screen. By analyzing the semiotic chain from signifier to signified, we can decode the architectural intentions behind the stimuli in architecture. This decoding process reveals ideologies embedded in architecture, allowing for a persuasive interpretation and increased knowledge. Architectural signs are not merely physical references but expressions of cultural meanings, transforming into spatial signifiers that convey deeper significance (Eco, 1986).

In the 20th century, Saussure defined semiotics as the scientific study of signs within society, while Barthes expanded this scope to include social phenomena like fashion, technology, and design. According to Barthes, a metalanguage is essential to express abstract concepts and convey meaning beyond direct communication (Barthes, 1979). This perspective is evident in his analysis of fashion, technology, automobiles, and architecture, where he explores how language operates within these fields. In fashion, for example, Barthes identifies a non-verbal language made up of signs and rules that communicate through written descriptions of clothing. This "clothing language" includes contrasts, assembly rules, and variations like length or cleanliness, each influencing how meaning is conveyed. Barthes further extends this semiotic approach to automobiles and furniture, which he views as semantic objects that also communicate meaning through style, structure, and arrangement in specific environments. These objects, like clothing, form a kind of speech, where meaning is derived from subtle modifications over time. Barthes' analysis shows that the semiotic language of everyday objects—whether fashion, furniture, or automobiles—reflects broader social practices and norms (Barthes, 1979). Understanding these sign systems, which consist of signifiers (form) and signifieds (content), offers valuable insights into how emotional and qualitative meanings are embedded within the visual and functional design of objects in historical context.

Semiology interprets meaning in daily life through signs, divided into signifiers and signifieds (Demir & Kula, 2022). TV series, filled with various signs, offer a rich field for analysis using Barthes' semiotic principles, which emphasize focusing on distinctive features amidst a mass of diverse facts. Barthes advocates for a restrictive approach in semiotic research, concentrating on the meanings attributed to objects

ICONARP – Volume 13, Issue 2 / Published: 31.12.2025

and subjects, while disregarding extraneous details (Barthes, 1979). Semiotics, as a process of meaning-making, examines how signs function within systems and how these systems construct meaning. This approach allows for the analysis of a wide range of media, including films, TV series, advertisements, fashion, and even food, all of which carry communicative value (Demir & Kula, 2022). From a semiotic perspective, signs appear in various forms—symbols, words, images, sounds, gestures, and objects. Contemporary semioticians consider these signs as part of larger systems rather than in isolation (Shojaee & Saremi, 2018). However, as Demir & Kula note, there is no single unified approach to semiotic analysis, with researchers often adopting different perspectives even when using the same methods (Demir & Kula, 2022). Semiotics, as a philosophical theory, explores how signs contribute to the construction of reality, particularly through textual analysis, and aims to offer more realistic representations of reality by examining the processes of representation (Shojaee & Saremi, 2018). It delves into how representations are constructed in various mediums, investigating their relationship with reality through descriptions, symbols, and characters that evoke mental images (Simitch & Warke, 2014). In TV series, which often blend comic book and fictional elements, semiotic analysis reveals how specific architectural periods are portrayed through historical reality. Elements like color, composition, costume, and cinematography are carefully aligned with the period setting, reinforcing the historical context. Architectural spaces, viewed as semiotic signs, gain meaning through their interaction within the series (Shojaee & Saremi, 2018). The continuity of time drives spatial development, while socio-cultural differences help delineate the study area. Through this lens, semiotics provides valuable insights into the layered meanings embedded in TV series and their portrayal of historical and architectural realities. This study employs a semiotic analysis to explore the relationship between signs, signifiers, and social consciousness as represented in Bodies. Barthes' theory of meaning-making is used to interpret the architectural and technological elements within the series. By examining how space is constructed and perceived across different periods, this research reveals how cinema uses architectural forms to comment on historical and social realities.

The analysis is divided into three main sections:

a) Daily Life Practices: How the series depicts social interactions and routines across different time periods.

b) Architectural Imaginary: The role of architecture in creating a sense of place and time, with a focus on historical accuracy versus creative interpretation. And also how technological advancements shape both physical and social spaces, particularly in the futuristic segments of the series.

c) Technology and Transportation: How technological developments have shaped the means of transport, both physically and socially.

DOI: 10.15320/ICONARP.2025.335

FINDINGS

Daily Life Practices: In this section, the relationship between the series and historical reality through costumes in different time periods is discussed and how social interactions and routines are depicted is analysed through semiotic analyses (Table 2 and Table 3).

Table 2. Semiotic analysis daily life practice

Semiotic Analysis- Daily Life Practice					
Scene Reference	Visual Element	Signifier (Expression) Denotation	Signified (Meaning/ Interpretation)	Mythic/ Ideological Function	Historical Reality
 **Source: BODIES TV Series S1E2-13.09**	Women's Indoor Clothing	Coton Fabric, corsets, gloves	Victorian feminity and class status	Naturalizes social stratification and domestic	Victorian era fashion (1839–1901) reflected the Romantic artistic style and societal modernization under Queen Victoria's reign, influencing architecture, design, and clothing. Women's attire included dresses, corsets, gloves, and hats, while men wore frock coats, waistcoats, and accessories like canes and pocket watches (Cercaşin, 2013). Similarly, the analyzed series portrays 1890s fashion with period-specific garments and accessories for both women and men, aligning with the era's stylistic norms.
 **Source: BODIES TV Series S1E7-41.25**	Women's Outerwear	Mini hat, gloves, Velvet Fabric	Upper class public dress code	Myth of orderly public feminity	
 **Source: BODIES TV Series S1E7-12.55**	Men's Use of Canes	Cane as accessory	Symbol of elegance and authority	Myth of patriarchal dignity	
 **Source: BODIES TV Series S1E1-36.10**	Men's Fashion	Three-piece suits, fedora hats	Post-war masculinity and conformity	Myth of patriotic resilience	During World War II, makeup and fashion were promoted in Britain and the U.S. to boost military morale, with Britain's London Fashion Designers Incorporated (1942) aiming to position London as a fashion center (Ermilova et al., 2022; Mason, 2011). Wartime clothing faced restrictions, such as limits on pockets and embellishments, leading to a uniform-inspired, tailored style with narrow skirts and padded shoulders (Shrimpton, 2014). By 1944, some design limitations were lifted (Notes, 2024). While men's fashion stayed conservative, the late 1940s "New Look" revived feminine silhouettes (Mason, 2011; Shrimpton, 2014). The analyzed series reflects 1940s fashion with slim, unadorned dresses, uniform-style jackets, tilted hats, scarves for women, and three-piece suits with fedora hats for men.
 **Source: BODIES TV Series S1E1-07.09**	Women's Fashion	Slim-cut dresses, tilted hats	Utilitarian elegance	War-time feminity and dicipline	
 **Source: BODIES TV Series S1E8-55.17**	Workplace Uniforms	Mass-produced uniforms	Professionalism and identity in modern society	Corporate conformity myth	Fashion significantly shapes individual and societal identities by influencing how they are perceived, constructed, and expressed (Yağlı, 2013). As a universal social and psychological phenomenon, fashion reflects cultural values and differences (Crane, 2003; Waquet & Laporte, 2011). It allows individuals to convey identity while navigating between tradition and rapidly changing modern trends driven by mass production (Lull, 2001; Yağlı, 2013). In the analyzed series, this is reflected through the use of ready-to-wear clothing, the presence of uniforms in formal settings, and distinctions between work and daily attire, highlighting shifts in cultural and identity-related dressing practices.
 **Source: BODIES TV Series S1E8-57.46**	Casual Wear	Contemporary casual style	Individual expression in Daily life	Freedom of identity myth	
 **Source: BODIES TV Series S1E2-07.48**	Tech-Infused Clothing	Wearable spine support, LED accessories	Post-human adaptation	Myth of technological determinism	The fashion and textile industries are being reshaped through integration with Industry 4.0, emphasizing technologies like AI, cloud computing, and 3D printing (Değerli, 2019; Toffler, 2008). Collaborations between fashion and tech companies have led to innovations such as wearable technologies (e.g., Galaxy Gear, Google Glass) and smart

 Source: BODIES TV Series S1E1-52.47	Radio Technology in Fashion	Embedded communication devices	Futuristic connectivity	Myth of hyper-efficency and surveillance	garments like the Adrenaline Dress, which respond to bodily data (Curtis, 2013; Olewitz, 2016). This digital revolution signals a shift toward Haute-Tech Fashion, merging the virtual and physical (Değerli, 2019). In the analyzed series, technology-based clothing for both genders and uniform styles reflect a utopian, future-oriented vision, aligning with the concept of wearable tech as a plausible evolution in fashion.

Table 3. Historical reality in a scene about the practice of daily life in the bodies series

Historical Reality in BODIES TV Series	
Source: BODIES TV Series S1E7 11.55 Min. 1890 Men's Use of Canes as Accessories	Victorian Era Women's an Men's Clothing (Cercaşin, 2013)
	 

The semiotic tables visually and analytically illustrate how everyday clothing practices in the Bodies TV series function as cultural signifiers reflecting historical ideologies across different time periods. The first table (Table 2) systematically decodes visual elements—such as fabric, garments, and technological accessories—through Barthes' tripartite semiotic model: denotation (what is shown), connotation (cultural interpretation), and myth (naturalized ideology). For instance, Victorian indoor clothing signifies gendered domesticity and class hierarchy, while post-2053 tech-infused garments embody a myth of post-human adaptation.

The second visual panel (Table 3) reinforces the historical grounding of these representations by juxtaposing scenes from the 1890s timeline of the series with period-authentic visual references. This side-by-side comparison not only validates the historical accuracy of the show's costume design but also highlights how fashion becomes a visual tool for encoding social authority, gender roles, and technological shifts.

Collectively, the visuals and tables reveal that in Bodies, costume design operates as a powerful semiotic vehicle—naturalizing constructed historical ideologies and enabling the audience to experience a seamless, yet ideologically loaded, vision of the past and future.

Architectural Imaginary: In this part of the study, the role of architecture in creating a place and time is discussed, taking into account creative interpretation and historical reality, and for this purpose, both the furniture and accessories used in the interior and architectural silhouettes are analysed from a semiotic perspective. This chapter also discusses how technological developments, especially in the futuristic episodes of the series, shape both physical and social spaces (Table 4, 5 and 6, 7).

DOI: 10.15320/ICONARP.2025.335

Table 4. Semiotic analysis interior architecture and furniture

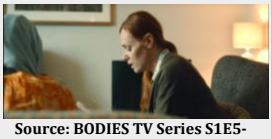
Semiotic Analysis- Interior Architecture and Furniture					
Scene Reference	Visual Element	Signifier (Expression) Denotation	Signified (Meaning/ Interpretation)	Mythic/ Ideological Function	Historical Reality
 **Source: BODIES TV Series S1E5-24.51**	Workplace Interior	Wooden desks, ornate cabinets	Handcrafted aristocratic taste	Myth of upper-class cultural refinement	In the Victorian era, furniture was viewed as a craft, with skilled artisans producing bespoke pieces for the aristocracy and middle class, emphasizing artistic value and craftsmanship (Edwards, 2022; Smith & Rogers, 2015). Solid wood, particularly walnut, was favored for high-quality items like desks and tables, requiring advanced skill compared to veneered pieces (Kirkham, 1988). In the examined series, wooden furniture with decorative craftsmanship is prominently featured, aligning with historical accuracy. The portrayal of domestic life, such as that of the Harker family, reflects studies on Victorian households and servants (Higgs, 1983), while the inclusion of a piano and period-style seating mirrors mid-Victorian furnishings documented in historical records (Kent, 2013, 2015).
 **Source: BODIES TV Series S1E2-29.11**	Piano in Living Room	Dark wood upright piano	Cultural capital and domestic leisure	Myth of domestic musical sophistication	
 **Source: BODIES TV Series S1E7-04.40**	Living Room Sofa	Velvet-upholstered furniture	Middle-class comfort and status	Myth of civilized family space	
 **Source: BODIES TV Series S1E5-29.15**	Workplace Interior	Metal desk lamp, plain wooden desks	Modernist functionality	Myth of wartime efficiency and dicipline	With the onset of World War I, the industrialized world experienced a transformation in objects and spaces through the rise of new commodities, reshaping both public and private domains. Public spaces and urban life were influenced by modernity, emphasizing shared consumption and functional design. Designers moved away from nature-inspired individualism, favoring standardized, mass-produced, and rational products using materials like glass and metal (Sparke, 2013). In the examined series, this modernist influence is reflected in the use of simple, mass-produced wooden furniture and modern elements like metal desk lamps, aligning with early 20th-century design principles.
 **Source: BODIES TV Series S1E1-41.27**	Shopping Mall Interior	Steel and glass design	Consumer capitalism and transience	Myth of perpetual modernity	Since the 1970s, architecture and urban planning in Britain and the U.S. have seen a strong reaction against modernism, symbolized by the 1972 demolition of Pruitt-Igoe. Postmodernism, shaped by consumer and producer interests, embraces diversity, originality, and rapid change. Flexible technologies enable lifestyle-specific design, making designers key figures in producing identity-driven goods (Rustin, 1989). In the examined series, scenes set in a shopping mall—a symbol of postmodern consumer culture—along with interiors reflecting modern and Scandinavian styles, illustrate themes of consumption, transience, and speed, aligning with postmodern architectural and cultural contexts.
 **Source: BODIES TV Series S1E5-31.17**	Residential Interior	Scandinavian-style furnishings	Minimalism and comfort	Myth of self-expressive domesticity	
 **Source: BODIES TV Series S1E2-21.47**	Workplace Interior	Transparent smart screens, AI desks	Human-technology integration	Myth of post-human productivity	Each era seeks to represent its own version of realism, capturing reality through evolving techniques and aesthetics (Bazin, 1966). With cinema, the mechanical reproduction of reality began in the 19th century, establishing film as the art of recreating time and space (Bazin, 2011; Godard, 1991). In the examined series, the depiction of 2053 emphasizes technological realism through innovations such as voice-controlled smart systems, transparent digital interfaces, LED lighting, and advanced medical imaging—illustrating how future-oriented design continues cinema's tradition of constructing plausible realities through technological means.
 **Source: BODIES TV Series S1E2-08.46**	Futuristic Apartment	Voice- controlled environment	Automation of daily life	Myth of convenience as control	

Table 5. Historical reality in a scene about the interior architecture and furniture in the bodies series

Historical Reality in BODIES TV Series	
Source: BODIES TV Series S1E2 43:51 Min. 2053 KYAL Center Interior	Infirmary (Erbay et al., 2017)
	

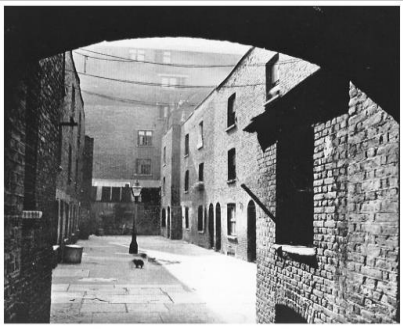
Table 6. Semiotic analysis urban façade and architecture

Semiotic Analysis- Urban Façade and Architecture					
Scene Reference	Visual Element	Signifier (Expression) Denotation	Signified (Meaning/ Interpretation) Conotation	Mythic/ Ideological Function	Historical Reality
 **Source: BODIES TV Series S1E3-05.28**	Cityscape and residential Façade	Red Brick, Palladian pediments	Queen Anne Style & Victorian order	Myth of imperial elegance and symmetry	The abolition of taxes on materials like glass and brick in the 1840s–1850s made Victorian homes more affordable. From the 1870s onward, Queen Anne and Arts and Crafts styles gained popularity, especially in suburban developments, influenced by architects like Richard Norman Shaw (Long, 2007). In the examined series, 1890s outdoor scenes prominently feature brick buildings and Queen Anne-style architecture, as seen in the Harker family's residence with its symmetrical Palladian pediment. Urban visuals also include red brick, white woodwork, and eclectic Gothic Revival elements like pointed roofs and city squares, reflecting the era's architectural trends (S1E7).
 **Source: BODIES TV Series S1E7-02.17**	Gothic Revival Church	Pointed arches, spires	Spiritual authority & moral code	Myth of divine order through architecture	
 **Source: BODIES TV Series S1E1-07.05**	Bombed Cityscape	Rubble, damaged façades	Wartime devastation	Myth of national endurance	Post-WWII reconstruction in Britain led to a push for industrialized building methods due to labor and material shortages. This included rationalized design, modular construction, and non-traditional materials, although some viewed these methods critically. The prefabrication movement of the 1920s–30s laid the groundwork for these innovations (Wall, 2013). Bullock documents bomb-damaged urban areas (Bullock, 2002), and Mort discusses their social implications (Mort, 2004). In the examined series, the 1943 cityscape, particularly in episodes S1E3–S1E4, reflects these historical visuals through accurate facade representations consistent with wartime architectural aesthetics.
 **Source: BODIES TV Series S1E5-01.13**	Synagogue Façade	Modest stonework and symmetry	Religious identity in adversity	Myth of resilient sacred space	
 **Source: BODIES TV Series S1E1-04.40**	Modern City Skyline	Skyscrapers, galss façades	Capitalism and globalism	Myth of endless progress	Postmodernism emerged during the late 19th and early 20th centuries, shaped by scientific advances and a rejection of traditional representations of reality. By the 1970s, it had become a popular cultural phenomenon (Thompson, 2017). In Britain, postmodern architecture of the 1980s–1990s developed in a contextual manner, influenced by European and American styles, increased mobility, and political-economic shifts—particularly the Thatcher government's deregulation policies (Franklin & Harwood, 2023). London's rise as a global financial hub further enabled the growth of postmodern architecture in urban centers like Canary Wharf and beyond (Szacka, 2018). In the examined series, this postmodern attitude is visible through the contrast between suburban low-rise architecture and urban skyscrapers, such as those inspired by Foster (S1E8), illustrating a clear urban–rural dichotomy and reflecting the postmodern architectural language of 2023.
 **Source: BODIES TV Series S1E2-02.23**	Suburban Houses	Low-rise, brick-clad homes	Postmodern pluralism	Myth of individualized domestic space	

DOI: 10.15320/ICONARP.2025.335

 Source: BODIES TV Series S1E2-06.03	Futuristic City Skyline	LED-lit towers, dense high-rise	Hyper-density and automation	Myth of technological destiny	High-tech architecture, characterized by the integration of advanced technologies into building design—such as LED panels and digital text—has become a means of architectural expression. In the examined series, future-oriented facade designs incorporate high-tech elements like holograms and LED displays, reflecting technological advancement. The urban skyline also highlights themes of densification, land scarcity, and sustainability, depicted through vertical structures that minimize ground footprint, aligning with the principles of high-tech architectural culture.
 Source: BODIES TV Series S1E7-28.11	Urban Street Façade	Holographic signs, metal cladding	Corporate and surveillance aesthetics	Myth of hyper-controlled urban space	

Table 7. Historical Reality in a scene about the Urban Façade and Architecture in the Bodies Series

Historical Reality in BODIES TV Series	
Source: BODIES TV Series S1E3 15.29 Min. 1941 Cityscape	1940's London (Mort, 2004)
	

This semiotic analysis reveals how Bodies constructs and naturalizes historical reality through interior design, architectural façades, and furniture elements. The first table (Table 4) decodes how interior elements and furnishings signify class identity, cultural capital, and modernist functionality. The second table (Table 6) explores how urban façades convey themes such as architectural style, wartime devastation, postmodern urbanization, and technological dystopia.

Using Roland Barthes' semiotic framework (denotation, connotation, myth), the study uncovers the ideological layers behind visual elements. For instance, handcrafted wooden furniture from the Victorian era conveys the myth of upper-class cultural refinement, while the 2053 transparent AI-integrated office interiors represent the myth of post-human adaptation. Similarly, in the urban analysis, red-brick Victorian façades are coded with imperial elegance, whereas LED-lit futuristic towers suggest the myth of hyper-density and automation.

The final visual panels juxtapose scenes from the series with historical records to validate the show's representations. This comparative approach (Table 5 and 7) demonstrates that Bodies does not merely construct fictional environments but creates historically referential spatial narratives. In this context, the study highlights that cinematic spaces and interior designs function not merely as aesthetic choices but as ideological tools, establishing an interdisciplinary dialogue between architecture, history, and media studies.

Technology and Transportation: This chapter examines how technological developments have shaped the means of transport, both physically and socially (Table 8 and 9).

Table 8. The semiotic analysis of transportation vehicles

Semiotic Analysis- Urban Façade and Architecture					
Scene Reference	Visual Element	Signifier (Expression) Denotation	Signified (Meaning/ Interpretation) Conotation	Mythic/ Ideological Function	Historical Reality
 **Source: BODIES TV Series S1E3- 03.56**	Horse-Drawn Carriage	Wooden wheels, enclosed cab	Pre-industrial transportation	Myth of traditional social order	In the early 19th century, most people in the British Isles lived near their homes and traveled mainly for work, war, or pilgrimage. Britain pioneered steam engines and railways during industrialization, but was slower to adopt internal combustion engines and electric traction motors, which originated in Germany and the U.S. Car ownership remained low compared to America until the late 1960s. Electric traction appeared in British trams in the 1890s and in London's underground, but widespread railway electrification was delayed (Bagwell & Lyth, 2002). In the examined series, the use of carriages in 1890 accurately reflects historical British transportation practices.
 **Source: BODIES TV Series S1E5- 29.28**	Automobile	Rounded metal frame, manual engine	Mid-war mobility (like Austin 10)	Myth of modern ressilience and masculine utility	Seventeen-year-old Austin returned to Britain with an innovative engineering mindset, producing his first car in 1895 and later working with Vickers. Despite early setbacks and outdated designs, he founded a major automobile company in 1914. After financial difficulties with a failed 20 hp model, he restructured the business and partnered with General Motors. His most notable success was the Austin 7, Britain's first successful small car. He also introduced limited flow production methods (Saul, 1980). In the examined series, the use of a vehicle resembling the Austin 10 in 1941 reflects historical accuracy, aligning with automotive developments of the time.
 **Source: BODIES TV Series S1E1- 40.46**	Modern Car	Sleek design, hybrid motor	Middle-class mobility	Myth of eco-conscious consumer choice	Today's automotive industry incorporates technologies like internal combustion engines, electric motors, and hybrid systems to promote sustainability. In the examined series, historically accurate yet technologically advanced vehicle designs are depicted, reflecting the evolution and integration of modern automotive technologies in alignment with their historical contexts.
 **Source: BODIES TV Series S1E1- 51.25**	Autonomous Electric	No driver, voice interaction	AI- based smart transport	Myth of post- human autonomy and control	By 2030, electric vehicles are projected to comprise 20% of light vehicle sales, rising to 50% by 2040. Additionally, autonomous vehicles and the integration of digital-electronic systems are expected to become widespread (Üstün, 2022). In the examined series, the portrayal of 2053 includes widespread electric vehicle use, autonomous driving systems, and advanced digital technologies. While not grounded in historical reality, these elements reflect a utopian vision aligned with the anticipated progression of Industry 4.0.

Table 9. Historical Reality in a scene about the Transportation Vehicles in the Bodies Series

Historical Reality in BODIES TV Series	
Source: BODIES TV Series S1E3 15.29 Min. 1941 Automobile	Austin 10 (https://www.uniquecarsandparts.com/car_spotters_guide_europe_1941.htm)
	

The semiotic analysis of transportation scenes in *Bodies* (Table 8) offers a diachronic view of how mobility technologies reflect broader societal ideologies and historical transitions. Through Barthes' semiotic framework, each vehicle—from the horse-drawn carriage to the autonomous electric car—is decoded as a signifier of its respective era's cultural, economic, and ideological constructs.

DOI: 10.15320/ICONARP.2025.335

The horse-drawn carriage embodies the myth of traditional social order, signifying a pre-industrial, class-structured mobility system. The mid-century Austin 10 automobile, depicted during the 1941 timeline, represents the myth of masculine resilience and wartime modernity, aligning with Britain's automotive history and engineering achievements. The modern hybrid car signals a shift toward eco-conscious consumerism and middle-class practicality. Finally, the autonomous electric vehicle from 2053 embodies the myth of post-human control and technological utopia—echoing Industry 4.0's narrative of seamless, AI-driven futures.

This visual panel (Table 9) reinforces the historical accuracy of these representations by comparing the show's 1941 vehicle with real-life imagery of the Austin 10. This juxtaposition highlights the series' commitment to authenticity while revealing how transportation technologies serve as ideological vessels—naturalizing complex transitions in class, gender, and power through mobility design.

Table 10. Standardized semiotic tables

Semiotic Analysis- Urban Façade and Architecture				
Scene Reference	Visual Element	Signifier Expression Denotation	Signified Meaning/ Interpretation Conotation	Mythic/ Ideological Function
 Source: BODIES TV Series S1E3-03.56	Carriage	Horse-Drawn vehicle	Pre-industrial transportation	Naturalizing a slower, class-divided society
 Source: BODIES TV Series S1E7-02.17	Pointed Roof	Verticality, spires	Gothic Revival/ spiritual authority	Authority & moral rigidity
 Source: BODIES TV Series S1E2-29.11	Desk Lamp	Brass and glass detail	Pre-industrial domesticity	Nostalgic restoration of order
 Source: BODIES TV Series S1E5-29.28	1941 Automobile	Compact, dark-colored (like Austin model)	British wartime practicality	Frugality, national resilience
 Source: BODIES TV Series S1E2-07.48	2053 Fashion	Wearable spine technology	Futuristic human enhancement	Control, dystopian assimilation

The semiotic analysis of Bodies reveals a deep connection between fictional architectural space and historical reality. Each time period in the series is marked by distinct architectural and technological characteristics, reflecting the social and cultural contexts of that era (Table 10).

- 1890s London is portrayed through Gothic Revival architecture, symbolizing the rigidity and formality of the Victorian era. The intricate detailing of buildings, along with

ICONARP – Volume 13, Issue 2 / Published: 31.12.2025

traditional elements like canes and top hats, reinforces the historical setting.

- 1941 presents a modernist vision, shaped by the austerity of World War II. Functional, minimalistic buildings dominate the landscape, reflecting the utilitarian mindset of the time.
- 2023 shifts to a post-modern context, where consumerism and rapid urbanization define the architectural landscape. Skyscrapers and shopping malls highlight the shift towards a more transient, consumption-driven society.
- 2053 offers a dystopian future where technology merges with architecture, creating a cold, impersonal environment. The integration of holograms, wearable technologies, and automated systems reflects a future where human agency is diminished by technological control.

Summary of findings regarding the relationship between the indicators examined and historical reality:

Using Roland Barthes' semiotic approach, which focuses on meaning, connotation and myth, this research examines how historical narratives are conveyed and naturalized through visual space, and how they are represented from the perspective of the viewer with the poststructuralist perspective that Barthes discusses in the death of the author.

The study draws attention to the importance of spatial design in visual media and emphasizes how architectural spaces are not only a backstage plan but also function as a historical and ideological narrative tool. The findings of the study clearly reveal how cinematic tools construct historical memory using the framework of semiotic analysis.

- The TV series successfully portrays different architectural periods using a combination of documentary and fictional imagery.
- Spatial shots incorporate historical reality, allowing viewers to experience architectural structures and spaces from different periods more realistically.
- Elements such as color, composition, costumes, and cinematography are used in accordance with the spirit of the era, creating an atmosphere that immerses viewers in that particular period.
- As emphasized in Barthes' later writings, the integration of myth into narrative enables a more layered and in-depth interpretation of recurring spatial symbols. For instance, the Gothic architecture of 1890 functions not merely as an aesthetic choice but as a mythic signifier of moral rigidity and ideological repression, naturalizing these meanings through visual repetition. Similarly, the high-tech urban environments of 2053 are not simply futuristic settings; rather, they become mythic representations of a sterile dystopia, where an atmosphere of control is visually

DOI: 10.15320/ICONARP.2025.335

encoded through uniform design principles and a limited color palette.

DISCUSSION & CONCLUSION

The findings of this study suggest that cinematic space serves as an important medium for the transmission of historical reality. Visual language as a sign system emphasizes the depth and complexity of the interaction of knowledge systems, social structure, religious beliefs and artistic expression. Based on the analysis of visual elements in the Bodies series using Roland Barthes' semiotic approach, this study concludes that cinematic space serves as an important medium to articulate how it naturalizes historical reality in audience perception. This research also contributes to existing knowledge by providing a detailed understanding of how ideological codes are embedded in the cinematic screen. This methodological framework offers a new perspective by emphasizing the importance of semiotic analysis in uncovering layered meanings in visual cultural narratives.

However, this study has several limitations. First, its focus on a single TV series may limit the generalizability of the findings to broader aspects of other ethnic groups, as the findings emphasize British culture due to the context in which the series is situated. Second, reliance on qualitative methods introduces potential subjectivity in interpreting cultural meanings and emphasizes the need for complementary quantitative studies to validate the findings. An interdisciplinary approach combining cultural studies and environmental studies, combining visual and verbal culture, may be more inclusive and further enrich the semiological perspective.

This study demonstrates that Bodies successfully uses architectural space to reflect historical and social realities. The series provides a rich case study for understanding how cinema can reinterpret architectural forms to convey complex narratives about time, culture, and technology. Through its careful blending of historical accuracy and futuristic speculation, Bodies not only explores the past but also presents a vision of the future, grounded in current technological and social trends.

Emphasizing the polysemantic nature of cinematic texts by integrating Barthes' notions of “mythologies”, “death of the author” and “the pleasure of the text”, the study argues that meaning is not fixed by the intention of the creator, but emerges through the viewer's interaction with the image. The cinematic space thus becomes an ideological battlefield where history is not represented but produced through spatial codes.

The semiotic analysis highlights the role of architecture in cinematic storytelling, revealing how space can be used to evoke different historical and cultural contexts. As such, this study contributes to the ongoing discourse on the relationship between cinema and architecture, offering a framework for analyzing how space and time are represented on screen. In this way, the study emphasizes the use of semiotic analysis and relates the findings to both historical reality and cinematic space.

ICONARP – Volume 13, Issue 2 / Published: 31.12.2025

The study reveals that cinematographic language, including architecture, clothing, furniture, and automobiles, aligns with historical reality, highlighting the role of cinema in introducing traditional arts to society. Cinematic spaces are analyzed within historical reality, influencing today's dreamy audience through implicit texts. Although digital tools create dystopian universes, it's crucial to consider the social definition of ideology in the spatial analysis. Cinematic spaces not only shed light on historical reality but also serve as an environment that portrays the role of ideology in shaping future visions. The selected TV series effectively reflects historical reality, providing viewers with a valuable experience in accurately conveying architectural and cultural characteristics of past periods.

The successful portrayal of architecture in the TV series is important in accurately conveying architectural styles and spaces from past periods to the audience. It can serve as a valuable resource for viewers interested in history and architecture.

Spatial shots that incorporate historical reality provide viewers with a better understanding of the atmosphere and lifestyle of past periods. This can contribute to increased interest in historical periods and a better understanding of cultural heritage.

The use of color, composition, costumes, and cinematography in line with the period helps viewers immerse themselves in the atmosphere of that era. This allows viewers to delve deeper into the lifestyle and cultural fabric of the period and facilitates the transmission of collective memory through the screen.

Future work could build on this research by applying similar semiotic frameworks to different visual genres or historical narratives, thus expanding the interdisciplinary discourse between architecture, cinema and cultural memory.

REFERENCES

Akin, Ö. & Weinel, E. F. (1982). *Representation and architecture*. USA: Information Dynamics.

Algan, E. (1996). *Görüntü Yönetmeliği Ve Görüntü Yönetmenine Özgü Biçemin Sinematografik Yapıta Yansıması* (Doctoral dissertation).Retrieved from ProQuest Dissertations and Theses – Anadolu University (Turkey).

Allmer, A. (2010). *Sinemekan–sinemada mimarlık*. 1. Baskı, İstanbul: Varlık Yayınları.

Aslan, G. & Arıdağ, L. (2023). Sinema-Mimarlık Arakesitinde Beden-Zaman-Mekân İlişkisi. *Online Journal of Art & Design*, *11*(1), 100-120.

Aydınlı, S. (2008). Mekandan Mekansal'a: Mekanın Zamansallığı/Zamanın Mekansallığı. In Ç. E. Orman (Ed.), *Zaman-Mekân* (pp. 150-161). YEM Yayın.

Bagwell, P. & Lyth, P. J. (2002). *Transport in Britain: from canal lock to gridlock*. A&C Black.

Barthes, R. (1977). Introduction to the Structural Analysis of Narratives: Image–Music–Text (trans.). *Stephen Heath (New York, 1977)*, 79.

Barthes, R. (1979). *Göstergebilim İlkeleri*, Çev. Berke Vardar-Mehmet Rifat. Ankara: Kültür Bakanlığı Yayınları.

DOI: 10.15320/ICONARP.2025.335

Barthes, R. (1986). The Death of the Author. In *The Rustle of Language* (pp. 49–55). Hill and Wang. (Original Publication 1968).

Barthes, R. (1991). *Mythologies* (A. Lavers, Trans.). Noonday Press. (Original Work Published: 1957)

Barthes, R. (2007). *Yazı Üzerine Çeşitlemeler-Metnin Hazzı* (Ş. Demirkol, Trans.). Yapı Kredi Yayınları. (Original Publication 2000)

Bazin, A. (1966). *Çağdaş sinemanın sorunları* (N. Özön, Trans.; Vol. 1. Baskı). Bilgi Yayınevi.

Bazin, A. (2011). *Sinema Nedir* (çev. İbrahim Şener). İstanbul: Doruk Yayınları.

Bergson, H. (2007). *Madde ve Bellek*, (çev. Işık Ergüden). Dost Kitabevi Yay., Ankara.

Beşgen, A., & Güner, D. M. (2023). Sinemada Deleuzian Mekan Üretimi: Roma. In C. A. Güzer (Ed.), *Sinema ve mimarlık* (pp. 161-178). Fol Kitap.

Bezel, N. (1984). *Yeryüzü Cennetleri Kurmak (Ütopyalar)* (Vol. 1. Baskı). Say Yayınları.

Bircan, U. (2022). Umberto Eco'da metin, mimarlık ve film göstergebilimi. *RumeliDE Dil ve Edebiyat Araştırmaları Dergisi* (31), 668-681.

Bordwell, D., & Thompson, K. (2011). *Film sanatı* (E. Yılmaz ve ES Onat, çev.). Ankara: Deki Yayınları.

Brown, B. (2014). *Sinematografi Kuram ve Uygulama* (Çev: Selçuk Taylaner). İstanbul: Hil Yayın.

Buckland, W. (1999). Film semiotics. *A companion to film theory* (pp. 84-104). Blackwell Publishing.

Bullock, N. (2002). *Building the post-war world: modern architecture and reconstruction in Britain*. Psychology Press.

Cercaşin, M. (2013). Reminiscenţe ale stilului victorian în moda contemporană. In *Buletin ştiinţific al tinerilor istorici* (pp. 177-180).

Chandran, V., & Jagadisan, S. (2024). Analysing the role of semiotics in films–from an architect's perspective. *Multidisciplinary Science Journal*, *6*.

Crane, D. (2003). *Moda ve Gündemleri* (çev. Ö. Çelik). İstanbul: Ayrıntı Yayınları.

Curtis, S. (2013). *Wearable devices: where fashion and technology collide The Telegraph.* Retrieved from (Last access date: 24.02.2024). https://www.telegraph.co.uk/technology/news/10382795/Wearable-devices-where-fashion-and-technology-collide.html

De Certeau, M., Giard, L., & Mayol, P. (1998). *The Practice of Everyday Life: Living and Cooking*. Volume 2 (T. J. Tomasik, Trans.; L. Giard, Ed. Vol. 2). University of Minnesota Press.

Değerli, N. G. (2019). Moda endüstrisinin giyilebilir teknoloji tasarımları. *Uluslararası Bilimsel Araştırmalar Dergisi (IBAD)*, 4(1), 50-65.

Deleuze, G. (1989). *Cinema 2 the time-image.* University of Minnesota Press.

Deleuze, G. (2006). *Bergsonculuk*, çev. Hakan Yücefer, Otonom Yayıncılık, İstanbul.

Demir, Ü. & Kula, N. (2022). Sinema Araştırmalarında Göstergebilimsel Eleştiri. *Uluslararası Sanat ve Sanat Eğitimi Dergisi.* Cilt: 5 (Sayı: 11), 63-77.

Eagleton, T. (2007). *Ideology: An Introduction*. Verso.

Eco, U. (1986). La estructura ausente Introducción a la semiótica, *trad. Francisco Serra Cantarell, España: Editorial Lumen.*

Edwards, C. (2022). *Collinson & Lock: Art Furnishers, Interior Decorators and Designers 1870-1900*. Troubador Publishing Ltd.

Emir, D., & Diler, H. E. (2011). Büyülü Gerçekçilik: Latife Tekin'in Sevgili Arsız Ölüm Ve Angela Carter'ın Büyülü Oyuncakçı Dükkânı İsimli Eserlerinin Karşılaştırması. *Dumlupınar Üniversitesi Sosyal Bilimler Dergisi* (30), 51-62.

Erbay, M., Tufan, A. Ş., & Konakoğlu, Z. N. (2017). Sinemada Geleceğin Mekânları: Uzay Temali Filmler. *İleri teknoloji bilimleri dergisi*, 6(3), 471-480.

Erginbaş, O. (2012). *Bir popüler kültür ürünü olarak kavak yelleri dizisinin lise gençliği üzerinde imaj oluşturma etkisi.* Selçuk Üniversitesi Sosyal Bilimler Enstitüsü Radyo Televizyon Anabilim Dalı Yüksek Lisans Tezi, Konya.

Erk, G. K. (2023). Gorunur Kentler ve Analog Ikizleri (Visible Cities and Their Analogue Twins). In C. A. Guzer (Ed.), *Sinema ve mimarlık* (pp. 63-86). Fol Kitap.

Ermilova, D. Y., Alibekova, M. I., Eryomkin, D. I., Lyakhova, N. B., & Sorokotyagina, E. N. (2022). Analysis of the impact of second World War on fashion and consumer practices. *New Design Ideas*, 6(1), 71-85.

Eskandani, H. O. (2020). *Peyzaj mimarlığı ile ilişkili göstergelerin doğu ve batı kültüründe peyzaj tasarımı üzerine etkisi* (Doctoral dissertation). Atatürk Üniversitesi, Erzurum.

Fontes, M. M., & Vieira, L. R. C. (2025). Urban Metaphors Depicted Through the Scenographic Architecture of the TV Series Smallville. *Estudios sobre las culturas contemporáneas* (3), 165-193.

Franklin, G., & Harwood, E. (2023). *Post-modern buildings in Britain*. Batsford Books.

Gezer Çatalbaş, Z. C., & Akpinar, I. (2025). Staging Nişantaşı: cultural conflicts and ideological representations of urban space in Turkish TV culture. *GeoJournal*, 90(3), 1-24.

Godard, J.-L. (1991). *Godard Godard'ı anlatıyor: söyleşiler* (A. Derman, Trans.). Metis.

Goodridge, M., & Grierson, T. (2014). *Sinematografi: Görüntü yönetmenliği*. Remzi Kitabevi.

Güngör, Ş. (2014). Görüntü düzenlemesi. In S. Yıldız (Ed.), *Sinema Dili: Beyazperdeyi Yaratanlar* (pp. 119-170). Su Yayınları.

Güzer, C. A. (2023). Sinemanın mimarlık üzerine söyledikleri: bir eleştiri biçimi olarak sinema. In *Sinema ve mimarlık* (pp. 27-63). Fol Kitap.

Hacıömeroğlu, T. (2023). Gerçekliğin yanılsamaları: sinemada kent ve mekanın yeniden üretimi. In C. A. Güzer (Ed.), *Sinema ve mimarlık* (pp. 112-123). Fol Kitap.

Higgs, E. (1983). Domestic servants and households in Victorian England. *Social History*, 8(2), 201-210.

Huppatz, D. J. (2011). Reconsidering Roland Barthes. *Design and Culture*, 3(1), 85-100. https://doi.org/10.2752/175470810x12863771378833

Ieta, R. (2010). The New Romanian Cinema: A Realism of Impressions. *Film Criticism*, 34(2-3), 22-36. <Go to ISI>://WOS:000279622100002

Kellner, D. (2002). Critical perspectives on visual imagery in media and cyberculture. *Journal of visual literacy*, 22(1), 81-90.

Kent, M. (2013). Piano Silkers in Eighteenth-and Nineteenth-Century London (1784-1911): a Genealogical Survey. *The Galpin Society Journal*, 71-248.

Kent, M. (2015). The Piano-Industry Workforce in Mid-Victorian England: a Study of the 1881 Census. *Royal Musical Association Research Chronicle*, 46, 95-158.

Kiessel, M., & Stubbs, J. (2025). Narratives of class and home: the visualization and meaning of mass housing complexes in urban science-fiction dystopias in film and TV. Journal of Property, *Planning and Environmental Law*, 17(1), 53-67.

Kirkham, P. (1988). The London furniture trade 1700-1870. *Furniture History*, 24, i-219.

DOI: 10.15320/ICONARP.2025.335

Kracauer, S. (1997). *Theory of film: The redemption of physical reality*. Princeton University Press.

Long, H. (2007). *Victorian houses and their details.* Routledge.

Lull, J. (2001). *Medya İletişim Kültür*, Çev. Nazife Güngör, Ankara, Vadi Yayınları.

Mascelli, J. V. (2007). *Sinemanın Beş Temel Öğesi* (Çev: Hakan Gür). Ankara: İmge Kitabevi Yayınları.

Mason, M. (2011). *The impact of World War II on women's fashion in the United States and Britain*. UNLV Theses Dissertations, Professional Papers, and Capstones.

Monaco, J. (2001). *Bir Film Nasıl Okunur*. (Çev. Ertan Yılmaz). Oğlak Yayıncılık, İstanbul.

Mort, F. (2004). Fantasies of metropolitan life: planning London in the 1940s. *Journal of British Studies*, 43(1), 120-151.

Niazi, M., Helali Sotoodeh, M., Afzali, A., & Goodarz, Z. (2025). The Influence of the Media on the Understanding of the Relationship Between Modern Man and the Environment: Semiotics of the Movie" So Far, So Close". *ECOPERSIA*, 13(1), 1-12.

Note: A. U. O. C. (2024). [Powerpoint slides]. Retrieved from https://acikders.ankara.edu.tr/mod/resource/view.php?id=70057

Oktuğ, M. (2008). Kent-Sinema İlişkisine Kuramsal Bir Yaklaşım. In M. Öztürk (Ed.), *Sinematografik Kentler Mekânlar Hatıralar, Arzular* (pp. 117-126). Agora Yayınları.

Olewitz, C. (2016). *Intel's morphing Adrenaline Dress will transform when it detects elevated stress levels. Digital Trends* Retrieved from (Last access date: 24.02.2024). https://www.digitaltrends.com/cool-tech/intel-adrenaline-dress-morphs-based-on-stress/#/1

Pezzella, M. (2006). *Sinemada Estetik* (F. Demir, Ed.). Dost Kitabevi Yayınları.

Rosenstone, R. A. (2018). Gerçek Tarih Olarak Tarihsel Film. *sinecine: Sinema Araştırmaları Dergisi*, 9(1), 159-181.

Rustin, M. (1989). Postmodernism and antimodernism in contemporary British architecture. *Assemblage* (8), 89-103.

Ryan, M., & Kellner, D. (2010). *Politik kamera*. İstanbul: Ayrıntı Yayınları.

Sarai, M. M., Jo, A. H., & Shagh, S. (2024). Reflection on the Semiotics of Color as an Element of Architectural Atmosphere in Dramatic, Political and Social Cinema (A Look at the Cinematic Works of Rakhshan Bani-Etemad). *Journal of Socio*, 3(6).

Saul, S. (1980). Herbert Austin: The British Motor Car Industry to 1941 by Roy Church. *Technology and Culture*, 21(4), 662-664.

Schaal, H. D. (2000). Spaces of the psyche in German Expressionist film. *Architectural Design* (143), 12-15. <Go to ISI>://WOS:000085776700004

Sevindik, S. M. (2025). Reflections of Light and Nature in Cinematic Space:"Komorebi" in Wim Wenders'Perfect Days. *Çukurova Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 34(1), 669-690.

Shojaee, S. M., & Saremi, S. A. A. (2018). Explaining the Methods of Architecture Representation Using Semiotic Analysis (Umberto Eco's Theory of Architecture Codes). *International Journal of Architecture and Urban Development*, 8(3), 33-48.

Shrimpton, J. (2014). *Fashion in the 1940s* (Vol. 784). Bloomsbury Publishing.

Simitch, A., & Warke, V. (2014). *The language of architecture: 26 principles every architect should know.* Rockport Publishers.

Smith, J., & Rogers, R. (2015). *Behind the veneer: the South Shoreditch furniture trade and its buildings.* Historic England.

Sözen, G., & Boyacıoğlu, E. (2020). Sinema ve mimarlığın mekânla mutlak ilişkisi: otomatik portakal. *Mimarlık* (415), 54-59.
Sparke, P. (2013). *An introduction to design and culture: 1900 to the present.* Routledge.
Sütcü, Ö. Y. (2015). *Gilles Deleuze'de İmge Hareketi Olarak Sinemanın Felsefesi.* Sentez Yayıncılık.
Szacka, L.-C. (2018). *Post-Modern Buildings in Britain*. In: Taylor & Francis.
Tanyeli, U. (1993). Zihinsel Yapımız Ütopyaya Kapalı Mı? *İstanbul Dergisi Tarih Vakfı Yayınları*, 22-25.
Tasbolatuly, A., & Ismagambetova, Z. (2024). Semiotic Concepts of Culture and Cinema language. *Journal of Philosophy Culture and Political Science*, 90(4), 46-55.
Thompson, W. (2017). *Postmodernism and history*. Bloomsbury Publishing.
Toffler, A. (2008). *Üçüncü dalga* (S. Yeniçeri, çev.). İstanbul: Koridor Yayıncılık.
Tseng, C.-I., van Leeuwen, T., & Djonov, E. (2025). The fragmentation and plasticity of space in film. *Multimodality & Society*, 26349795251335017.
Üstün, S. (2022). Otomobil İç Dünyasındaki İletişim Teknolojileri Ve Endüstri 4.0 Beklentileri. *Düşünce Dünyasında Türkiz*, 8(43), 147-160.
Wall, C. (2013). *An architecture of parts: architects, building workers and industrialisation in Britain 1940-1970*. Routledge.
Waquet, D., & Laporte, M. (2011). *Moda* (Çev: I. Ergüden). Ankara: Dost Kitabevi Yayınları.
Weinel, F. (1982). Endnote: representation and architecture: Why. *Representation and Architecture.*
Yağlı, S. (2013). Gündelik hayatın bir alanı olarak moda aracılığıyla kültürün yeniden inşası. *İstanbul Arel Üniversitesi İletişim Çalışmaları Dergisi*, 2(4), 37-63.
Yalım, Ö. (2023). Sinemada Bir Protagonist Karakter Olarak Tasarım. In C. A. Güzer (Ed.), *Sinema ve mimarlık* (pp. 287-308). Fol Kitap.
Yıldız, S. (2014). *Sinematografik anlatım*. Su Yayınevi.

Resume

Dilek Aybek Özdemir is an assistant professor in the Department of Architecture at Bingöl University. She received her doctorate from Gazi University. In addition to her work focusing on architectural education and creativity, she has also conducted research on theory and criticism in architecture. She has taught various courses on cinema and architecture at Bingöl University.

DOI: 10.15320/ICONARP.2025.335

ICONARP
International Journal of Architecture and Planning
Received: 29.04.2024 Accepted: 16.12.2025
Volume 13, Issue 2/ Published: 31.12.2025
DOI: 10.15320/ICONARP.2025.336 E- ISSN:2147-9380
Research Article

Morphological Analysis of Tea Factories as Industrial Structures

Ceyda Yurttaş Şahin*
Zehra Eminağaoğlu**

Abstract

With the establishment of the Republic and the momentum generated by the Industrial Revolution —the most significant cultural, economic, social, and physical transformation of the era—industrialization activities in Anatolia accelerated rapidly and played a decisive role in shaping cities and societies. As major industrial enterprises in the Eastern Black Sea Region, tea factories have persisted not only as products of industrialization but also as core components of the modernization program. Although initially located outside the urban core, these large, multifunctional buildings gradually became focal points of settlements and significantly influenced urban growth and development decisions. In addition to shaping urban morphology and skyline, tea factories contribute perceptually and semantically to collective memory by reflecting the history of the built environment, as well as economic, technological, and industrial development processes. The literature review indicates that, despite their economic and ideological significance during the Republican period, tea factories remain insufficiently represented in academic studies. In response to this gap, the study aims to systematically analyze the multidimensional morphological impacts of tea factories on the formation and transformation of settlement patterns in the Eastern Black Sea Region. The study area consists of nine factory settlements with reliable data, located along the coastal belt of Trabzon, Rize, and Artvin, where tea cultivation is most intensive. Within this framework, morphological analyses supported by conceptual maps and tables were conducted to examine figure–ground ratios, spatial boundaries, relational patterns, and the effects of factories on the urban silhouette. The findings demonstrate that tea factories, embedded in collective memory, function as tangible expressions of Republican ideology and play a significant role in shaping urban morphology, skyline, and the social, cultural, and economic life of their regions. The study is expected to contribute to efforts aimed at identifying, evaluating, and safeguarding the historical and social values of tea factories.

Keywords:
Çaykur tea factory, Eastern Black Sea, Social memory, Urban identity, Urban morphology

*Department of Architecture, Artvin Coruh University, Artvin, Türkiye (*Corresponding author*)
Email: ceydayurttas@artvin.edu.tr

** Department of Architecture, Artvin Coruh University, Artvin, Türkiye
Email: zeminagaoglu@artvin.edu.tr

To cite this article: Yurttaş Şahin, C., & Eminağaoğlu, Z. (2025). Morphological Analysis of Tea Factories as Industrial Structures. *ICONARP International Journal of Architecture and Planning,* 13 (2), 570-591. DOI: 10.15320/ICONARP.2025.336

INTRODUCTION

Industrialization is defined as "a process of economic development characterized by a dynamic manufacturing sector, with a large share of national resources directed towards technical innovation (up to-date), producing and owning means of production and consumer goods, capable of ensuring high development for the economy as a whole, and ensuring economic and social progress" (Özbilen, 1970). Based on the definition, it is seen that economic development stands out in industrialization. Economic development will undoubtedly raise the level of welfare, but it will also affect the social change of society. Thus, it will be possible for society to develop culturally, increase educational opportunities, and change employment and the physical environment. Within the large-scale facilities established during the Republican period, which were designed to foster development across multiple domains, built environments incorporating diverse social functions were systematically introduced. Modernization movements manifested themselves in the field of industry in a very short time. As a result, in addition to cultural spaces such as educational buildings, sports fields, libraries, cinemas, and lounges, social-cultural units such as places of worship and accommodation structures such as guesthouses were built in industrial settlements. According to Zeybekoğlu, with the ideology of modernization and independence brought about by the Republican Revolution, economic activities were handled as an integrated spatial and social policy (Zeybekoğlu, 2002; Semiz & Toplu, 2019). As a result, industrial settlements were built, which played a role in the development of studies in the field of urban morphology.

Established as one of the large-scale industrial enterprises during the first 50 years of the Republic, the Tea Factories, the most important structure of industrialization in the Eastern Black Sea Region, has continued its existence as one of the central components of the modernization program until today. With their large multifunctional physical structures, these buildings, which were located on the periphery or outside of the city in the first years of their establishment, became the focal point of the settlement over time and played a major role in urban growth and development decisions. In addition to affecting urban morphology and silhouette, tea factories shed light on the history of the built environment, economy, technology and industrial developments. They also have a very important perceptual and semantic place in social memory (Eminağaoğlu & Yurttaş Şahin, 2023).

Considering their role in both the economic and ideological development of a period during the history of the Republic, the importance of Tea Factories has not been sufficiently emphasized enough in academic studies. Although there are economic studies on tea factories in the literature, architectural studies are insufficient. In this study, the aim is to partially address the gap in the existing literature concerning tea factories, which have influenced the Eastern Black Sea Region across social, cultural, economic, and other domains. Moreover,

DOI: 10.15320/ICONARP.2025.336

the physical impacts of these large-scale industrial structures on the settlement environments in which they are situated, as well as the dominant conditions shaping local development, are examined through comprehensive morphological analyses.

1.1. Material and Method

1.1.1. Material

Within the scope of the study, three provinces in the Eastern Black Sea Region, where tea production is most intensively carried out, were selected. From these provinces, nine factories for which data could be obtained through a sampling approach were included in the analysis. During the selection process, particular attention was given to choosing factories located along the international coastal highway and positioned within the visible settlement silhouette. Accordingly, the structures examined in the study consist of the Araklı, Sürmene, and Of Eskipazar Tea Factories in Trabzon; the Pazar, Ardeşen, and Fındıklı Tea Factories in Rize; and the Arhavi, Hopa, and Kemalpaşa Tea Factories in Artvin (Figure 1.).

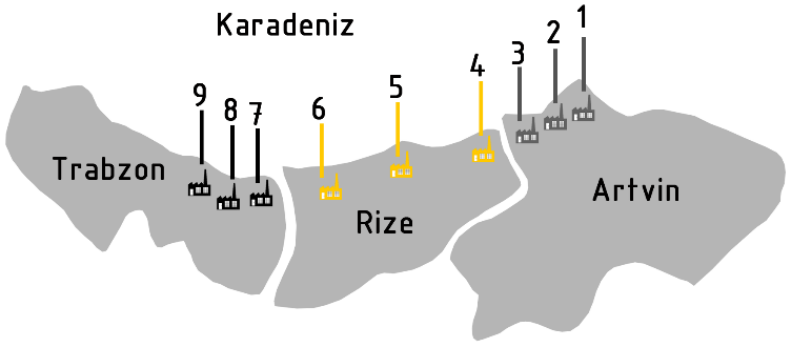


Figure 1. Provincial distribution of factories in the study area (produced by the authors)

Çaykur Factories, which are handled within the scope of the study area, undertake a leading role in increasing the socio-economic development level in the Eastern Black Sea Region in areas such as tea agriculture and industry in general, urbanization, income distribution, regional migration, efficient use of agricultural lands, prevention of erosion, development of agriculture-based industry and similar areas. Çaykur, the strategic institution of the region, is the largest organization in the Turkish tea sector with 49 Wet Tea Processing Factories. Approximately 55-60% of the fresh tea products produced in the region are purchased and processed by Çaykur, although it varies from year to year.

ICONARP – Volume 13, Issue 2 / Published: 31.12.2025

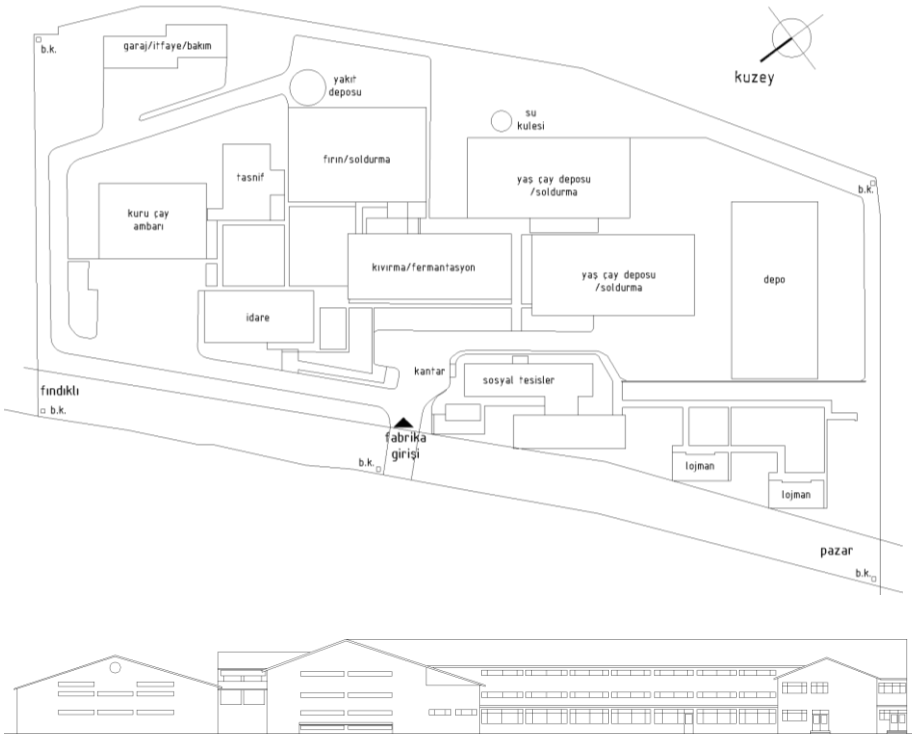


Figure 2. Ardeşen Tea Factory plan and facade (produced by the authors)

There are departments such as withering, curling, drying departments, and warehouses in the factory premises, as well as sorting, green tea production, boiler room, tea unloading departments, dining hall, and workers' lodge buildings. In addition to these, units such as cooperatives, administrative buildings, woodsheds, lodging, lodging houses, clubhouses, and warehouses were designed within the campus to meet needs such as shelter, socialization, recreation, and entertainment. Although the story heights of the buildings vary according to the function, they are designed as 1, 2, 3, and rarely higher stories. The factory buildings consist of quadrangular forms with a horizontal effect. Band windows and large-sized doors are used throughout the buildings. There are also chimneys visible from many parts of the settlement (Figure 2.). In all the factory buildings, frame construction systems in which reinforced concrete and steel are used together are used as building materials. As a result of geographical requirements, hipped roofs, and mixed roofs were preferred for the upper covers of the buildings. These upper covers covering the wide openings of the buildings were constructed with steel and/or reinforced concrete. The facades of most of the buildings mostly preserve their originality. Although the buildings have been painted at regular intervals, because they are in a region with heavy rainfall and high humidity, damages such as contamination, vegetation, mossing, abrasion, corrosion, and loss of parts are observed in the building elements. In addition to these, in the building, which was downsized in line with periodic requirements and needs, function changes were made with the increase in capacity. This situation has led to the deterioration of the spatial fiction shaped according to the function attributed to the

DOI: 10.15320/ICONARP.2025.336

buildings during the design phase. In addition, later additions to the buildings have led to a change in the visual perception of the buildings (Eminağaoğlu & Yurttaş Şahin, 2023).

Table 1. Information about the factories in the study area (ÇAYKUR, 2024) (produced by the authors).

No	Province	Factory Name	Informations
1	Artvin	Kemalpaşa Tea Factory	Kemalpaşa Tea Factory covers an area of 42,381 m_2 in the center of the campus. The factory campus, which continues to exist today, has a closed volume of 42,381 m^2. It produces 165 tons of tea daily during the green tea production season.
2		Hopa Tea Factory	Hopa Tea Factory covers an area of 26,621 m^2 in the center of the campus. The factory campus, which continues to exist today, has an indoor volume of 18,597 m^2. It produces 160 tons of tea daily during the green tea production season.
3		Arhavi Tea Factory	Arhavi Tea Factory covers an area of 36,171 m^2 in the center of the campus. The factory campus, which continues to exist today, has a closed volume of 24,308 m^2. It produces 280 tons of tea daily during the green tea production season.
4	Rize	Fındıklı Tea Factory	Fındıklı Tea Factory covers an area of 30,245 m^2 in the center of the campus. The factory complex, which continues to exist today, has a closed volume of 22,740 m^2. During the green tea production season, 195 tons of tea is produced daily.
5		Ardeşen Tea Factory	Ardeşen Tea Factory covers an area of 36,171 m^2 in the center of the campus. The factory campus, which continues to exist today, has a closed volume of 24,308 m^2. It produces 280 tons of tea daily during the green tea production season.
6		Pazar Tea Factory	Pazar Tea Factory covers an area of 44,166 m^2 in the center of the campus. The factory campus, which continues to exist today, has a closed volume of 22,606 m^2. It produces 150 tons of tea daily during the green tea production season.
7	Trabzon	Of Eskipazar Tea Factory	Of Eskipazar Tea Factory covers an area of 12,785 m^2, 35 km from the center of Of. The factory campus, which continues its existence today, has a closed volume of 14.368 m^2. It produces 150 tons of tea daily during the green tea production season.
8		Sürmene Tea Factory	Sürmene Tea Factory covers an area of 32,906 m^2 in the center of the campus. The factory campus, which continues to exist today, has a closed volume of 17,653 m^2. It produces 150 tons of tea daily during the green tea production season.
9		Araklı Tea Factory	Araklı Tea Factory covers an area of 25,557 m^2 in the center of the campus. The factory campus, which continues to exist today, has a closed volume of 17,465 m^2. It produces 130 tons of tea daily during the green tea production season (ÇAYKUR, 2024).

1.1.2. Method

The urban morphological analysis of the factories was conducted using systematically structured tables. These tables incorporate thematic maps containing schematic representations of buildings, road networks, the historical settlement core, the contemporary settlement area, the factory itself, and the adjacent residential–commercial axis. Furthermore, to determine the figure–ground ratio of each factory within its settlement pattern, a 400,000 m^2 area encompassing the factory was delineated. Within this boundary, the closed, semi-open, and open spaces; surrounding structures; circulation routes; and all components forming the factory campus were graphically illustrated,

ICONARP – Volume 13, Issue 2 / Published: 31.12.2025

and their proportional distributions within the selected 400,000 m^2 zone were quantified numerically.

In addition, the tables include urban silhouette drawings of the factories, prepared using archival data obtained from the General Directorate of ÇAYKUR Tea Enterprises and supplemented by findings from fieldwork. Through the evaluation table generated from these analyses, the plan- and silhouette-based urban figure–ground ratios of the nine factory settlements, their spatial relationships with the surrounding built environment, and the ways in which they influence the urban silhouette in both planimetric, and three-dimensional perspectives were examined and interpreted using conceptual maps (Figure 3.).

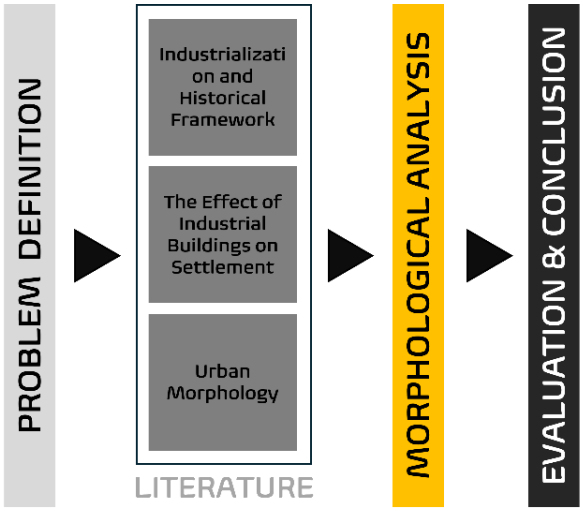


Figure 3. Research methodology (produced by the authors)

1.2. Tea Factories in Historical Process

As a result of the 16th century developments, the Industrial Revolution turned into an industrial movement centered in Europe. These developments, which affected Anatolian geography during the Ottoman Empire, continued afterwards. (Bigat, 2017; Kazas, 2008; Yavaşoğlu & Özgül, 2020).

The Republic of Turkey, which was established after the national independence achieved in World War I, has acted with the aim of creating a modern and independent country since its establishment (Zeybekoğlu, 2002). This idea also emerged as a reflection of the nationalism movement that emerged after the French Revolution and the desire to create a national identity by getting rid of colonialism. (Bozdoğan, 2020). In line with this goal, reform and improvement studies were carried out in many political, legal, social, cultural, and economic fields. The intellectual framework of the period was dominated by the idea that the foundation of a modern and independent state could only be realized through the establishment of a stable economic infrastructure. In this context, an economic policy that supported the private sector for industrialization has been implemented

DOI: 10.15320/ICONARP.2025.336

since the 1920s. In the 1930s and afterwards, the liberal economy, in which the private sector was supported, was replaced by a statist-oriented economic order. While the private sector continued to be supported in the background, a system in which the state was the locomotive power in the economy began to be implemented (Bigat, 2017; Bancı, 2006; Ayvaz & Halaç, 2023). Following these arrangements, the First Five-Year Industrialization Plan was prepared in 1934-38. In line with this plan, it was planned to establish sugar, weaving, mining, cellulose and ceramic factories in locations determined by the state. (Sadioğlu & Yürük, 2020; Ay, Efe Güney, & Ecemiş Kılıç, 2022). After the 1950s, factors such as the development of transportation facilities, the migration of the population from rural areas to the city, the increase in the potential workforce with the increasing population, the strengthening of the private sector and the increase in investments led to the development and diversification of the industry. The Industrial Development Bank of Turkey, which was established in these years, accelerated the development of private industry with its own facilities (Semiz & Toplu, 2019; Toprak, 2019; Bancı, 2006; Dönmez, 2019; Kasap & Toy, 2018; Durukan Kopuz, 2018).

Figure 4. The first modern tea factory (URL-1)

After the Industrial Revolution, moves towards the production of tea, which has been produced in the Far East for thousands of years, have started to be realized in our country. In 1888, the first steps were taken and in 1892, repeated attempts to produce tea failed due to the wrong choice of geographical region. In 1917, research activities within the state were interrupted due to the outbreak of World War I. Due to the increasing unemployment in the Black Sea Region after World War I, steps were taken to increase agricultural activities in the region (Alikılıç, 2016; Kacar, 1992). In 1924, a law was enacted specifically for tea production and units were opened in this context. The first fresh tea leaf harvest and dry tea production was realized in 1938. In 1940, a decree was prepared to allow tea production from Araklı Creek to the border with Georgia. Between 1940-42, the first tea workshops were established and developed on a capacity basis. In 1947, with the breakthroughs made in the industry, the first tea factory was established in Rize Center (Kuzucu, 2012; Lafcı, 2013) (Figure 4.).

1.3. The Impact of Industrial Buildings on the City

Invented in 1712, the first steam engines were developed and used in different fields and their importance in industry increased. Factory structures shaped around steam engines affected the entire environment with their noisy and dangerous structures. In the first years of their establishment, new settlements were formed around the factories, which were generally established far from the settlement center due to their noise, pollution and dangers, and this situation brought along problems related to vital activities in these cities. Migration from rural areas to newly formed settlements led to rapid population growth and poor living conditions. With modern urban studies, factories and workers' residences were reconsidered, started to be planned and built. Healthier settlements were designed with the planning of industrial areas (Benevolo, 1971; Pekdemir Başeğmez & Asiliskender, 2023). Factories have become one of the important problems of urbanization over time. Housing and transportation of workers have become important factors for the location of the factory. For this reason, not only the factory but also its surroundings were designed. A direct relationship was established between the locations of factories, houses and public spaces. In the factory settlements built in America during this period, there were houses, shops, schools and chapels that were the blueprints of the companies. Workers living in these settlements often created their own culture, working hours and social activities within the built environment (Garner, 1992). All these developments were made to improve unhealthy conditions in industrial zones and to increase the working efficiency of workers.

In Turkey, as a result of the modernization process, especially in the Early Republican period, there has been a reconstruction of the physical environment as well as economic development. Industrial buildings, with the structures within them, had effective physical locations within the reshaped settlement pattern (Gür, 2020). As a result of the supply and transportation requirements needed in the ordinary cycle of the industry, the units that make up the industrial established in the appropriate region had to be shaped with a certain functional fiction to obtain the maximum benefit. This fiction consists of buildings and machinery, ateliers, workhouses and factories, mines, operation and treatment areas, warehouses and storages, places where energy is produced, transmitted, and used, transportation and all its infrastructure, as well as places used for social activities such as housing, health, worship or education related to the industry, which are arranged in a systematic organization (Zeybekoğlu, 2002). In addition to their physical location within the city, industrial settlements have also become an important symbol in the urban silhouette. In the early years of the Republic, factories took on a symbolic meaning with their tall chimneys rising as symbols of industrialization in cities and were named “national chimneys” (Peri, 2006; Acar & Uzunali, 2021).

DOI: 10.15320/ICONARP.2025.336

Figure 5. Arhavi Tea Factory chimney (authors' archive)

With their various services and social activities, industrial settlements have effectively shaped the lives of local people, functioning not only as a place of production but also as social and cultural centres. Structures of this nature have been important spaces that support social change. Especially structures such as housing, social facilities, guesthouses and lodges for accommodation and socialization have played an important role in the intended sociocultural change (Eminağaoğlu & Yurttaş Şahin, 2023). In short, industrial structures consist of many components (such as historical, technological, social, etc.) of industrial culture. These components have resulted in factory campuses not only developing the local economy of the region where they are established but also affecting the socio-cultural life in every sense with their structures as production spaces, modern technologies, and new social life routines.

The establishment of factory buildings in small-scale settlements after the proclamation of the Republic, particularly after 1935, caused significant changes in the economic, spatial, and social structure of the region, which was previously reliant on agricultural activities (Asiliskender, 2009). In addition to the physical presence of the factories, the spatial functions that were added or changed because of needs and limitations were also reflected in the spatial texture of the settlement. Another reflection of the functional changes was also experienced in the silhouette of the building and landscape views. In short, the spatial effects of the factories were felt not only in the areas where they were established but also in the settlement (Asiliskender, 2006). The social and cultural spaces built for the needs of the workers and their families in the established factories occupied large areas and directed the development of the settlement. The settlements concentrated around the factory complexes also affected the landscape and infrastructure. Factory complexes have emerged as prominent urban landmarks, shaping new transportation networks and development zones through the construction of additional roads, residential areas, and social and cultural facilities.

Industry has undergone many changes since the Industrial Revolution. Thanks to globalization, advances in technology, and transportation, the spheres of influence of the industry have changed significantly. The results of this change have been seen especially in the built environment. In the second half of the 21st century, with the increase in

the speed of production technology, a new consumption culture emerged and dragged society to a new order in daily life. Over time, consumption has overtaken production (Harvey, 1992). This transformation did not end industrial production while designing new production systems, on the contrary, it caused it to grow. In the 1970s, computer technologies developed, and workers began to use the systems that operated them, not the machines that produced them (Rappaport, 2017; Ķeire & Vugule, 2022).

Although the shift of production from workshops to factories caused some difficulties in production spaces and their surroundings, this situation became one of the most critical planning data for 20th century cities. Factories were initially conceived as part of the company town with its residential areas, schools, hospitals and social spaces; later, they pioneered the establishment of larger towns with residential areas and directed growth. As the number of factories increased in the second half of the twentieth century, factories created their own production campuses or districts to meet growing consumer demand (Pekdemir Başeğmez & Asiliskender, 2023). Today's technological developments are also changing the equipment of factory workers. Face-to-face communication is decreasing with the developing communication technologies. With the increase and diversification of consumption needs, interaction moves outside the factory campus. For this reason, factory campuses have shrunk; they have generally turned into production centres. This situation causes the physical existence of industrial buildings, which are the physical reflection of the social, economic, cultural and architectural development of a period, to disappear, as well as the erasure of the image formed in society.

1.4. Urban Morphology

The word morphology means shape, form knowledge in the context of the word origin (TDK, 2024). The widely accepted definition of urban morphology can be explained as "the examination of the physical form of settlements". More precisely, it is the study of the formation of urban texture components and their relationships that define their composition and configuration over time (Smailes, 1955). In this context, in short, urban morphology is used as an important method of analysis in determining the stages of change-transformation of the urban texture with all these features, expressing the spatial and functional fiction within the historical origins of the buildings and transferring them to the present day (Kubat & Topçu, 2009). Urban morphology is an approach that analyses the physical form of cities. Morphological change occurs in social and economic contexts and has a direct impact on the city's construction and architectural texture (Koç & Kubat, 2018).

At the centre of urban morphology is the urban pattern and the urban pattern is shaped by different users at different spatial scales in line with different objectives and requirements. The concept of space is

DOI: 10.15320/ICONARP.2025.336

produced with different contextual relations in each period. This situation enables the construction of a dynamic relationship between the conscious interventions of users and urban objects. In the historical process, space experiences a change of state under the control of the user. In this context, the concept of space fills the place of the relation formed in the previous state with a new relation in each change of state. These changes of state become concrete and observable through spatial change in the city, revealing different spatial organization structures in different periods. These relations are shaped successively in the process. In this context, spatial relations between users, which are effective in shaping space, lead to the formation of morphological periods in which different spatial characteristics become evident. However, this process is a one due to many different inputs (Ünlü, 2018; Sınmaz & Özdemir, 2016; Sakar & Ünlü, 2018).

Morphological approaches, which are mostly used to understand and analyse the city due to its structure, help to collect comprehensive information about the urban area. Morphological analysis, which enables the analysis of urban phenomena at different spatial scales and through different disciplines, helps to make sense of the physical development process with structural data. For the last two decades, urban morphology has been associated with urban growth; scientists have been trying to understand how the shape of the city has changed over the historical process and the main reasons for this. As defined by Li et al. (2022), urban morphology is an interdisciplinary approach that focuses on physical form to reveal the characteristics of transformation and displacement of urban areas over time at various spatial scales. According to Duan et al. (2022), the city is a structure, it is not easy to deeply analyse the influencing factors only from a whole object. In order to divide the under relatively simple conditions, starting from the different scale levels of a city, examining all the details and effects of its form language will probably have a positive effect on this issue. According to this idea, urban morphological analysis can be handled at three levels: single element, parcel, and city (Duan, Lan, & Jiang, 2022). In urban morphology research, it is stated that different levels of detail of the city can be handled at different scales. The first studies, which saw the city as a part of geography, focused on different fields of study by separating the parts that make up the city towards the middle of the 20th century (Yalıner & Begeç, 2023; Soleimani, 2022). Urban morphology, which is basically constructed as a part of geography, recognizes that the environment built in the natural environment is based on cultural transmissions. When we look at the city, the structural elements that make up the city consist of many classifiable sub-elements such as streets, squares, roads, and parks. Urban morphology and planning, although regulated through laws and administrative frameworks, are intrinsically linked to a wide range of evolving urban dynamics, including industrialization, urban thresholds and belt zones, population growth, urbanization processes, urban identity, typological

differentiation, conservation practices, obsolescence, urban transformation, energy management, and sustainability. In this way, studies have been carried out to understand the nature of urban development and to manage the development process (İlhan & Ediz, 2019). Since it is based on cultural accumulation, it is inevitable to experience morphological change along with culture. Altınbulak (2022) mentions that the city should be treated as a dynamic and transforming living organism within the scope of morphology. Due to its layered structure, urban morphology can provide information about past life as well as foresight for the future depending on cultural changes (Aydınsoy, 2023; Bancı, 2006).

In morphological studies, the urban texture can be analysed at the parcel level, making it easier to recognize the characteristics and layout of individual buildings and thus analyse the city. Individual elements include buildings and spaces within and outside the parcel and can directly express the character of the settlement through their appearance and spatial arrangement. The physical structure is a continuous system of smaller parts with various behaviours, which are arranged and interconnected for a variety of reasons - social, cultural, economic, etc. - and finally form the unique, temporary urban image. Buildings and groups of buildings that physically occupy large areas within the settlement scale can create remarkable images in the region.

Urban form is not only about permanent physical elements such as buildings, streets, hills, rivers, and trees. The important thing is to decide on the elements that make up the city. These elements are the social structure, the economic system, the ecological system, the preservation of the spatial and semantic background, and the maintenance of the ordinary motion (Kevin, 2010). However, the guiding variables and impact rates of each city are different from each other and even for the same city, different variables may have more dominant effects at different times. For the same region, a factor that is an indicator of development in one period may become a problem to be solved in the next. For this reason, in interpreting the temporal morphological change regardless of scale, it is necessary to read the city with its different dynamics instead of evaluating the intertwined urban components separately or categorizing the urban texture according to its form (McAdams, 2007; Gür, 2020).

MORPHOLOGICAL EVALUATION OF TEA FACTORIES

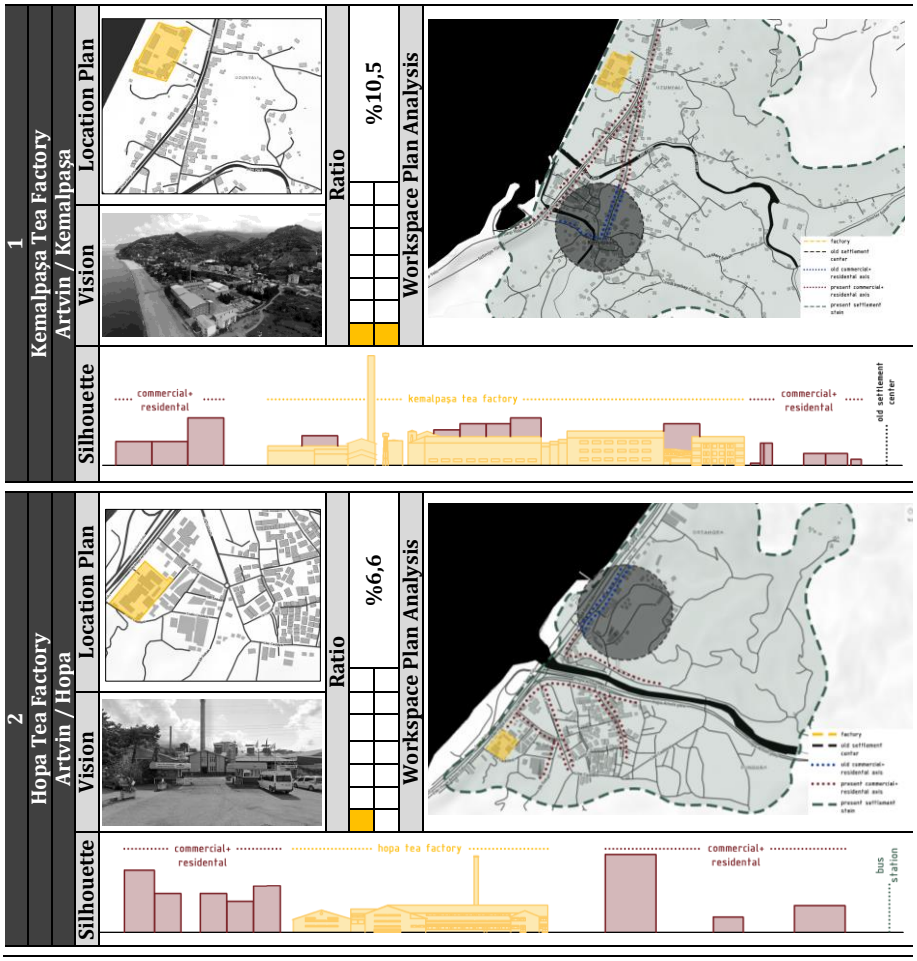
Tea factories, which emerged as a spatial reflection of modernization and independence with the establishment of the Republic, led the existing rural settlement typology to turn into an industrial-oriented form. With the establishment of tea factories in the Eastern Black Sea Region, which mostly shows a dispersed / loose collective settlement character because of geographical and climatic requirements and limitations, collective settlements with tighter qualities, especially shaped around the factory, began to form. The settlements, which were

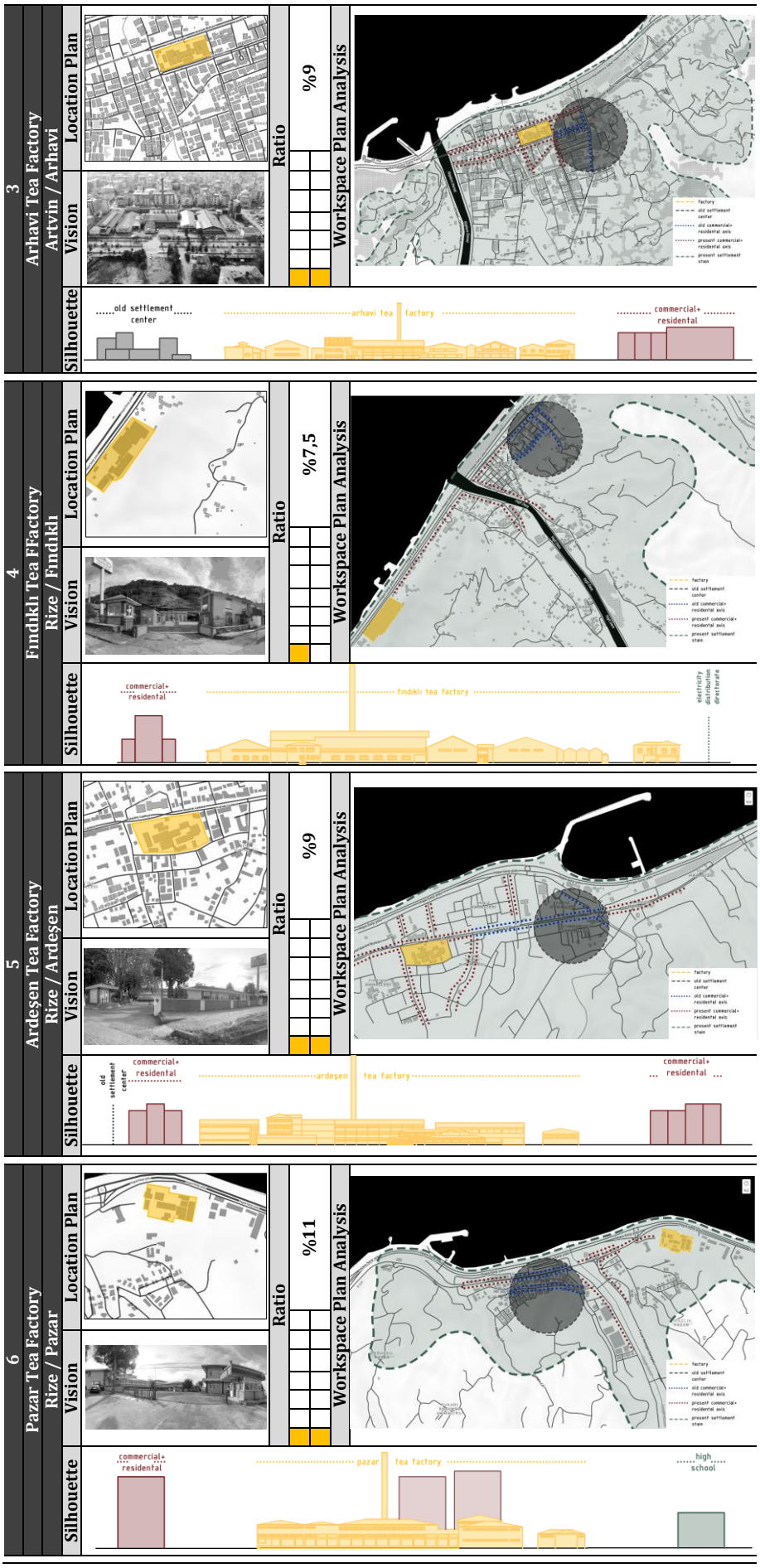
DOI: 10.15320/ICONARP.2025.336

shaped because of the agriculture-dominated economy in the pre-factory period, have seen an increase in the human population after industrial activities. The zoning and infrastructure activities carried out in and around the factories to meet the needs of the increasing population caused the factories, which were located on the periphery of the settlements in the years they were established, to become a central location. Factory buildings and their associated sociocultural units were constructed in a modernist architectural language, utilizing the construction systems and materials characteristic of their period. Their surroundings, initially located outside the urban core and therefore open to new development, subsequently evolved to comprise predominantly structures built with contemporary construction technologies and materials.

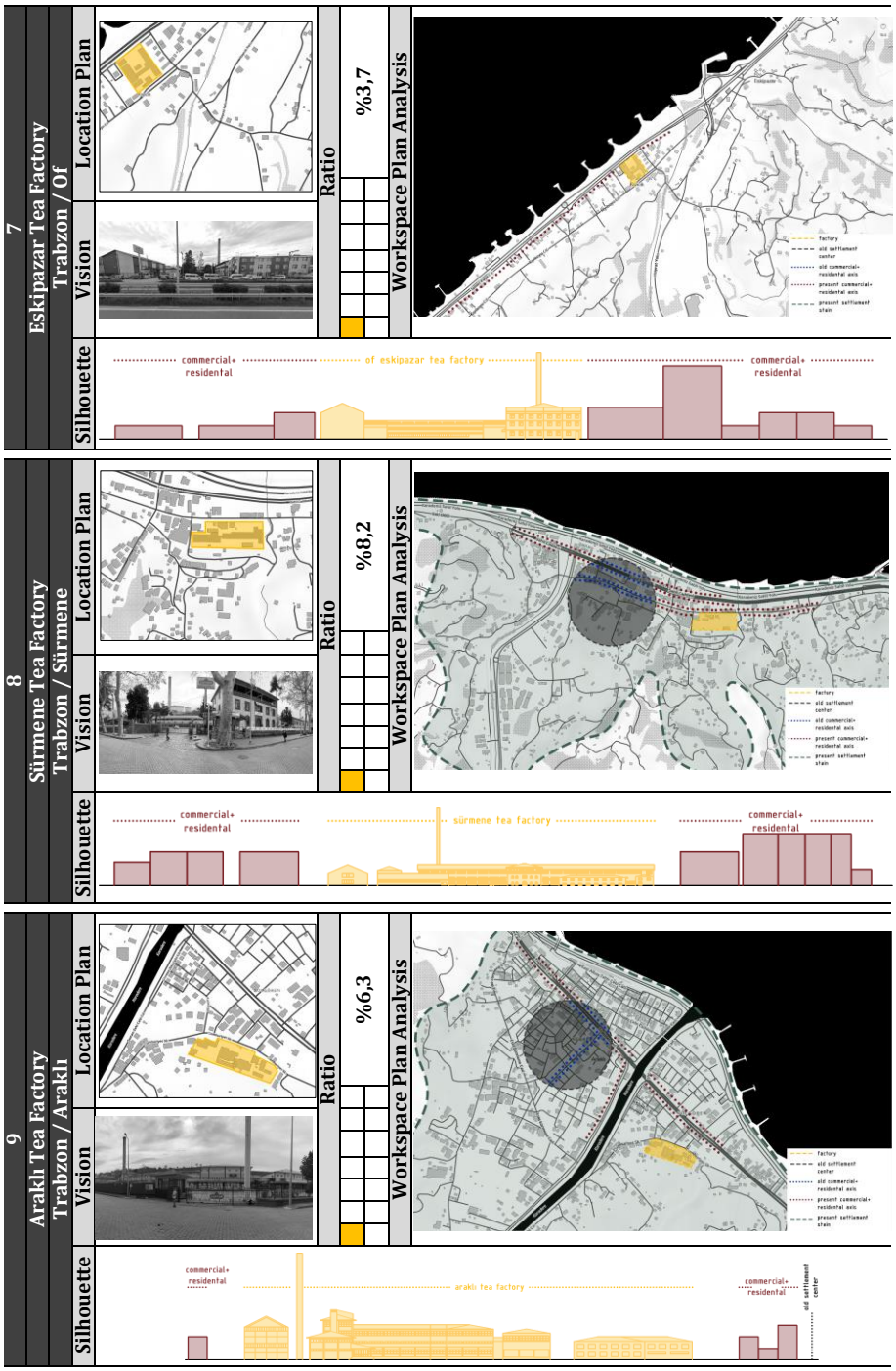
In the table below, the morphological effects of the tea factories in the settlement are analysed at the plan and silhouette level.

Table 2. Morphological analysis of Tea Factory campuses.





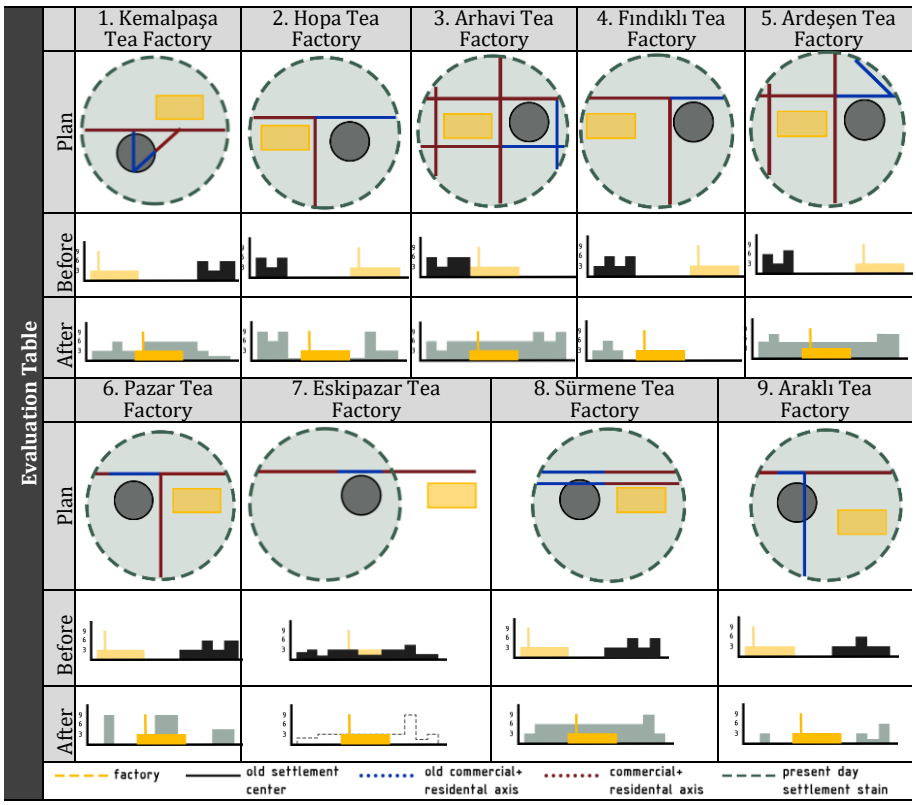
DOI: 10.15320/ICONARP.2025.336



Considering the region in which they were established, factory buildings occupy a considerably larger area in both building scale and parcel size compared to other industrial buildings of similar quality, with a total area ranging between 12.000-44.000m2. As seen in the table, the Rize-Pazar Tea Factory, which occupies 11% of the selected 400.000 m2 settlement area, has the highest ratio among the selected examples. Trabzon-Eskipazar Tea Factory has the lowest ratio with 3.7%. It is seen that there is no clear standard in the size of the factories; the size is very variable depending on the capacity or the units within its structure. Especially considering the figure and ground rates in the settlement and their presence in the urban skyline, it is seen that even at

the lowest rate, factories occupy large areas compared to other buildings in the settlement.

Table 3. Evaluation table.



The building communities of the factories affected the buildings, building groups, functions and the roads surrounding these parcels. In the residential areas where the factory buildings are located, the transportation pattern in which linear and grid systems are designed together is predominantly used. Factory buildings constructed for industrial activities were built on the intercity highway routes of the settlements where they were located. These highways, which started to be used for urban transportation with the construction of the Eastern Black Sea coastal road, which has an international character, have become the main commercial axes within the settlement with the effect of the factories. In particular, the building stock within the factory parcels and the surrounding plots has been reorganized for commercial or mixed residential–commercial use to keep pace with this transformation. This has resulted in commercial areas showing an edge characteristic between factories and residential areas. Residential and social structures designed within the factory campuses also led to the emergence of public socio-cultural structures around the factory. The factory and its surroundings are enclosed by buildings of varying heights depending on the settlement boundaries, predominantly ranging from one to eight storeys. Given the 4–5-meter storey heights required for industrial functions, the factory buildings create a pronounced horizontal impact within the urban pattern through their one-, two-, and three-storey configurations and spatial distribution. This

DOI: 10.15320/ICONARP.2025.336

horizontal emphasis is visually counterbalanced by the chimneys and water towers that rise within the factory grounds. Over the years, the chimneys rising from the factory complex have become a symbol of the city, determining the perception of the location of the factories from a distance and strengthening their physical presence.

Tea factories affect the settlements they are in not only with their physical presence, but also in terms of affecting the socio-cultural structure, the economic system and the continuity of collective memory. Factory buildings, which are shaped within the framework of a certain functional fiction, have effectively shaped the lives of the local people with their social and cultural spaces established for the needs of employees and their families, apart from their identity as production structures, and have become remarkable centres for the settlement. Urban morphology, which is based on cultural transmissions, has a layered structure because of the preservation of the time-dependent dynamic structure of the elements that make up the city. As a result of this, tea factories have also had different impact rates over time as the elements that make up the settlement in which they are located. Tea factories, which were considered as an indicator of development in the first years of their establishment, are now considered as a problem that needs to be solved because of changing needs.

EVALUATION and CONCLUSION

As of the early 19th century, the replacement of human and animal power by machines because of the large-scale developments in the Industrial Revolution led to large amounts of migrations from rural areas to the regions where mechanization took place. Globally, urban morphological analyses in countries have evolved into a different dimension with both the physical presence of factory settlements shaped by the requirements of industrial production and the increasing population because of migration. These developments in the industrial field on a global scale have also found a place in Anatolia, albeit late. Although the impacts of World War I during the late Ottoman period were not as profound as those experienced in Europe, the establishment of the Republic initiated a period of accelerated economic development supported by the prevailing state ideology. Guided by the principles of modernization and independence introduced through the Republican Revolution, economic initiatives were approached as integrated spatial and social policies. As a result, industrial settlements that played a role in shaping the practice of urbanization and the formation of modern identity and social consciousness were built.

The tea factories, which were established by the state with the steps taken to increase agricultural activities in the region due to the increasing unemployment in the Black Sea Region after World War I, have added value to the region in many areas, in terms of providing services in both economic and sociocultural fields at the point where society needs them. These structures, which are indicative of the

ideological approaches and economic development activities of the period, were able to establish close ties with the region in the local context. Both their physical shape and their impact on social, cultural, and economic life are of great importance throughout the region.

Since its establishment, the factory complexes have contributed greatly to the economic development of the local people. Both the workers working in the factory and the farmers producing tea earn their income through this institution. It has the distinction of being a centre thanks to the employment of a large community and the technical and social areas in its physical existence. Especially the realization of the sociocultural activities carried out in the region in the past within the borders of the factory has brought the impact of the campus on urban morphology and social life to the forefront. Therefore, with these features, tea factories physically occupy large areas in the settlements where they are located and shape the development of the city. The size capacity of tea factories as settlements is not standardized but varies within the scope of the buildings they contain. Nevertheless, considering the settlements they are in, the proportional values of the areas they occupy are high.

Tea factories, which have a very important place in the history of the Republic, occupy a remarkable area in the city silhouette morphologically. In addition to taking place in the city silhouette with their unique architectural qualities, the buildings played a major role in the functionalization of the surrounding structures. The chimney rising from the factory complex has become a symbol of the city over the years and has been decisive in the remote perception of its location. As a result, in this study, it is observed that the urban form of the settlements examined in this study has developed under the influence of tea factories and that these influences have also formed the symbolic elements of the city.

Tea factories are a group of buildings that have a very important place in the identity, social memory, and settlement morphology of the settlement they are located in. Although the factory campuses were partially located on the city periphery when they were first built, they remained at a central point with the expanding city limits. This situation causes the gases released from the iconic chimney to affect the whole city and pollute the air. The factory buildings, which were built as a major modernization step for the Early Republican Period, have become a problem that needs to be solved today. As with many other factory buildings, the issue of moving tea factories out of the city has come to the agenda. Factory buildings, which have effective locations within the settlement texture, face negativities such as technological inadequacy, economic loss, obsolescence, and loss of value in the historical process. Depending on the decisions taken because of developing industrialization and changing needs, the buildings are faced with the danger of demolition and the inability to continue their existence. These buildings should be considered the industrial heritage of the future

DOI: 10.15320/ICONARP.2025.336

because of their unique architectural qualities, and tangible and intangible values. Tea factories, which form deep traces in both the physical structure and social structure of the Black Sea Region, should be evaluated as cultural heritage and policies should be produced for their existence with this understanding.

REFERENCES

Acar, C., & Uzunali, A. (2021). Analysis of the Effect of Urban Change on Urban Silhouettes by Entropy Method. Fresenius Environmental Bulletin, 30, s. 10633-10642.

Alikılıç, D. (2016). Çay'ın Karadeniz Bölgesi için Önemi ve Tarihi Seyri. Karadeniz İncelemeleri Dergisi (26), s. 269-280.

Altınbulak, E. (2022). Kentsel morfolojide 'kalıcılık kuramı': Arcadius Forumu'nun izlerinin Okunması ['Persistence theory' in urban morphology: reading the traces of the Arcadius Forum]. Master Thesis, Institute of Science and Technology, Mimar Sinan Fine Arts University, İstanbul.

Asiliskender, B. (2006). Kayseri Eski Kent Merkezi'nde Cumhuriyet'in İlanından Günümüze Mekan ve Kimlik Deneyimi. Erciyes Üniversitesi Fen Bilimleri Enstitüsü Dergisi, 22(1-2), s. 203-212.

Asiliskender, B. (2009). Cumhuriyet Sonrası Kalkınma Hareketi olarak Sanayileşme ve Mekânsal Değişim. Türkiye Araflt›rmalar› Literatür Dergisi, 17(13), s. 153-169.

Ay, F., Efe Güney, M., & Ecemiş Kılıç, S. (2022). Cumhuriyet'in Önemli Bir Sanayi Yatırımı Olarak Kocaeli Seka Örneği ve Gelecek İçin Öneriler. Dokuz Eylül Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, 24(1), s. 329-380.

Aydınsoy, M. (2023). Karakter Alanlarının Morfolojik Değişiminin Niteliksel Etkileri: Şenesenevler, Levent Ve Koşuyolu Bahçeli Konut Yerleşimleri [Qualitative effects of morphological change of character areas: Senesenevler, levent and kosuyolu single-family housing settlements]. PhD Thesis, Institute of Science and Technology, Mimar Sinan Fine Arts University, İstanbul.

Ayvaz, E., & Halaç, H. H. (2023). Tarihi Sirkeci Garı Gümrük ve Ambar Binalarının Endüstri Mirası Kapsamında Değerlendirilmesi ve Koruma Önerileri. İdealkent, 15(39), s. 62-91.

Bancı, S. (2006). Şeker Şirketi ve Ankara Şeker Fabrikası Yerleşkesi. TMMO Ankara Mimarlar Odası Ankara Şubesi Yayını Dosya: Endüstri Mirası, 45(3), s. 36-40.

Benevolo, L. (1971). The origins of Modern Town Planning. Massatchusetts: MIT Press.

Bigat, B. (2017). Kuruluşu ve İlk Yıllarında Nazilli Sümerbank Basma Fabrikası [Establishment and first years Nazilli Sümerbank Print Factory]. Master Thesis, Institute of Social Sciences, Adnan Menderes University, Aydın.

Bozdoğan, S. (2020). Modernizm ve Ulusun İnşası Erken Cumhuriyet Türkiyesi'nde Mimari Kültür. İstanbul: Metis Yayınları.

ÇAYKUR, https://www.caykur.gov.tr/Pages/Kurumsal/KurumHakkinda.aspx (Date Accessed: 29.04.2024).

Dönmez, G. (2019). Cumhuriyet Dönemi İşçi Yerleşkeleri ve Lojman Alanlarının Kente Olan Etkileri: Bursa Örneği. PARADOKS Ekonomi, Sosyoloji ve Politika Dergisi, 15(1), s. 55-76.

Duan, J., Lan, W., & Jiang, Y. (2022). An Evaluation Approach to Spatial Identity in Historic Urban Areas from a Humanistic Perspective. Frontiers of

Architectural Research, 11(5), s. 806-814. doi: https://doi.org/10.1016/j.foar.2021.12.009

Durukan Kopuz, A. (2018). Alpullu Şeker Fabrikası ve İşçi Konutları. METU JFA (2), s. 29-54. doi:10.4305

Eminağaoğlu, Z., & Yurttaş Şahin, C. (2023). Kültürel Mimari Mirasın Kolektif Bellek İnşasındaki Rolü: Arhavi Çay Fabrikası. 4. Turizmde Mimarlık ve Kültürel Miras Kongresi, 12-14 Ekim 2023, Karabük/Türkiye, (s. 15-16). Karabük.

Garner, J. S. (1992). The Company Town: Architecture and Society in the Early Industrial Age. New York: Oxford University Press.

Gür, D. (2020). Yakın Dönem Endüstri Mirasının Korunması: Doğu Sanayi Sitesi Örneği. Betonart | 1950'ler istanbulu(65), s. 70-77.

Harvey, D. (1992). The Condition of Postmodernity. Oxford U.K.: Blackwell Publishers.

İlhan, C., & Ediz, Ö. (2019). Kent Dokusu Morfolojik Değişiminin Fraktal Geometri Aracılığıyla Hesaplanması: Bursa Örneği. Mimarlık ve Yaşam Dergisi Journal of Architecture and Life, s. 117-140.

Kacar, B. (1992). Yapraktan Bardağa Çay. İstanbul: T.C. Ziraat Bankası.

Kasap, M., & Toy, S. (2018). Cumhuriyet Dönemi Sanayileşmenin Mekânsal Gelişim Üzerine Etkileri ve Sanayi Yapılarının Endüstriyel Mirasa Dönüşümü: Eskişehir Fabrikalar Bölgesi Örneği. Dicle Üniversitesi 1. Uluslararası Mimarlık Sempozyumu, s. 2079-2090. Dicle.

Kazas, J. (2008). Endüstriyel Miras Kapsamındaki Alanların Kentsel Yenilemeyi Oluşturmadaki Rolünün İrdelenmesi "Ödemiş Örneği" [Examination of the roles of industrial heritage areas in the establishment of urban renewal with the case of study of Odemis]. PhD Thesis, Institute of Science and Technology, Yıldız Technical University, İstanbul.

Ķeire, L., & Vugule, K. (2022, 03 21). The importance of silhouette in the perception of the urban landscape. Saldus example. Scientific Journal of Latvia University of Life Sciences and Technologies Landscape Architecture and Art, 21(21), s. 30-40.

Koç, A., & Kubat, A. S. (2018). Kent Biçimi Araştırmalarında Karşılaştırmalı Analiz Yöntemleri: İstanbul Tarihi Yarımadası Örneği. "DeğişKent" Değişen Kent, Mekân ve Biçim Türkiye Kentsel Morfoloji Araştırma Ağı II. Kentsel Morfoloji Sempozyumu, (s. 243-254). İstanbul.

Kubat, A. S., & Topçu, M. (2009). Antakya ve Konya Tarihi Kent Dokularının Morfolojik Açıdan Karşılaştırılması. Uluslararası İnsan Bilimleri Dergisi, 6(2), s. 334-347.

Kuzucu, K. (2012). Bin Yılın Çayı Osmanlı'da Çay ve Çayhane Kültürü. İstanbul: Kapı Yayınları.

Lafcı, N. (2013). Çay Kültüründe Değişen Alışkanlıkların Türkiye Örneğinde Ürün Tasarımına Etkileri. İstanbul: Yüksek Lisans Tezi, Güzel Sanatlar Enstitüsü, Marmara Üniversitesi.

Li, M., Wang, Y., Rosier, J., Verburg, P. H., & Vliet, J. (2022). Global Maps of 3D Built-up Patterns for Urban Morphological Analysis. International Journal of Applied Earth Observation and Geoinformation, 114, s. 1-9. doi: https://doi.org/10.1016/j.jag.2022.103048

Lynch, K. (2010). Kent İmgesi. İş Bankası Kültür Yayınları.

McAdams, A. (2007, Ocak). Fractal Analysis and The Urban Morphology of a City in a Developing Country: A Case Study of Istanbul. Marmara Coğrafya Dergisi (15), s. 149-172.

DOI: 10.15320/ICONARP.2025.336

Özbilen, A. (1970). Türkiye Sanayileşmesi ve Endüstri Yapıları Yönünden Mimarlığa Etkileri. Mimarlık.

Pekdemir Başeğmez, M., & Asiliskender, B. (2023). Evolution of Production Spaces: A Historical Review for Projecting Smart Factories. ICONARP International Journal of Architecture and Planning, 11(2), s. 716-733.

Peri, B. (2006). Cumhuriyet Dönemi Endüstri Yapıları Ve Yerleşkeleri Kayseri Ve Nazilli Sümerbank Fabrikaları. TMMOB Mimarlar Odası Ankara Şubesi Yayını Dosya: Endüstri Mirası, 45(3), s. 24-26.

Rappaport, N. (2017). Factory Architecture in the Age of Industry 4.0. Metropolismag. https://metropolismag.com/projects/factory-architecture-age-industry-4-0/.

Sadioğlu, U., & Yürük, E. (2020). Eskişehir'in Endüstriyel Mirası Fabrikalar Bölgesinin Kent Kimliği Üzerindeki Etkileri. Kent Araştırmaları Dergisi (Journal of Urban Studies), Kentleşme ve Ekonomi Özel Sayısı (11), s. 1049-1072.

Sakar, S., & Ünlü, T. (2018). Kentsel Mekânın Değişimi ve Karakter Oluşumu; İzmir. "DeğişKent" Değişen Kent, Mekân ve Biçim Türkiye Kentsel Morfoloji Araştırma Ağı II. Kentsel Morfoloji Sempozyumu, (s. 417-434). İstanbul.

Semiz, Y., & Toplu, G. (2019). Cumhuriyet Döneminde Devlet Tarafından Kurulan İlk Sanayi Kuruluşu Kayseri Sümerbank Bez Fabrikası. Selçuk Üniversitesi Türkiyat Araştırmaları Dergisi(45), s. 29-59.

Sınmaz, S., & Özdemir, H. A. (2016, 01). Türkiye Şehir Planlama Pratiğinin Kentsel Morfoloji ve Tipoloji Üzerindeki Etkileri, Siverek Kenti İçin Bir Değerlendirme. İdealkent, 7(18), s. 80-115.

Smailes, A. (1955). Some Reflections on the Geographical Description and Analysis of Townscapes. Transactions and Papers (Institute of British Geographers) (21), s. 99-115. doi: https://doi.org/10.2307/621275

Soleimani, M. (2022, 09). Urban design in a historic context: Evaluation of the renovation project of Sahibabad Meydan in Tabriz. Megaron, 17, s. 424–436.

TDK: https://sozluk.gov.tr/ (Date Accessed: 23.04.2024)

Toprak, Z. (2019). Türkiye'nin Ekonomik Gelişimi 1923-2018. Ankara: Pegem Akademi.

URL-1, (2024). https://100sene100nesne.com/cay/ (Date Accessed: 31.01.2024).

Ünlü, T. (2018). Mekânın Biçimlendirilmesi ve Kentsel Morfoloji. Türkiye Kentsel Morfoloji Araştırma Ağı II. Kentsel Morfoloji Sempozyumu, (s. 59-70). İstanbul. https://tnum.org.tr/index.php/tnum/article/view/68.

Yalıner, İ., & Begeç, H. (2023). Kent Morfolojisinin Değişiminde Yüksek Yapıların Rolü: İzmir Kent Araştırmaları. TNUM, IV. Kentsel Morfoloji Sempozyumu, (s. 359-369). Konya.

Yavaşoğlu, F., & Özgül, C. G. (2020). Endüstri Mirasının Korunması ve Dönüşümü: Malatya Şeker Fabrikası Yerleşkesi Örneği. İdealkent 11. Kentleşme ve Ekonomi Özel Sayısı, s. 972-996.

Zeybekoğlu, S. (2002). Erken Cumhuriyet Dönemi Sanayi Komplekslerinin Mekansal Analizi Nazilli, Kayseri, Bursa ve Eskişehir Örnekleri [Spatial analysis of industrial es in the Early Republican Period of Turkey: Nazilli, Kayseri, Bursa and Eskişehir case studies]. Master Thesis, Institute of Science and Technology, Yıldız Technical University, İstanbul.

Resume

Ceyda YURTTAŞ ŞAHIN received her bachelor's degree (2009) and master's degree (2018) in architecture from Karadeniz Technical University, where she

also began her doctoral studies in 2018. In 2017, she was appointed as a Research Assistant at the Department of Architecture at Artvin Çoruh University, where she has continued her academic career. Her research interests focus on architectural heritage and conservation, Heritage Building Information Modeling (HBIM), and restoration project management, with particular emphasis on the integration of digital technologies into heritage conservation processes.

Zehra EMINAĞAOĞLU received her bachelor's degree in architecture from Istanbul Technical University and her master's degree and PhD from Karadeniz Technical University. She currently serves as Head of the Department of Architecture at Artvin Çoruh University. Her research interests include architectural heritage and conservation, design culture and social context, architecture and design, sustainable architecture, and architecture and environmental psychology.

DOI: 10.15320/ICONARP.2025.336

ICONARP
International Journal of Architecture and Planning
Received: 06.05.2025 Accepted: 04.11.2025
Volume 13, Issue 2/ Published: 31.12.2025
DOI: 10.15320/ICONARP.2025.337 E- ISSN:2147-9380
Research Article

Integration of AI, Spatial Data, and GIS in Planning: Spatial Application Based on Machine Learning and Deep Learning

Ahmet Şekeroğlu*
Kadir Tolga Çelik

Abstract

The study focuses on the integration of data, deep learning (DL) models, and machine learning (ML) algorithms with geographical information systems (GIS) within the field of spatial planning. An original contribution is provided by addressing the integration of DL and ML into GIS in terms of their advantages, limitations, encountered challenges, and potential directions for development within the context of spatial data and model validation processes. In this context, the objective is to identify the developmental trajectory, challenges, and potentials of spatial studies based on the integration of DL, ML, and GIS. To achieve this aim, 91 research articles published in high-impact journals indexed in the Web of Science (WoS) database were analyzed. The selected studies were evaluated under five main categories: spatial and temporal distribution, applications of DL and ML methods, thematic approaches, employed GIS tools, and data-model validation processes. The findings suggest that artificial intelligence technologies have the potential to serve as significant tools in spatial planning, although the current developmental stage remains in its early phases. While ML algorithms are widely applied across the reviewed studies, the application scope of DL models has expanded in recent years due to the increasing availability of large datasets. Spatial applications predominantly concentrate on land use, natural hazard assessments, environmental issues, and climate-related themes, particularly supported by the extensive use of remote sensing techniques. However, due to the limited accessibility of spatial data in rural areas, the majority of applied studies have been oriented toward urban centers, revealing a noticeable gap in research focusing on rural contexts. Furthermore, studies that implement AI and planning integration in practice demonstrate that the use of spatial data and the necessity of model validation constitute critical requirements. This study may offer guidance for future research by supporting the implementation of applications across diverse thematic domains involving the integration of artificial intelligence, planning, and GIS within spatially oriented processes.

Keywords: *Big data, Deep learning, Geographical information systems, Machine learning, Spatial planning*

* Department of Urban and Regional Planning, Faculty of Architecture, Amasya University, Amasya, Türkiye (*Corresponding author*)
Email: ahmet.sekeroglu@amasya.edu.tr

** Department of Urban Design and Landscape Architecture, Faculty of Architecture, Amasya University, Amasya, Türkiye
Email: kadir.celik@amasya.edu.tr

To cite this article: Sekeroglu, A., & Celik, K.T. (2025). Integration of AI, Spatial Data, and GIS in Planning: Spatial Application Based on Machine Learning and Deep Learning. *ICONARP International Journal of Architecture and Planning,* 13 (2), 592-624. DOI: 10.15320/ICONARP.2025.337

INTRODUCTION

The increasing complexity of urban environments necessitates the advancement of objective decision-making mechanisms. Spatial data plays a crucial role in the development of this necessity. At present, spatial data is widely utilized in urban research and planning. Spatial big data refers to datasets that are collected from diverse sources and characterized by spatial or geographic components, encompassing the dimensions of volume, velocity, variety, and veracity. These datasets incorporate spatial, temporal, thematic, and relational information, all of which are vital for interpreting and understanding space (Zou et al., 2024). However, the diversification of spatial data and the growing demand for data have positioned the use of big data as one of the principal challenges encountered in planning processes (Su et al., 2023).

Throughout history, planning has undergone significant transformations influenced by data, methodological approaches, and technological advancements. In the 1950s, the prevailing planning paradigm emphasized printed documents and maps, with debates centered on the adequacy and consistency of spatial data. During the 1960s, the transition of planning from a design-oriented practice to an applied science was notably shaped by the emergence of computer technologies (Klosterman, 1995). The rapid advancement of computer technologies led to the widespread adoption of computer-based Geographical Information Systems (GIS) in planning practices (Scholten & Stillwell, 2013). The capacity of GIS to provide essential data and techniques across various stages of the planning process—including data storage, data management, monitoring, goal setting, resource inventory, situational analysis, modeling, development of planning alternatives, and feedback—has significantly accelerated its integration into planning studies (Santos et al., 2021; Goodchild, 2009).

In spatial planning, data pertaining to space play a critical role. These data reflect the characteristics of objects analyzed at a specific location, and the results are influenced by changes in location. Therefore, data constitute the core of spatial assessments (Goodchild & Janelle, 2004). With the increasing number of objective and criteria sets in spatial decision-making processes, traditional analytical and evaluative methods have become insufficient to manage large volumes of data (Wan & Ma, 2022). The development of Artificial Intelligence (AI), particularly Machine Learning (ML) and Deep Learning (DL) techniques, has in recent years offered researchers new opportunities to address challenges related to big data and complex urban issues (Peng et al., 2023). Advances in AI technologies have contributed significantly to reducing data collection time, costs, and error rates in spatial applications (Al-Azizi et al., 2020).

The concept of AI and the foundation of the first AI programs date back to 1956 (McCorduck, 2004), during which the focus was on solving non-quantitative, simple-level problems. However, resolving problems characterized by complex processes proved to be a formidable task. In

DOI: 10.15320/ICONARP.2025.337

spatial disciplines, including geography and earth sciences, the problem-solving capacity of AI began to receive attention in the 1980s (Smith, 1984). More recently, the accessibility of high-quality datasets and advancements in hardware and software have triggered substantial transformations across various fields, particularly spatial sciences (Janowicz et al., 2020).

The progress in data-driven AI has made significant contributions to the analysis, modeling, and assessment of large datasets that are difficult to process using traditional spatial analysis techniques (Li, 2020). Developments in this area are largely driven by the computer-assisted application of ML and DL tools, ensuring the continuity of technological advancement (Zappone et al., 2019). Among AI-driven tools, ML offers important perspectives for decision support systems in spatial planning. First introduced in 1959 (Samuel, 1959), ML represents a data-centered approach that extracts meaningful information from datasets through a learning process (Mitchell, 1997). In general, ML comprises a variety of models and patterns capable of minimizing errors by leveraging processes of data collection, analysis, and monitoring (Hagenauer et al., 2019). ML algorithms are increasingly important in planning due to their ability to outperform traditional modeling techniques, offer accurate predictions, simplify data acquisition, and effectively address urban form modeling challenges (Chaturvedi & De Vries, 2021; Ma et al., 2020). Another AI technique, DL, specializes in classifying data types such as images, text, and audio (Harrington, 2012). With the proliferation of open spatial data sources, DL models—by focusing on perception—have made valuable contributions to spatial data science. While the approach can be applied at various scales, from regional to street level, its dependence on algorithms and limited capacity to incorporate external professional knowledge represent notable drawbacks (Fang et al., 2022). Therefore, there is a growing need for scalable and interpretable DL models capable of effectively processing multimodal spatial data (Zou et al., 2024).

In an era increasingly defined by digitalization, the significance of AI technology has been widely acknowledged across scientific domains and is reflected in applied research. In the field of planning, AI has rapidly emerged as a critical technology for transformation and reconfiguration. Nevertheless, numerous unanswered questions remain regarding the potential impacts of AI on urban and regional planning research and practice, as well as the challenges encountered and appropriate policy responses (Peng et al., 2023). Although the number of studies on ML and DL in spatial planning is on the rise, the field is still considered to be in an early stage compared to other disciplines (Casali et al., 2022). In spatially based research, integrating GIS as an implementation tool for ML and DL algorithms is essential (Jing et al., 2023). The integration of ML and DL with GIS is gaining increasing attention in areas such as land use related to global climate change (Lemonkova, 2024), disaster risk

assessment (Mishra et al., 2024), waste management (Mondal et al., 2024), biodiversity (Zheng et al., 2024), urban heat islands (Jato-Espino et al., 2022), energy (Ali et al., 2020), ecology (Huettmann et al., 2023), and transportation (Iamtrakulet al., 2023). Despite the growing body of work focused on the application of ML, DL, and GIS, there is a lack of comprehensive discourse regarding the identification of the most suitable learning techniques, the selection of appropriate GIS application tools, the integration of DL and ML into GIS environments, and the validation of spatial big datasets. In particular, the uncertainties in data–model validation processes, the marked variation in the metrics used for data validation within studies addressing similar themes, and the superficial treatment of concepts such as spatial data sources and resolution highlight the need for a critical and guiding discussion. This study distinguishes itself from systematic literature reviews by incorporating a comprehensive discussion not only on spatial data and model validation processes but also on the advantages, limitations, challenges, potentials, and spatial applicability of integrating DL and ML into GIS. In this regard, it aims to provide researchers in spatial sciences with a perspective, grounded in the expectation that the advancement of artificial intelligence will significantly influence spatial planning.

The objective of the study is to examine how ML and DL techniques integrated with GIS have evolved within the context of spatial planning and, based on current literature trends, to propose a conceptual and practical framework for future research that incorporates spatial planning themes within the broader scope of GIS, ML, DL, and big data. To achieve this objective, the study evaluates applied articles published in high-impact journals indexed in the Web of Science (WoS) database, focusing on spatial issues. The analysis reveals the current trajectory of development, existing gaps, emerging potentials, and key challenges. Accordingly, the study focuses on the integration of DL and ML techniques with GIS in spatial planning.

The structure of the study is organized as follows:

Section 2 presents the methodology, including database selection, publication criteria, and the scope of analysis, to reveal prevailing trends in the literature. Section 3 offers findings on the progression of published studies, thematic distributions, the use of ML and DL techniques, GIS implementation tools, data and model validation, and the intended purposes of AI applications. Section 4 discusses the current trends, deficiencies, opportunities, challenges, and data-model validation processes from the perspective of spatial planning. Finally, Section 5 concludes the study with a summary of the main results.

METHODOLOGY

The methodology of the study consists of a two-stage process that addresses spatially applied research based on the integration of ML, DL, and GIS: (i) database and data source, and (ii) scope of analysis. A systematic literature review was conducted to examine the forms of GIS

DOI: 10.15320/ICONARP.2025.337

integration in ML- and DL-focused studies within spatial planning, to analyze the accumulated scientific knowledge in the field comprehensively, and to identify current research trends. Accordingly, meaningful findings were obtained regarding the dominant themes of the reviewed studies, the most frequently used methods and models, the software employed, the development trajectory of AI technologies in the field of spatial planning, existing challenges and potentials, and the functions through which GIS has been integrated into the planning process.

Database and Data Source

To conduct a comprehensive review of studies based on the integration of DL, ML, and GIS in the context of spatial planning, a method encompassing the entirety of the research field was adopted. In this study, the Web of Science (WoS) database was employed as the data source, being a widely recognized citation and analysis platform at the international level for systematic literature reviews (Yan & Zhiping, 2023; Kar & Wasnik, 2024). WoS was preferred due to its provision of high-quality archival resources (Zhu et al., 2023), comprehensive access to scholarly literature (Junjia et al., 2023), coverage of a broad range of international journals (Wang & Liu, 2014; Birkle et al., 2020; Fang & Zhang, 2024), inclusion of journals with high impact factors and low redundancy rates (Baghini et al., 2024), reliable author identification via ResearcherID (Ohlan et al., 2025), and advanced search functionalities along with an extensive analytical toolset (Avinç & Yıldız, 2025).

In recent years, the growing volume of research on ML and DL, driven by the broad applicability of these techniques across various domains, has increased scholarly interest in the field. However, due to the wide range of applications and the growing number of studies, it has become challenging to conduct evaluations without imposing certain thematic limitations (Casali et al., 2022). For this reason, the present study applies specific constraints focused on DL, ML, spatial data, and GIS integration. Accordingly, the selection of publications from the database was based on the following criteria:

- A search query was constructed using the main keywords DL, ML, GIS, spatial data, and planning. The query applied was: ("GIS" OR "Geographic Information System*" OR "Geographical Information System*") AND ("Deep Learning" OR "Machine Learning") AND ("Urban" OR "City" OR "Planning" OR "Spatial Planning"). To expand the search scope, the wildcard character (*) was included. The review was limited to documents categorized as "articles", and the "Topic" field was used to provide a general overview of each publication (Tang et al., 2023; Guo et al., 2019).
- The article selection was limited to English-language journal articles with high impact factors, indexed in the Social Sciences Citation Index (SSCI), Science Citation Index Expanded (SCI-E), Emerging

Sources Citation Index (ESCI), and Arts & Humanities Citation Index (A&HCI). The database was last updated in March 2025.

Scope of Analysis

This study was conducted through a four-stage process consisting of: (i) identification, (ii) screening, (iii) perspective, and (iv) discussion and suggestion (Figure 1). In the first stage, a total of 135 articles were identified within the database search under the Topic Title (queries) scope. After assessing whether the articles included fieldwork, were based on spatial data, fully addressed the key concepts, and were not duplicates, 91 articles were deemed eligible and included in the review process. According to the research criteria, the earliest of the relevant publication dates to 2017, and to account for the rapidly growing body of recent studies, the time span of 2017–2025 was adopted. To sort, filter, and group the data from the selected studies, a spreadsheet was created in Excel. This table covers a wide range of information, including the author, publication year, topic, use of DL and ML, type and rationale for the GIS application tools, data-model validation methods, scale, and study area. The analysis is structured around five perspectives designed to identify challenges and potentials in the integration of AI technologies and GIS within the field of spatial planning:

- Spatial and temporal distribution on DL & ML: Assesses the spatial and temporal evolution of research through country-level and year-based evaluation, providing insight into the main development trends across nations.
- Distribution of models used in DL and algorithms used in ML: Examines the primary purposes for which DL models and ML algorithms are applied, revealing the underlying rationale for the dominant trends.
- Distribution of themes and topics used in DL and ML: Identifies how the integration of DL, ML, and GIS is reflected in practical applications within spatial planning and evaluates the thematic focus of the research.
- Distribution of software used in DL and ML, and their usage purposes: Investigates the practical tendencies in integrating GIS tools with AI technologies, highlighting the types of software commonly utilized.
- Distribution of accuracy metrics commonly Used in DL and ML: Detects prevailing trends in spatial data and model validation processes in applied studies.

Based on these perspectives, findings are presented and thoroughly discussed in relation to the interrelationship between GIS, AI, and spatial planning, with a particular focus on spatial data and model validation processes.

DOI: 10.15320/ICONARP.2025.337

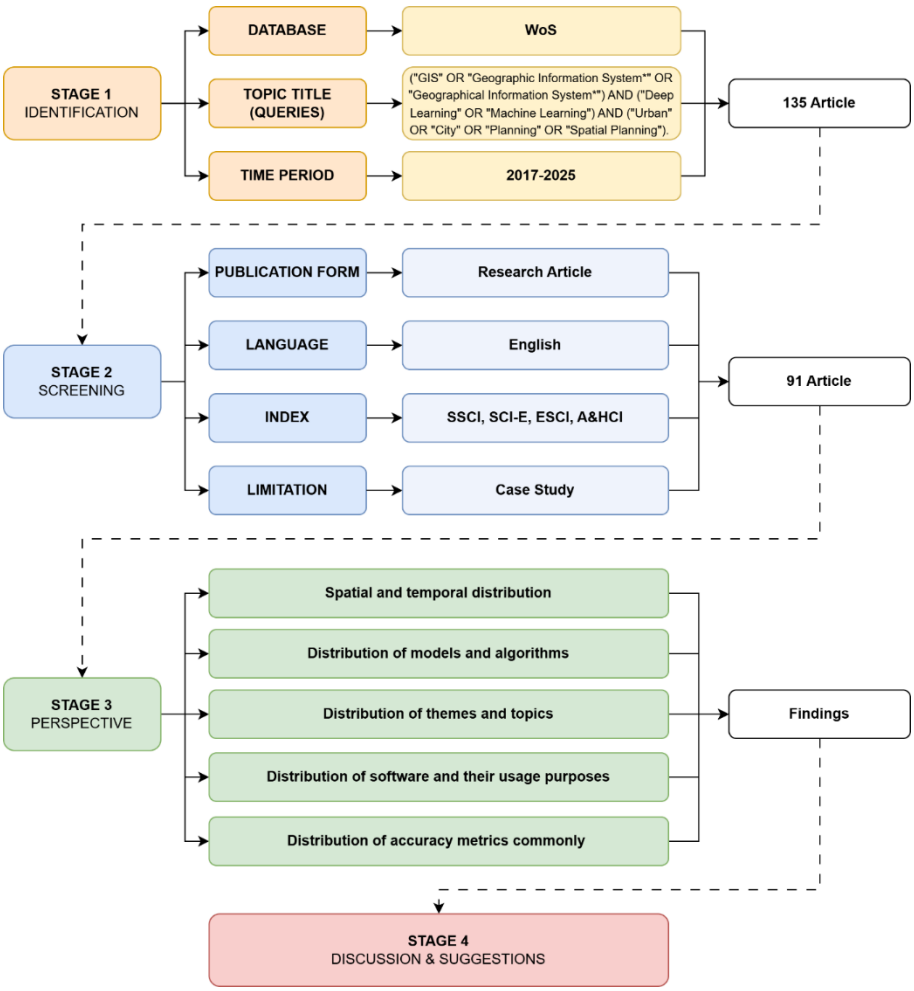


Figure 1. The flowchart of the study

RESULTS

Spatial and Temporal Distribution on DL and ML

This study systematically reviewed 91 research articles integrating DL, ML, spatial data, and GIS. According to the data, a consistent upward trend in publication frequency has been observed since 2019, reaching a peak in 2024 with the publication of 29 articles. As of March 2025, 12 articles had been published, indicating a significant concentration of research activity during the first quarter of the year. The findings reveal that China leads in the application of DL and ML methods in spatial planning, with 24 studies, followed by the United States with 12 studies and India with 10 studies (Figure 2). The rising trend of studies on the integration of DL and ML into GIS indicates that the field is likely to expand further in the coming years. Limited access to spatial data remains a critical factor, and research in this area is concentrated in countries such as China, the United States, and India, where broader access to comprehensive spatial data sources is available. The high data production capacity and urbanization dynamics of these countries support the increasing number of studies in this domain.

Examination of the spatial scales addressed in these studies shows a predominant focus on the 'city' scale, represented in 54 publications,

followed by 9 studies at the 'regional' level, 7 studies at the 'basin' scale, 7 studies at the 'district' level, 6 studies at the 'neighborhood' scale, 4 studies at the 'street' level, 2 studies at the 'hamlet' scale, and only 1 study at the 'country' level (Figure 2). Due to the increasing number of studies at urban scales, the creation of rural spatial datasets and the expansion of research in this area represent a significant research gap.

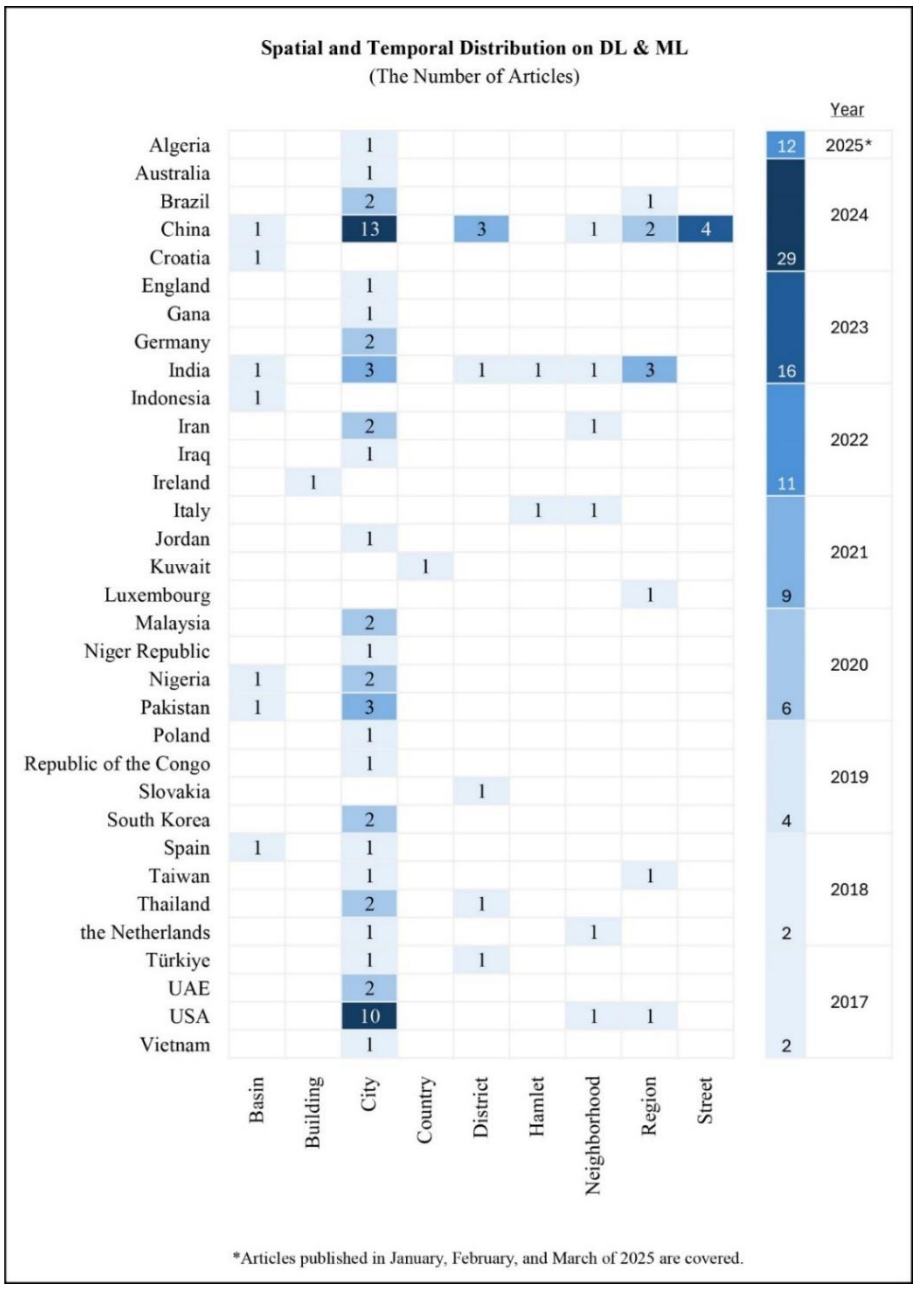


Figure 2. Spatial and temporal distribution on DL and ML

Distribution of Models Used in DL, and Algorithms Used in ML

A total of 22 publications involving DL have employed 10 distinct models. All of these models are based on deep neural network (DNN) architectures. In several studies, models such as DeepLabV3, FCN, HAU-Net, SegNet, and YOLOv5m have been utilized for the advancement of convolutional neural networks (CNN). Among the DL-related publications, CNN has emerged as the most adopted method, with a

DOI: 10.15320/ICONARP.2025.337

usage rate of 45.15% (Figure 3). The prevalence on DNN-based CNNs in DL techniques reveals a limited diversity of models. Therefore, presenting different DL methods in terms of comparative performance and potential for development can make a significant contribution to spatial data analysis and visual-based modeling in the literature.

In the 69 studies applying ML, 34 different algorithms have been documented. The most prevalent algorithms included Random Forest (RF) at 29.09%, Support Vector Machine (SVM) at 18.18%, and Artificial Neural Networks (ANN) at 17.27%, followed by Logistic Regression (LoR) at 7.27%, K-Nearest Neighbor (KNN) and Extreme Gradient Boosting (XGB) each at 5.45%, Decision Tree (DT) at 4.55%, Gradient Boosting Decision Tree (GBDT) and Multilayer Perceptron (MLP) each at 3.64%, and Linear Regression (LiR) and Maximum Likelihood (ML) each at 2.73% (Figure 3). Compared to DL methods, ML techniques stand out due to their greater diversity. The presence of different algorithms offers opportunities for methodological comparisons. However, there is a need to relate these methods to thematic domain, spatial scale, and spatial resolution when selecting appropriate approaches.

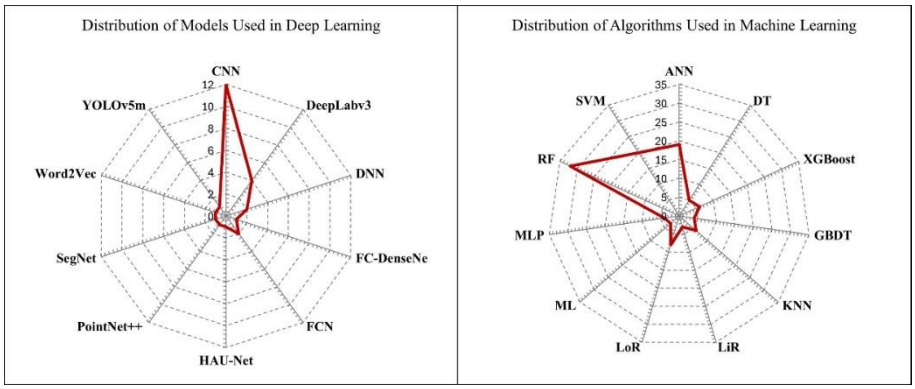


Figure 3. Distribution of models used in DL, and algorithms used in ML

Distribution of Themes and Topics Used in DL and ML

This study categorizes research integrating DL, ML, and GIS in spatial planning into six primary themes, encompassing 54 distinct topics. These themes are Land Use–Land Cover & Urban Growth, Climate, Environment & Energy, Natural Hazards & Risk Assessment, Urban Infrastructure & Planning, Urban Quality & Aesthetic–Perception, and Socio-economic. The most prevalent addressed themes are Land Use–Land Cover & Urban Growth at 25.17% (23 articles), followed by Climate, Environment & Energy at 23.08% (21 articles), and Natural Hazards & Risk Assessment at 21.98% (20 articles). These are followed by Urban Infrastructure & Planning at 14.29% (13 articles), Urban Quality & Aesthetic–Perception at 10.99% (10 articles), and Socio-economic at 4.40% (4 articles). Within these themes, the most frequently addressed topics include Land-Use and Land Cover (LULC) Change Analysis at 20.83% (10 articles), Flood Risk Assessment at 18.75% (9 articles), Landslide Risk Assessment at 14.58% (7 articles), Urban Growth Modeling at 10.42% (5 articles), Land Use Management

and Urban Heat Island each at 8.33% (4 articles), Urban Air Quality at 6.25% (3 articles), and LULC Classification, Mapping of Impervious Surfaces, and Wind Environment Analysis each at 4.17% (2 articles) (Figure 4). In the themes where most studies are concentrated, AI methods are shown to be primarily used for monitoring spatial changes and managing environmental risks. This may be linked to the widespread availability of land-use datasets derived from satellite imagery based on advancing remote sensing technologies.

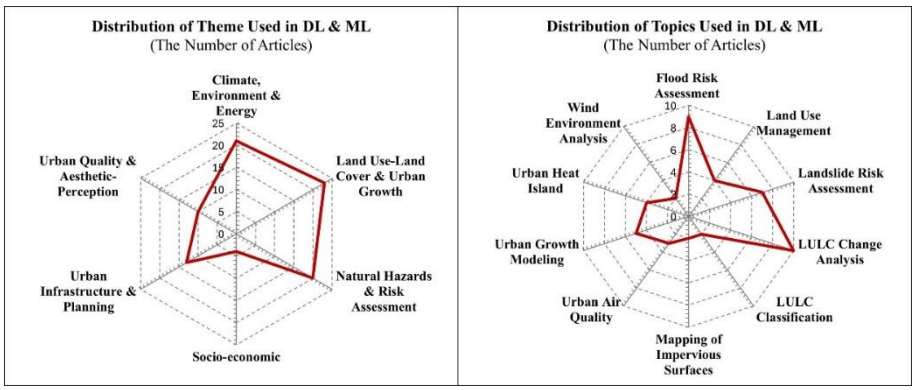


Figure 4. Distribution of theme and topics used in DL and ML

The research articles analyzed within the scope of this study have been classified based on their subjects, identifying 17 distinct subtopics within the Climate, Environment & Energy theme. Among these, Urban Heat Island emerges as a prominent subject, particularly due to its direct relevance to global climate change and its recent treatment through diverse assessment methodologies (Figure 5).

Under the Land Use–Land Cover & Urban Growth theme, six subtopics have been identified. The most extensively studied among these are Land Use Management, LULC Change Analysis, and Urban Growth Modeling, which have primarily been conducted using satellite imagery derived from remote sensing techniques. The Natural Hazards & Risk Assessment theme comprises six subtopics as well. Within this category, Flood Risk Assessment and Landslide Risk Assessment have received the most scholarly attention, typically approached through satellite image–based classification and modeling frameworks.

A total of 12 distinct subtopics have been examined under the Urban Infrastructure & Planning theme. These include: Blue-green infrastructure mapping and assessment, creating building information system, determining spatial risk factors of health inequalities, global terrain and altitude mapping, height-augmented geo-located dataset, identification mapping of buildings, mapping of impervious surfaces, optimizing of outdoor sports facilities, spatial optimization of healthcare facilities, urban parks, urban street pattern analysis, and user experience for greenspace. Compared to other main themes, Urban Quality & Aesthetic–Perception and Socio-economic themes have attracted relatively limited application in spatial research.

While thematic depth and methodological orientations are prominent in certain areas, significant opportunities exist for energy-

DOI: 10.15320/ICONARP.2025.337

related research, which plays a crucial role in the context of climate change. Although studies on land use are widespread, the integration of multiple data sources, such as social media and mobile data, has not yet received sufficient attention. Incorporating multi-source data could enhance dynamic and real-time planning solutions. In disaster-based risk assessments, planning approaches are predominantly focused on single hazards, and an integrated, multi-hazard risk-based planning approach has not yet matured.

Figure 5. Thematic classification of the articles

Distribution of Software Used in DL and ML, and Their Usage Purposes

An analysis of the reviewed publications reveals that the most frequently utilized software tools are ArcGIS at 35.24% and QGIS at 22.86%. These are followed by Python (4.76%), MATLAB (2.86%), ArcGIS-R Integration (1.90%), GRASS GIS (1.90%), and ENVI (1.90%). Examination of the purposes for which these software tools have been utilized reveals that the most common application is modelling, accounting for 33.04% of use cases. Additionally, the software tools have been employed for data processing (21.74%, 25 studies), classification (18.26%, 21 studies), image analysis (18.26%, 21 studies), and mapping (4.35%, 5 studies). In some publications (4.35%), only the general term "GIS" has been referred without specification of the software used (Figure 6). Studies in this field generally indicate that GIS software (ArcGIS and QGIS) occupies a central role in AI-based research.

Recently, the increasing use of programming-based tools (Python, R, MATLAB, ENVI etc.) has introduced innovation and methodological strengthening in the literature through their integration into AI-driven spatial research.

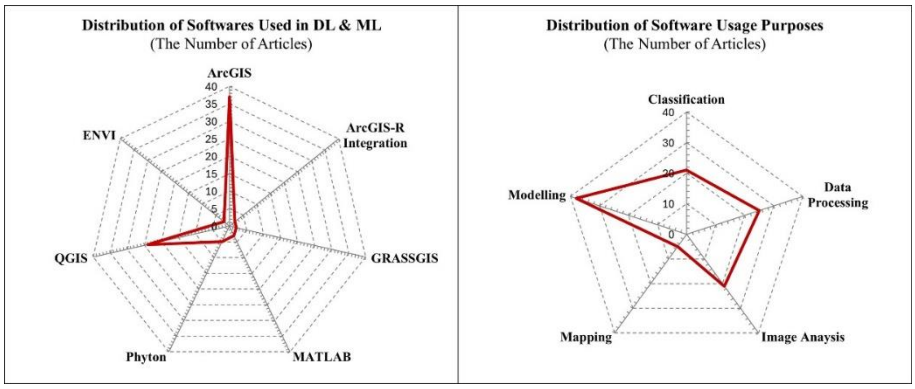


Figure 6. Distribution of software used in DL and ML, and their usage purposes

Distribution of Accuracy Metrics Commonly Used in DL and ML

In studies focusing on the integration of DL, ML, and GIS in spatial planning, the most frequently employed validation metrics include Area Under the Receiver Operating Characteristic Curve (AUC-ROC) at 18.92%, Overall Accuracy at 16.89%, and the Kappa coefficient at 12.16%. These are followed by Root Mean Squared Error (RMSE) at 9.46%, Precision (8.78%), Recall (8.78%), F1 Score (8.78%), Coefficient of Determination (R^2) at 8.11%, Mean Absolute Error (MAE) at 2.70%, Mean Absolute Percentage Error (MAPE) at 1.35%, Mean Squared Error (MSE) at 1.35%, Intersection over Union (IoU) at 1.35%, Cross-validation at 0.68%, and the Kruskal–Wallis test at 0.68% (Table 1).

The focus of existing studies on image processing predominantly emphasizes classification-based accuracy assessments. In spatial data classifications, the reliance on conventional metrics such as Accuracy and Kappa underscores the necessity of incorporating additional measures to generate more objective performance indicators for imbalanced datasets. Accordingly, the dependence of current research on limited and traditional metrics highlights the need for broader adoption of more comprehensive and problem-oriented evaluation measures.

Table 1. Distribution of accuracy metrics commonly used in DL and ML

Author, Year	DL	ML	Accuracy Metrics
Acharya et al., 2024	x	ANN, RF	MAE, RMSE, R^2
Achu et al., 2024	DNN	x	AUC-ROC
Adu et al., 2025	x	RF, LiR, LSTM	MAE, MSE, RMSE, R^2
Ahmadi et al., 2024	CNN	x	AUC-ROC
Al Mazroa et al., 2024	x	ANN, MLP	OA, Kappa
Al-Dousari et al., 2023	x	RF, ANN	RMSE
Ali et. al, 2020	x	SVR, RF, DT, LoR, GBDT, SVM	AUC-ROC
Aliyu et al., 2023	x	SVM	OA, Kappa
Alsumaiti et al., 2024	x	NS	Kappa
AlThuwaynee et al., 2021	x	XGBoost, RF	AUC-ROC
Amirii et al., 2023	x	XGBoost	R^2

DOI: 10.15320/ICONARP.2025.337

Table 1. (Continued).

Author, Year	DL	ML	Accuracy Metrics
Aslam et al., 2024	x	RF	OA, Kappa
Badshah et al., 2024	x	RF	AUC-ROC, Kappa
Ballesteros et al., 2022	NS	x	x
Blanco et al., 2023	x	RF	x
Boonpook et al., 2021	SegNet	x	Precision, Recall, F1 Score
Bortoloti et al., 2022	CNN	x	OA
Chanpichaigosol et al., 2025	x	RF	x
Chen and Zhang, 2021	x	LoR	AUC-ROC
Chen et al., 2024	x	RF	MAPE, R^2
Darabi et al., 2019	x	GARP, QUEST	AUC-ROC, Kappa
Darabi et al., 2022	x	MLPNN, BRT, RF, MultiB	AUC-ROC
Deb and Smith, 2021	x	KNN, SVM, RF	Precision, Recall, F1 score, AUC-ROC
Di Napoli et al., 2021	x	ANN, GBM, MaxEnt	AUC-ROC
Dogan et al., 2024	x	ANN, SVM	AUC-ROC
Fang et al., 2024	FCN	x	R^2
Fanos et al., 2020	x	RF, ANN, SVM, LoR, KNN	AUC-ROC
Ferreira et al., 2025	x	LoR, RF, SVM	AUC-ROC, F1 Score
Gharaibeh et al., 2020	x	ANN	OA
Gómez et al., 2021	x	SLEUTH CA	x
Hamid et al., 2023	x	LoR	AUC-ROC
He et al., 2018	CNN	x	OA, Kappa
Huettmann et al., 2023	x	SPM	AUC-ROC
Hussain et al., 2025	x	RF, SVM, XGBoost	OA, Kappa, Precision, Recall, F1 Score
Iamtrakul et al., 2023	CNN	x	x
Jato-Espino et al., 2022	x	SVR, MLR, RF	RMSE
Karli and Terzi, 2025	x	RR, KNN, SVM, RF, ANN, XGBoost, GBDT, LGBDM	RMSE, MAE, MAPE, R^2
Leitch and Wei, 2024	x	RF, KNN, GBM2, LASSO	RMSE
Lemankova, 2024	x	ANN, RF, SVM, DT	OA
Li et al., 2022	CNN	x	Over union (IoU), F1 score
Li et al., 2023a	CNN	x	R^2
Li et al., 2023b	CNN	x	composite reliability (C.R.), Cronbach's α
Lin et al., 2024	CNN, DNN	x	OA, Kappa, Precision, Recall, F1 score
Liu et al, 2023	x	ANN	OA, Kappa
Liu et al., 2021	x	LiR, GBDT	RMSE, R^2
Liu et al., 2022	x	SVM	RMSE
Liu et al., 2024	YOLOv5m	x	Precision, Recall
Liu et al., 2025	x	RF, GBM2 DT, LiR, PR	MAE, RMSE, R^2
Lloyd et al., 2020	x	NS	AUC-ROC
Mahendra et al., 2024	CNN	x	NS
Manna et al., 2025	x	ANN, RF, SVM	AUC-ROC
Mansourihanis et al., 2023	x	NS	x
Mishra et al., 2024	x	ANN, SVM	Cross-validation, Kruskal-Wallis, AUC-ROC
Mishra et al., 2025	x	RF, ML	OA
Mondal et al., 2024	x	RF	OA, Kappa
Mustak et al., 2022	x	MLP	OA, Kappa
Mutani et al, 2024	x	RF	MSE, RMSE
Nahid et al., 2025	x	ML, ANN	OA, Kappa
Ni et al., 2024	DeepLab-v3 CNN	x	intersection over union (IoU)
Omrani et al., 2017	x	ANN	Precision, Recall, F1 Score
Park and Yang et al, 2020	x	SVM, ANN	NS
Patil et al., 2024	DNN	x	OA
Pushpalatha et al., 2025	CNN	x	OA
Quan, 2024	x	ANN, KNN, SVM, DT, GBDT	RMSE, R^2
Riaz et al., 2024	x	SVM	AUC-ROC
Rizeii et al, 2019	x	ANN, MLP	RMSE, AUC-ROC
Salale et al., 2023	x	EANN	RMSE, R^2
Sampurno et al., 2023	x	MLR	RMSE

Table 1. (Continued).

Author, Year	DL	ML	Accuracy Metrics
Schrammeijer et al., 2022	x	AIC	AUC-ROC
Segura-Méndez et al, 2023	x	NS	x
Seydou et al., 2024	x	RF, SVM	OA, Kappa
Shao et al., 2023	DeepLabv3	x	x
Sincic et al., 2025	x	SVM, LoR	AUC-ROC
Sobieraj et al., 2023	x	SVM	Kappa
Srivanit et al., 2024	x	RF, DT	Precision, Recall, F1 score, AUC-ROC
Sun et al., 2021	DeepLabv3, PointNet++	x	Precision, Recall, F1 score
Tang et al., 2020	x	LoR	AUC-ROC
Tokarcík et al., 2024	NS	x	OA, Precision, Recall, F1 Score
Trinh et al., 2024	x	SVM, RF, CART, ML, ANN, LoR	OA, Kappa
Wang et al, 2018	x	ANN	AUC-ROC
Wang et al., 2021	x	XGBoost	Precision, Recall, F1 Score
Wang et al., 2024	x	CART	R^2
Wu et al., 2024	x	KNN, MLP, SVM, XGBoost, RF	AUC-ROC, Precision, Recall, F1 Score
Xiao et al., 2019	x	RF	AUC-ROC
Xu et al., 2025	x	RF	OA
Yagoup et al., 2022	x	RF	OA, Kappa
Yao et al., 2017	Word2Vec	x	OA, Kappa
Yao et al., 2022	x	RF	AUC-ROC, R^2
Ye et al., 2019	CNN	x	Precision, Recall
Yu et al., 2022	CNN	x	OA, Recall, Precision, F1 Score
Zheng et al., 2024	x	NS	x

AIC: Artificial Intelligence Companions
ANN: Artificial Neural Networks
BRT: Boosted Regression Tree
CART: Classification and Regression Tree
CNN: Convolutional Neural Network
DNN: Deep Neural Network
DT: Decision Tree
EANN: Emotional Artificial Neural Network
FCN: Fully Convolutional Neural Network
GARP: Genetic Algorithm Rule-Set Production
GBM: Generalized Boosting Model
GBM2: Gradient Boosting Model
GBRT: Gradient Boosting Regression Tree
Google Word2Vec
KNN: K-Nearest Neighbor
LASSO: Least Absolute Shrinkage and Selection Operator
LGBDM: Light Gradient Boosting Decision Model
LiR: Linear Regression
LoR: Logistic Regression
LSTM: Long Short-Term Memory
MaxEnt: Maximum Entropy
ML: Maximum Likelihood
MLP: Multilayer Perceptron
MLPNN: Multilayer Perceptron Neural Network
MLR: Multiple Linear Regression
MultiB: Multi-Boosting
NNLM: Neural Network Language Model
NS: Not Specified
OA: Overall Accuracy
PR: Polynomial Regression
QUEST: Quick Unbiased Efficient Statistical Tree
RF: Random Forest
RR: Ridge Regression
SSN: Semantic Segmentation Network
SVM: Support Vector Machine
SPM: Salford Predictive Modeler
SVR: Support Vector Regression
XGB: Extreme Gradient Boosting

DISCUSSION

This study proposes a research framework that identifies the general trends, challenges, and potentials of integrating ML algorithms and DL models—based on the rise of digital technologies and spatial data—with GIS in planning. Drawing from recent findings, this section provides (i) inferences regarding the impacts, challenges, and future implications of AI–GIS integrated approaches in planning processes, and (ii) evaluations of how spatial data and model validation procedures can be incorporated into multi-criteria decision-making strategies.

DOI: 10.15320/ICONARP.2025.337

The Correlation Between AI, Spatial Planning, and GIS

The development of AI technologies is driving significant transformations in data-driven spatial planning processes. To capture this general trend, we emphasize the importance of integrating ML algorithms and DL models in spatial data workflows with practical implementation tools. Furthermore, defining the planner's role in decision-making processes shaped by AI technologies is essential. AI technologies have made a substantial contribution to data-driven planning processes (Huang et al., 2025; Kamrowska-Załuska, 2021). Findings show that although AI-based planning studies grounded in spatial data and GIS integration have increased since 2019, the field remains in its infancy and lags behind developments in other disciplines. This trend parallels the historical delay of GIS adoption within planning disciplines (Çelik & Şekeroğlu, 2023). Several factors may contribute to the limited use of AI in planning, such as the early-stage adoption of innovations in planning, the underexplored practical applications of AI technologies, and the relatively low interest in the topic. Nonetheless, many decision-makers in planning practice believe that AI will bring significant innovations to the field (Sanchez et al., 2023). This situation presents promising future research opportunities regarding how AI technologies can be integrated into applied planning practices.

AI technologies are operationalized in planning through the implementation of ML algorithms and DL models. Although these two concepts are interrelated, they differ in technical and practical terms (Batty, 2018). Our findings indicate that ML algorithms are more commonly employed in planning-related applications. In particular, Random Forest (RF), Support Vector Machine (SVM), and Artificial Neural Network (ANN) algorithms are frequently used in environmental risk assessments, land use change analyses, and management and modeling studies. These algorithms, which often rely on remote sensing datasets, prioritize data classification and modeling tasks. Studies demonstrate that RF and SVM algorithms, used for classification, deliver high accuracy in image processing tasks. Similarly, modeling-focused studies show that ANN, SVM, and RF algorithms can generate highly accurate spatial maps (Manna et al., 2025; Lemenkova, 2024; Fanos et al., 2020). However, the optimal algorithm varies depending on the study, influenced by factors such as data volume, study area size, and the validation methods used. Current developments indicate that while SVM and RF are dominant in classification and modeling, ANN is more commonly used for modeling. This suggests a research gap in evaluating the factors influencing the accuracy of these algorithms in detail.

DL models emerge as a powerful method for classifying and recognizing objects in large datasets during the integration of spatial assessments with GIS. These models are generally characterized by deep neural networks (DNNs) with more than two layers, utilizing feature representations learned solely from data (Patil et al., 2024; Achu et al.,

2024). Convolutional Neural Networks (CNNs), in particular, have proven successful in areas such as image recognition, object detection, and semantic segmentation (Zhu et al., 2017). Our findings reveal that CNNs—one of the prominent DNN architectures—are frequently used for image recognition, object detection, and classification in spatial studies. Additionally, CNN-based models such as DeepLabV3 (Ni et al., 2024; Shao et al., 2023; Li et al., 2022), FCN (Fang et al., 2024), HAU-Net (Li et al., 2022), SegNet (Boonpook et al., 2021), and YOLO5vm (Liu et al., 2024) have been developed for spatial evaluations. The Word2Vec model, developed by Google, stands out from others by vectorizing words based on their contextual meanings (Yao et al., 2017). The absence of a clear and unified definition of DL in current studies highlights the diversity of models used; however, many of these methods are fundamentally linked to DNNs and their subset, CNNs. Despite being in its early stages, DL is a rapidly growing field. Especially in cases where the data source consists of objects or images and spatial data needs to be produced, DL models demonstrate high applicability in managing large datasets. However, due to their data-driven learning architecture, one major limitation is the inability to easily incorporate new datasets into the system.

The reflections of ML and DL technologies on spatial planning show a clustering around six thematic areas where the assessment of spatial data is essential. This study identifies ML, DL, spatial data, and GIS-based implementation tools as the key concepts. Thematic focuses, primarily including land use, environment, climate, natural hazard assessments, socio-economic evaluation, urban infrastructure, and urban aesthetics, are predominantly driven by spatial data. Land use studies frequently employ ML for land use change analysis, land management, classification, and urban growth modeling using satellite imagery. Recently, DL models are increasingly being utilized in large-scale classification studies. In the domains of climate, environment, and energy, which maintain their topical relevance, ML algorithms and DL models are found to be critical tools for prediction, modeling, and classification in topics such as urban heat islands, biodiversity, energy modeling, energy demand and consumption, and carbon emissions. In the context of natural hazards and risk assessments, ML algorithms are widely used for identifying and predicting risk zones for earthquakes, landslides, floods, and rockfalls. Additionally, DNN models have been employed in flood (Patil et al., 2024) and landslide (Achu et al., 2024) risk assessments to generate sensitivity maps based on existing datasets. For instance, Patil et al. (2024) conducted a comparative analysis using ResNet34, InceptionV3, and VGG16 models, while Achu et al. (2024) relied on the general structure of DNN. As with other thematic areas, satellite image-based land use maps are frequently used in these studies. Moreover, in urban infrastructure and urban quality-aesthetics domains, there has been an increase in the use of ML algorithms and DL models in recent years. In contrast, the application of AI technologies in

DOI: 10.15320/ICONARP.2025.337

socio-economic studies remains relatively limited. Although ML algorithms have been used in studies on spatial justice (Deb & Smith, 2021), housing classification (Lloyd et al., 2020), and the impact of household income on green space (Xu et al., 2025), the spatial distribution of urban commercial areas has been evaluated using a CNN-based DL model (Ye et al., 2019).

Findings reveal that among GIS-based implementation tools, ArcGIS and QGIS are the most used platforms in spatial studies employing ML and DL approaches. Their capabilities in collecting, storing, managing, mapping, and modeling spatial data contribute to their widespread use as application tools (Anwar & Sakti, 2024). ArcGIS, one of the most widely used GIS software globally, stands out for its integration with AI technologies (Haery et al., 2024). The frequent use of built-in RF and SVM in ArcGIS supports its growing role in planning. Although QGIS does not offer built-in algorithms, it can be integrated with AI applications through Python scripting and plug-ins. Due to the limited number of algorithms available in ArcGIS and QGIS, there is a growing trend toward the development of programming-based tools for various ML and DL models. Among these tools, Python, MATLAB, and R offer significant flexibility in ML and DL studies and are capable of generating spatially explicit results through scripting and plug-in extensions. Additionally, ENVI and GRASS GIS provide map-supported outcomes via various extensions. MATLAB is effective in mathematical modeling and visualization (Xiao et al., 2019), ENVI in satellite image processing and classification (Gharaibeh et al., 2020), GRASS GIS in handling large datasets (Lemenkova, 2024), R Software in statistical ML and analysis (Jato-Espino et al., 2022), and Python in advanced library-based applications (Lin et al., 2024). GIS generally consists of five main components: hardware, software, data, personnel, and methods (Liu & Cheng, 2020). Although GIS is a general concept, its implementation tools may vary depending on the application domain. Nevertheless, it is noteworthy that some studies do not specify which GIS tool is used, treating GIS as the tool itself rather than as a conceptual framework.

Given the trajectory of AI technologies in the existing literature, it becomes increasingly evident that researchers engaged in spatial planning must enhance their ability to understand, interpret, and implement AI-assisted systems. The developmental course of current AI technologies suggests that planning practices will be profoundly influenced, and possessing the experience and competence to engage with and guide these systems will provide a significant advantage. Furthermore, considering that planning cannot be conducted entirely through autonomous systems, the role of AI tools in directing data and information processes, generating scenario-based outcomes for various objectives, and the increasing necessity for GIS in evaluating AI-driven results will become even more prominent. In spatial planning processes, executing models, extracting knowledge, and generating efficient and meaningful decision-making functions from complex and diverse

datasets will constitute critical components. Our findings indicate that the integration of planning, data, and GIS with ML algorithms and DL models can significantly enhance rationality and expedite decision-making processes by delivering high-performance outcomes. Given that planning heavily relies on spatial data, keeping pace with AI advancements in practice requires a substantial increase in implementation-oriented studies across all planning domains—urban and rural alike—including data collection, processing, transformation, generation of spatial multi-objective decisions, expansion of alternative options, and establishment of dynamic and queryable data optimization mechanisms. Accelerating these practical applications will enable more precise identification of challenges and potential within the field, fostering a broader and more constructive discourse on the future trajectory of planning. Our review of a limited number of studies highlights a critical concern: not all techniques should be assumed equally effective in leveraging the benefits of AI technologies. A notable limitation in the current literature is the superficial use of the terms ML and DL without adequate methodological explanation. Therefore, it is essential to assess and compare the applicability of ML algorithms and DL models in planning processes to determine the most appropriate and effective techniques.

Spatial Data and Model Accuracy

Spatial planning has been significantly influenced by data science. The integration of planning and data science practices expands the diversity of alternatives in decision-making processes. Within this integration, human–AI interaction emerges as a necessity. Given the massive increase in data collection and the growing accessibility and popularity of AI methods, human-AI interaction can be considered a vital component of contemporary decision-making processes. The successful implementation of these new methods requires the acquisition of new skills and knowledge concerning data analysis techniques and information systems (Sanchez et al., 2023).

Our findings reveal that remote sensing techniques and their associated data products are widely utilized in the areas where existing studies are concentrated. In numerous studies involving land use datasets, open-access satellite imagery such as Sentinel and Landsat, along with CORINE maps developed for European countries, are frequently employed. However, biases, uncertainties, and ethical concerns must be considered during the acquisition, analysis, and sharing of spatial data (Zou et al., 2024). The methods of data production, the level of detail, accuracy, and spatial resolution all play crucial roles in this process. For example, CORINE maps (https://land.copernicus.eu/pan-european/highsolution-layers), offered by the European Union at a spatial resolution of 100 meters, represent areas of 25 hectares or larger, which reduces the precision of the resulting outputs (Venter & Sydenham, 2021). While the datasets

DOI: 10.15320/ICONARP.2025.337

derived from Landsat satellite images with a spatial resolution of 30 meters exhibit higher accuracy compared to CORINE maps (Pflugmacher et al., 2018), the Sentinel datasets produced at a spatial resolution of 10 meters (http://s2glc.cbk.waw.pl/) have been shown to yield more successful results in terms of detail (Immitzer et al., 2016). Given that outcome-oriented approaches are prevalent in current studies, the purpose of the study, the representativeness of the spatial data at the relevant scale, and its processability constitute a critical stage. This stage leads to the conclusion that spatial data must be validated in the initial phase, which is based on data generation.

As spatial data-related systems have developed more extensively in certain regions, studies have become concentrated in countries such as China, India, and the United States. Many of these studies also exhibit a tendency to focus on urban centers, where data collection and access are comparatively easier. This urban-centric focus, fueled by the application of AI technologies primarily in urban contexts, may exacerbate data inaccessibility in rural areas and further intensify the research concentration in urban settings. As a result, planning processes for rural areas risk being overlooked. Therefore, it is essential to map the development trajectory of spatial data in this field and to promote the adoption of innovative approaches. Additionally, the limitations imposed by computational capacity during data storage, analysis, and processing stages remain significant challenges in this field.

Evaluating the performance of ML algorithms and DL models is of paramount importance to ensure the reliability of outcomes (Sierra et al., 2025; Zafar et al., 2024). Model validation is treated as an integral part of the research process. Our findings indicate that commonly used model validation methods in map-based processes include AUC-ROC, RMSE, overall accuracy, R^2, F1 score, recall, Cohen's Kappa, and precision. These metrics are used both individually and in combination to generate more robust and reliable results. However, only a limited number of studies incorporate multiple metrics simultaneously. Among these, multiple evaluation metrics are used, including overall accuracy–kappa (Al Mazroa et al., 2024; Aliyu et al., 2023), precision–recall–F1 score (Sun et al., 2021; Omrani et al., 2017), precision–recall–F1 score–AUC–ROC (Wu et al., 2024; Srivanit et al., 2024), RMSE–AUC–ROC (Rizeii et al., 2019), overall accuracy–kappa–precision–recall–F1 score (Hussain et al., 2025), and overall accuracy–precision–recall–F1 score (Yu et al., 2022). In studies concerning land use, overall accuracy and Kappa statistics should be calculated together (Foody, 2002). Furthermore, in spatial data validation processes, precision, recall, and F1 score are essential indicators of model performance (Belgiu & Drăguţ, 2016). When dealing with binary classification problems, the use of the ROC-AUC metric, which is based on true and false rates, becomes especially important for model evaluation (Fawcett, 2006).

As the complexity and volume of spatial data increase in planning processes, it is foreseeable that traditional methods will be replaced by

AI-driven approaches. The challenges that planners face in acquiring and evaluating data are growing steadily. With increasing digitalization, AI-supported systems can accelerate data access. However, planners are still at an early stage in adapting to advancements in AI technologies, which constrains broader implementation. A lack of clarity regarding the developmental trajectory of AI in spatial planning may result in planning practices falling behind contemporary standards. Therefore, we argue that spatial data and model validation processes must be addressed in greater detail in both current and future studies.

In this context, it is necessary to structure the planning process in stages—from the role of the planner to AI-supported data generation and model validation. We emphasize that the planner or decision-maker should not be excluded from this system. Their direct influence should be evident in key stages such as identifying data types, selecting validation methods for data and models, and determining the most suitable alternative among several options. The fundamental principle is that rather than relying solely on autonomous AI-driven systems, the planner should retain a significant role in managing the process. Moreover, critical elements such as spatial resolution, data types, GIS tools applicable during implementation, and selection of appropriate validation metrics should be treated as core components of the process.

The use of AI systems in spatial planning necessitates adherence to the principles of impartiality and neutrality in decision-making processes. The absence of these principles may foster a framework characterized by subjectivity and heightened ethical concerns (Nizamani et al., 2025). Traditional planning approaches, with their top-down hierarchical scales, risk marginalizing certain groups. Within the scope of human-centered AI in planning, ensuring equality requires the integration of sensitivity and the participation of all community segments in the processes. For an equitable urban future, urban planners should prioritize the inclusion of stakeholders within AI integration stages under a local policy framework, while distancing themselves from biased algorithms.

CONCLUSION

This study evaluates 91 research articles published between 2017 and 2025 that address the trajectory of applied research on the integration of AI technologies and GIS in the field of spatial planning, focusing on their development, challenges, potentials, and research gaps. The assessment suggests that, due to the increasing prominence of AI technologies, evaluation methods in planning are entering a phase of rapid transformation. However, the limited number of studies, along with the lack of clear definitions regarding implementation tools, methods, and the associated problems and potentials of AI technologies, presents fundamental challenges in this area.

Current research trends indicate that ML algorithms are more frequently employed in spatial studies, particularly those involving data

DOI: 10.15320/ICONARP.2025.337

classification and modeling, with SVM, RF, and ANN being favored for their ease of implementation in existing software environments. More recently, CNN-based DL models have emerged as valuable tools, especially for object detection and classification, producing more successful results when large datasets are available. However, the existing literature provides limited justification for why particular algorithms are preferred over alternative methods. Comparative evaluations regarding thematic domains, spatial scales, and spatial resolutions remain insufficient. As a result, the relationship between AI technologies and spatial planning largely relies on the repetitive application of commonly used algorithms.

Thematic areas where the integration of AI technologies and GIS have found the most application within spatial planning include land use, natural hazard assessments, and environmental and climate-related topics. Many of these studies utilize satellite imagery derived from remote sensing techniques to address the need for detection, classification, and modeling of land use. In contrast, relatively few studies address socio-economic themes and urban infrastructure planning, largely due to limitations in access to spatial data. Research in underexplored areas such as socio-economic dimensions and urban infrastructure should be encouraged to strengthen the societal dimension of spatial planning and its contribution to the Sustainable Development Goals. Such efforts can also make a significant contribution to diversifying thematic studies. Because many studies focus on urban centers, there is a risk of a growing gap between urban and rural spatial studies in the future. Therefore, expanding data production and research with a focus on rural areas can contribute to reducing the urban–rural research imbalance and enhancing inclusiveness in spatial planning.

The implementation of ML and DL methods in spatial planning requires compatible GIS tools. There is a growing trend in the use of ArcGIS and QGIS software in relevant studies. However, due to the limited number of built-in application models and algorithms in these platforms, the use of plugins and custom coding is necessary to broaden the range of algorithms and models available. Additionally, tools such as Python, GRASS GIS, MATLAB, and R provide considerable flexibility for map-based ML and DL evaluations, thereby contributing to the advancement of this field.

One of the key challenges in this domain concerns the verification of spatial data and model accuracy. Validation and model performance should be prioritized in future studies. Concepts such as the source, resolution, and accuracy of spatial data necessitate careful selection of appropriate validation metrics. Similarly, the suitability of each model must be verified using performance metrics, considering its influence on the study's outcomes. Therefore, appropriate validation metrics should be selected by considering data sources, resolution, accuracy, and thematic focus. In spatial data–based studies, these processes should be

addressed in detail to ensure that evaluations and modeling objectively reflect the outcomes.

Due to the limited number of existing studies and the relatively low emphasis placed on validation, there is a critical lack of applied research and an evident research gap in the domain of data and model validation. Therefore, planners and decision-makers should not uncritically accept the outputs of fully auto"""nomous AI systems. Rather, they must play a key role in defining and validating data, selecting appropriate validation metrics, and choosing the most suitable alternative among diverse options within the system.

REFERENCES

Acharya, T., Gharekhan, D., & Samal, D. (2024). Harnessing ML and GIS for seismic vulnerability assessment and risk prioritization. *Revue Internationale De Géomatique, 33*(1), 111–134. https://doi.org/10.32604/rig.2024.051788

Achu, A., Thomas, J., Aju, C., Vijith, H., & Gopinath, G. (2024). Redefining landslide susceptibility under extreme rainfall events using deep learning. *Geomorphology, 448*, 109033. https://doi.org/10.1016/j.geomorph.2023.109033

Ahmadi, M., Lonbar, A. G., Nouri, M., Javidi, A. S., Beris, A. T., Sharifi, A., & Salimi-Tarazouj, A. (2024). Supervised multi-regional segmentation machine learning architecture for digital twin applications in coastal regions. *Journal of Coastal Conservation, 28*, 44. https://doi.org/10.1007/s11852-024-01038-1

Al-Azizi, J. I., Shafri, H. Z. M., Hashim, S. J. B., & Mansor, S. B. (2020). Deep auto mapping: low-cost and real-time geospatial map generation method using deep learning and video streams. *Earth Science Informatics, 15*(3), 1481–1494. https://doi.org/10.1007/s12145-020-00529-7

Al-Dousari, A. E., Mishra, A., & Singh, S. (2023). Land use land cover change detection and urban sprawl prediction for Kuwait metropolitan region, using multi-layer perceptron neural networks (MLPNN). *The Egyptian Journal of Remote Sensing and Space Science, 26*(2), 381-392. https://doi.org/10.1016/j.ejrs.2023.05.003

Ali, U., Shamsi, M. H., Bohacek, M., Purcell, K., Hoare, C., Mangina, E., & O'Donnell, J. (2020). A data-driven approach for multi-scale GIS-based building energy modeling for analysis, planning and support decision making. *Applied Energy, 279*, 115834. https://doi.org/10.1016/j.apenergy.2020.115834

Aliyu, A., Isma'il, M., Zubairu, S. M., Gwio-Kura, I. Y., Abdullahi, A., Abubakar, B. A., & Mansur, M. (2023). Analysis of land use and land cover change using machine learning algorithm in Yola North Local Government Area of Adamawa State, Nigeria. *Environmental Monitoring and Assessment, 195*, 1470. https://doi.org/10.1007/s10661-023-12112-w

Alsumaiti, T., Yagoub, M. M., Tesfaldet, Y. T., Alhosani, N., & Pakam, S. (2024). Integration of building age into flood hazard mapping: A case study of Al Ain City, United Arab Emirates. *Water, 16*(17), 2408. https://doi.org/10.3390/w16172408

AlThuwaynee, O. F., Kim, S., Najemaden, M. A., Aydda, A., Balogun, A., Fayyadh, M. M., & Park, H. (2021). Demystifying uncertainty in PM10 susceptibility mapping using variable drop-off in extreme-gradient boosting (XGB) and random forest (RF) algorithms. *Environmental Science and Pollution Research, 28*(32), 43544–43566. https://doi.org/10.1007/s11356-021-13255-4

DOI: 10.15320/ICONARP.2025.337

Amiri, S. S., Mueller, M., & Hoque, S. (2023). Investigating the application of a commercial and residential energy consumption prediction model for urban Planning scenarios with Machine Learning and Shapley Additive explanation methods. *Energy and Buildings, 287*, 112965. https://doi.org/10.1016/j.enbuild.2023.112965

Anwar, M. R., & Sakti, L. D. (2024). Integrating artificial intelligence and environmental science for sustainable urban planning. *IAIC Transactions on Sustainable Digital Innovation (ITSDI), 5*(2), 179–191. https://doi.org/10.34306/itsdi.v5i2.666

Aslam, R. W., Naz, I., Quddoos, A., & Quddusi, M. R. (2024). Assessing climatic impacts on land use and land cover dynamics in Peshawar, Khyber Pakhtunkhwa, Pakistan: A remote sensing and GIS approach. *GeoJournal, 89*, 202. https://doi.org/10.1007/s10708-024-11203-6

Avinç, G. M., & Yıldız, A. (2025). A bibliometric and systematic review of scientific publications on metaverse research in architecture: Web of science (WoS). *International Journal of Technology and Design Education, 35,* 825–849. https://doi.org/10.1007/s10798-024-09918-1

Badshah, M. T., Hussain, K., Rehman, A. U., Mehmood, K., Muhammad, B., Wiarta, R., Silamon, R. F., Khan, M. A., & Meng, J. (2024). The role of random forest and Markov chain models in understanding metropolitan urban growth trajectory. *Frontiers in Forests and Global Change, 7*, 1345047. https://doi.org/10.3389/ffgc.2024.1345047

Baghini, M. S., Mohammadi, M., & Norouzkhani, N. (2024). Usability testing: A bibliometric analysis based on WOS data. *Journal of Scientometric Research, 13*(1), 09–24. https://doi.org/10.5530/jscires.13.1.2

Ballesteros, J. R., Sanchez-Torres, G., & Branch-Bedoya, J. W. (2022). HAGDAVS: Height-augmented geo-located dataset for detection and semantic segmentation of vehicles in Drone aerial orthomosaics. *Data, 7*(4), 50. https://doi.org/10.3390/data7040050

Batty, M. (2018). Artificial intelligence and smart cities. *Environment and Planning B Urban Analytics and City Science, 45*(1), 3–6. https://doi.org/10.1177/2399808317751169

Belgiu, M., & Drăguţ, L. (2016). Random forest in remote sensing: A review of applications and future directions. *ISPRS Journal of Photogrammetry and Remote Sensing, 114*, 24–31. https://doi.org/10.1016/j.isprsjprs.2016.01.011

Birkle, C., Pendlebury, D. A., Schnell, J., & Adams, J. (2020). Web of Science as a data source for research on scientific and scholarly activity. *Quantitative Science Studies, 1*(1), 363–376. https://doi.org/10.1162/qss_a_00018

Blanco, L., Alhamwi, A., Schiricke, B., & Hoffschmidt, B. (2024). Data-driven classification of urban energy units for district-level heating and electricity demand analysis. *Sustainable Cities and Society, 101*, 105075. https://doi.org/10.1016/j.scs.2023.105075

Boonpook, W., Tan, Y., & Xu, B. (2021). Deep learning-based multi-feature semantic segmentation in building extraction from images of UAV photogrammetry. *International Journal of Remote Sensing, 42*(1), 1–19. https://doi.org/10.1080/01431161.2020.1788742

Bortoloti, F. D., Tavares, J., Rauber, T. W., Ciarelli, P. M., & Botelho, R. C. G. (2022). An annotated image database of building facades categorized into land uses for object detection using deep learning. *Machine Vision and Applications, 33,* 80. https://doi.org/10.1007/s00138-022-01335-5

Casali, Y., Aydin, N. Y., & Comes, T. (2022). Machine learning for spatial analyses in urban areas: A scoping review. Sustainable *Cities and Society, 85*, 104050. https://doi.org/10.1016/j.scs.2022.104050

Celik, K.T. & Sekeroglu, A. (2023). The importance of geographical information systems in urban and landscape planning: A bibliometric analysis. *MEGARON / Yıldız Technical University Faculty of Architecture E-Journal, 18*(4), 499–519. https://doi.org/10.14744/megaron.2023.70962

Chanpichaigosol, N., Chaichana, C., & Rinchumphu, D. (2025). Urban heat island classification through alternative normalized difference vegetation index. *Global Journal of Environmental Science and Management, 11*(1), 57–76. https://doi.org/10.22034/gjesm.2025.01.04

Chaturvedi, V., & De Vries, W. T. (2021). Machine learning algorithms for urban land use planning: A review. *Urban Science, 5*(3), 68. https://doi.org/10.3390/urbansci5030068

Chen, W., & Zhang, S. (2021). GIS-based comparative study of Bayes network, Hoeffding tree and logistic model tree for landslide susceptibility modeling. *CATENA, 203,* 105344. https://doi.org/10.1016/j.catena.2021.105344

Chen, W., Jing, C., Liquan, X., & Haiyun, X. (2022). Spatial potential of recreational services in Western Hubei Region in light of the "all-for-one tourism" development -A machine learning approach based on ensemble model. *Landscape Architecture Frontiers, 10*(5), 8. https://doi.org/10.15302/j-laf-1-020073

Chen, X., Tu, W., Yu, J., Cao, R., Yi, S., & Li, Q. (2024). LCZ-based city-wide solar radiation potential analysis by coupling physical modeling, machine learning, and 3D buildings. *Computers Environment and Urban Systems, 113*, 102176. https://doi.org/10.1016/j.compenvurbsys.2024.102176

Darabi, H., Choubin, B., Rahmati, O., Haghighi, A. T., Pradhan, B., & Kløve, B. (2019). Urban flood risk mapping using the GARP and QUEST models: A comparative study of machine learning techniques. *Journal of Hydrology, 569*, 142–154. https://doi.org/10.1016/j.jhydrol.2018.12.002

Darabi, H., Rahmati, O., Naghibi, S. A., Mohammadi, F., Ahmadisharaf, E., Kalantari, Z., Haghighi, A. T., Soleimanpour, S. M., Tiefenbacher, J. P., & Bui, D. T. (2022). Development of a novel hybrid multi-boosting neural network model for spatial prediction of urban flood. *Geocarto International, 37*(19), 5716–5741. https://doi.org/10.1080/10106049.2021.1920629

Deb, D., & Smith, R. M. (2021). Application of Random Forest and SHAP Tree Explainer in Exploring Spatial (In)Justice to aid Urban Planning. *ISPRS International Journal of Geo-Information, 10*(9), 629. https://doi.org/10.3390/ijgi10090629

Di Napoli, M., Di Martire, D., Bausilio, G., Calcaterra, D., Confuorto, P., Firpo, M., Pepe, G., & Cevasco, A. (2021). Rainfall-Induced shallow landslide detachment, transit and runout susceptibility mapping by integrating machine learning techniques and GIS-Based approaches. *Water, 13*(4), 488. https://doi.org/10.3390/w13040488

Dogan, S., Kilicoglu, C., Akinci, H., Sevik, H., Cetin, M., & Kocan, N. (2024). Comprehensive risk assessment for identifying suitable residential zones in Manavgat, Mediterranean Region. *Evaluation and Program Planning, 106*, 102465. https://doi.org/10.1016/j.evalprogplan.2024.102465

Fang, X., & Zhang, Z. (2024). Hotspots and trends in health-oriented physical literacy research: a visual analysis based on the WOS database. *BMC Public Health, 24*(1). https://doi.org/10.1186/s12889-024-18951-7

DOI: 10.15320/ICONARP.2025.337

Fang, Y., Tian, J., Namaiti, A., Zhang, S., Zeng, J., & Zhu, X. (2024). Visual aesthetic quality assessment of the streetscape from the perspective of landscape-perception coupling. *Environmental Impact Assessment Review, 106*, 107535. https://doi.org/10.1016/j.eiar.2024.107535

Fang, Z., Jin, Y., & Yang, T. (2022). Incorporating Planning Intelligence into Deep Learning: A Planning Support Tool for Street Network Design. *Journal of Urban Technology, 29*(2), 99–114. https://doi.org/10.1080/10630732.2021.2001713

Fanos, A. M., Pradhan, B., Alamri, A., & Lee, C. (2020). Machine Learning-Based and 3D kinematic models for rockfall hazard assessment using LiDAR data and GIS. *Remote Sensing, 12*(11), 1755. https://doi.org/10.3390/rs12111755

Fawcett, T. (2006). An introduction to ROC analysis. *Pattern Recognition Letters, 27*(8), 861–874. https://doi.org/10.1016/j.patrec.2005.10.010

Ferreira, Z., Almeida, B., Costa, A. C., Fernandes, M. D. C., & Cabral, P. (2025). Insights into landslide susceptibility: a comparative evaluation of multi-criteria analysis and machine learning techniques. *Geomatics Natural Hazards and Risk, 16*(1). https://doi.org/10.1080/19475705.2025.2471019

Foody, G. M. (2002). Status of land cover classification accuracy assessment. *Remote Sensing of Environment, 80*(1), 185–201. https://doi.org/10.1016/s0034-4257(01)00295-4

Frimpong, A. T., Mensah, L. D., Rockson, M. A. D., & Kemausuor, F. (2025). Forecasting municipal solid waste generation and composition using machine learning and GIS techniques: A case study of Cape Coast, Ghana. *Cleaner Waste Systems, 10,* 100218. https://doi.org/10.1016/j.clwas.2025.100218

Gharaibeh, A., Shaamala, A., Obeidat, R., & Al-Kofahi, S. (2020). Improving land-use change modeling by integrating ANN with Cellular Automata-Markov Chain model. *Heliyon, 6*(9), e05092. https://doi.org/10.1016/j.heliyon.2020.e05092

Gómez, J. A., Guan, C., Tripathy, P., Duque, J. C., Passos, S., Keith, M., & Liu, J. (2021). Analyzing the spatiotemporal uncertainty in urbanization predictions. *Remote Sensing, 13*(3), 512. https://doi.org/10.3390/rs13030512

Goodchild, M. F. (2009). Geographic information systems and science: Today and tomorrow. *Annals of GIS, 15*(1), 3–9. https://doi.org/10.1080/19475680903250715

Goodchild, M. F., & Janelle, D. G. (2004). *Thinking spatially in the social sciences*. In M. F. Goodchild & D. G. Janelle (Eds.), Spatially integrated social science (pp. 3–17). United States: Oxford University Press

Haery, S., Mahpour, A., & Vafaeinejad, A. (2024). Forecasting urban travel demand with geo-AI: A combination of GIS and machine learning techniques utilizing uber data in New York City. *Environmental Earth Sciences, 83,* 594. https://doi.org/10.1007/s12665-024-11900-y

Hagenauer, J., Omrani, H., & Helbich, M. (2019). Assessing the performance of 38 machine learning models: The case of land consumption rates in Bavaria, Germany. *International Journal of Geographical Information Science, 33*(7), 1399–1419. https://doi.org/10.1080/13658816.2019.1579333

Hamid, B., Massinissa, B., & Nabila, G. (2023). Landslide susceptibility mapping using GIS-based statistical and machine learning modeling in the city of Sidi Abdellah, Northern Algeria. *Modeling Earth Systems and Environment, 9*(2), 2477–2500. https://doi.org/10.1007/s40808-022-01633-x

Harrington, P. (2012). *Machine learning in action*. United States: Manning Publications.

He, J., Li, X., Yao, Y., Hong, Y., & Jinbao, Z. (2018). Mining transition rules of cellular automata for simulating urban expansion by using the deep learning techniques. *International Journal of Geographical Information Science, 32*(10), 2076–2097. https://doi.org/10.1080/13658816.2018.1480783

Huang, J., Bibri, S. E., & Keel, P. (2025). Generative Spatial Artificial Intelligence for Sustainable Smart Cities: A pioneering large flow model for urban digital twin. *Environmental Science and Ecotechnology, 24*, 100526. https://doi.org/10.1016/j.ese.2025.100526

Huettmann, F., Kövér, L., Robold, R., Spangler, M., & Steiner, M. (2023). Model-based prediction of a vacant summer niche in a subarctic urbanscape: A multi-year open access data analysis of a 'niche swap' by short-billed Gulls. *Ecological Informatics, 78*, 102364. https://doi.org/10.1016/j.ecoinf.2023.102364

Hussain, K., Badshah, T., Mehmood, K., Rahman, A. U., Shahzad, F., Anees, S. A., Khan, W. R., & Yujun, S. (2025). Comparative analysis of sensors and classification algorithms for land cover classification in Islamabad, Pakistan. *Earth Science Informatics, 18*(2). https://doi.org/10.1007/s12145-025-01720-4

Iamtrakul, P., Chayphong, S., Kantavat, P., Hayashi, Y., Kijsirikul, B., & Iwahori, Y. (2023). Exploring the spatial effects of built environment on quality of life related transportation by integrating GIS and deep learning approaches. *Sustainability, 15*(3), 2785. https://doi.org/10.3390/su15032785

Immitzer, M., Vuolo, F., & Atzberger, C. (2016). First Experience with Sentinel-2 Data for Crop and tree species classifications in Central Europe. Remote Sensing, 8(3), 166. https://doi.org/10.3390/rs8030166

Janowicz, K., Gao, S., McKenzie, G., Hu, Y., & Bhaduri, B. (2020). GeoAI: spatially explicit artificial intelligence techniques for geographic knowledge discovery and beyond. *International Journal of Geographical Information Science, 34*(4), 625–636. https://doi.org/10.1080/13658816.2019.1684500

Jato-Espino, D., Manchado, C., Roldán-Valcarce, A., & Moscardó, V. (2022). ArcUHI: A GIS add-in for automated modelling of the Urban Heat Island effect through machine learning. *Urban Climate, 44,* 101203. https://doi.org/10.1016/j.uclim.2022.101203

Jing, Y., Cui, J., Ma, D., & Chen, Y. (2023). Editorial: Towards sustainable urban development: Use of geographic big data for spatial planning. *Frontiers in Environmental Science, 11*. https://doi.org/10.3389/fenvs.2023.1202661

Junjia, Y., Alias, A. H., Haron, N. A., & Bakar, N. A. (2023). A bibliometric review on Safety Risk assessment of construction based on CiteSpace software and WOS database. *Sustainability, 15*(15), 11803. https://doi.org/10.3390/su151511803

Kamrowska-Załuska, D. (2021). Impact of AI-Based tools and urban big data analytics on the design and planning of cities. *Land, 10*(11), 1209. https://doi.org/10.3390/land10111209

Kar, R., & Wasnik, A. (2024). Progress and trends in healthcare marketing strategy (2018–2022): A descriptive and bibliometric analysis of the Web of Science (WOS) dataset. *International Journal of Pharmaceutical and Healthcare Marketing, 18*(2), 325–349. https://doi.org/10.1108/ijphm-12-2022-0106

Karlı, M., & Terzi, F. (2025). Modelling the energy footprint of urban form in Istanbul: A big data and machine learning approach. *Energy and Buildings, 115495.* https://doi.org/10.1016/j.enbuild.2025.115495

DOI: 10.15320/ICONARP.2025.337

Klosterman, R. E. (1995). The appropriateness of geographic information systems for regional planning in the developing world. *Computers Environment and Urban Systems, 19*(1), 1–13. https://doi.org/10.1016/0198-9715(94)00028-x

Leitch, S., & Wei, Z. (2024). Improving spatial access to healthcare facilities: an integrated approach with spatial analysis and optimization modeling. *Annals of Operations Research, 341*(2–3), 1057–1074. https://doi.org/10.1007/s10479-024-06028-y

Lemenkova, P. (2024). Artificial intelligence for computational remote sensing: Quantifying patterns of land cover types around Cheetham wetlands, port Phillip Bay, Australia. J*ournal of Marine Science and Engineering, 12*(8), 1279. https://doi.org/10.3390/jmse12081279

Li, Q., Taubenböck, H., Shi, Y., Auer, S., Roschlaub, R., Glock, C., Kruspe, A., & Zhu, X. X. (2022). Identification of undocumented buildings in cadastral data using remote sensing: Construction period, morphology, and landscape. *International Journal of Applied Earth Observation and Geoinformation, 112*, 102909. https://doi.org/10.1016/j.jag.2022.102909

Li, T., Xu, H., & Sun, H. (2023a). Spatial patterns and multi-dimensional impact analysis of urban street quality perception under multi-source data: A case study of Wuchang district in Wuhan, China. *Applied Sciences, 13*(21), 11740. https://doi.org/10.3390/app132111740

Li, W. (2020). GeoAI: Where machine learning and big data converge in GIScience. *Journal of Spatial Information Science, 20*(20), 71–77. https://doi.org/10.5311/JOSIS.2020.20.658

Li, X., Zhang, X., & Jia, T. (2023b). Humanization of nature: Testing the influences of urban park characteristics and psychological factors on collegers' perceived restoration. *Urban Forestry & Urban Greening, 79,* 127806. https://doi.org/10.1016/j.ufug.2022.127806

Lin, L., Di, L., Zhang, C., Guo, L., Zhao, H., Islam, D., Li, H., Liu, Z., & Middleton, G. (2024). Modeling urban redevelopment: A novel approach using time-series remote sensing data and machine learning. G*eography and Sustainability, 5*(2), 211–219. https://doi.org/10.1016/j.geosus.2024.02.001

Liu, C., Lin, T., Yuan, K., & Chiueh, P. (2022). Spatio-temporal prediction and factor identification of urban air quality using support vector machine. *Urban Climate, 41,* 101055. https://doi.org/10.1016/j.uclim.2021.101055

Liu, L., Xu, Z., Yao, S., Lv, M., & Liu, C. (2024). Optimizing the spatial accessibility of outdoor sports facilities: a greedy heuristic algorithm based on remote sensing images. *International Journal of Digital Earth, 17*(1). https://doi.org/10.1080/17538947.2024.2390427

Liu, M., Chen, H., Wei, D., Wu, Y., & Li, C. (2021). Nonlinear relationship between urban form and street-level PM2.5 and CO based on mobile measurements and gradient boosting decision tree models. *Building and Environment, 205,* 108265. https://doi.org/10.1016/j.buildenv.2021.108265

Liu, R., Wang, Y., Zhang, Y., Peng, Z., Chen, H., Li, X., Li, H., & Li, W. (2025). Analysis of the city-scale wind environment and detection of ventilation corridors in high-density metropolitan areas based on CFD method. *Urban Climate, 59,* 102274. https://doi.org/10.1016/j.uclim.2024.102274

Liu, R., Xu, Y., Xue, C., Xia, Z., Li, G., Gou, X., & Luo, S. (2023). Simulation of early warning ındicators of urban expansion derived from machine learning. *Journal of Urban Planning and Development, 149*(1). https://doi.org/10.1061/jupddm.upeng-4127

Liu, Z., & Cheng, L. (2020). Review of GIS technology and its applications in different areas. *IOP Conference Series Materials Science and Engineering, 735*(1), 012066. https://doi.org/10.1088/1757-899x/735/1/012066

Lloyd, C., Sturrock, H., Leasure, D., Jochem, W., Lázár, A., & Tatem, A. (2020). Using GIS and machine learning to classify residential status of urban buildings in low and middle income settings. *Remote Sensing, 12*(23), 3847. https://doi.org/10.3390/rs12233847

Mahendra, H., Pushpalatha, V., Mallikarjunaswamy, S., Subramoniam, S. R., Rao, A. S., & Sharmila, N. (2024). LULC change detection analysis of Chamarajanagar district, Karnataka state, India using CNN-based deep learning method. *Advances in Space Research, 75*(12), 6384-6408. https://doi.org/10.1016/j.asr.2024.07.066

Manna, H., Mallick, S. K., Sarkar, S., & Roy, S. K. (2025). Developing decision making framework on built-up site suitability assessment for urban regeneration in the industrial cities of Eastern India. *Scientific Reports, 15*(1). https://doi.org/10.1038/s41598-025-90408-2

Mansourihanis, O., Tilaki, M. J. M., Yousefian, S., & Zaroujtaghi, A. (2023). A computational geospatial approach to assessing land-use compatibility in urban planning. *Land, 12*(11), 2083. https://doi.org/10.3390/land12112083

Mazroa, A. A., Maashi, M., Kouki, F., Othman, K. M., Salih, N., Elfaki, M. A., & S, S. B. (2024). An analysis of urban sprawl growth and prediction using remote sensing and machine learning techniques. *Journal of South American Earth Sciences, 142,* 104988. https://doi.org/10.1016/j.jsames.2024.104988

McCorduck, P. (2004). *Machines who think: A personal inquiry into the history and prospects of artificial intelligence* (2nd ed.). Canada: AK Peters.

Mishra, K., Tiwari, H., & Poonia, V. (2025). An integrated approach of machine learning methods coupled with cellular automation for monitoring and forecasting of land use and land cover. *Journal of Arid Environments, 226*, 105293. https://doi.org/10.1016/j.jaridenv.2024.105293

Mishra, S., Bajpai, A., Mohanta, A., Banerjee, B., Rajput, S., & Kundu, S. (2024). Dynamic flood risk prediction in Houston: A multi-model machine learning approach. *Geocarto International, 39*(1). https://doi.org/10.1080/10106049.2024.2432866

Mitchell, T. M. (1997). *Machine Learning*. New York: McGraw-Hill.

Mondal, S., Parveen, M. T., Alam, A., Rukhsana, N., Islam, N., Calka, B., Bashir, B., & Zhran, M. (2024). Future site suitability for urban waste management in English Bazar and Old Malda municipalities, West Bengal: a geospatial and machine learning approach. *ISPRS International Journal of Geo-Information, 13*(11), 388. https://doi.org/10.3390/ijgi13110388

Mustak, S., Baghmar, N. K., Singh, S. K., & Srivastava, P. K. (2022). Multi-scenario based urban growth modeling and prediction using earth observation datasets towards urban policy improvement. *Geocarto International, 37*(27), 18275–18303. https://doi.org/10.1080/10106049.2022.2138983

Mutani, G., Scalise, A., Sufa, X., & Grasso, S. (2024). Synergising machine learning and remote sensing for Urban heat island dynamics: A Comprehensive Modelling approach. *Atmosphere, 15*(12), 1435. https://doi.org/10.3390/atmos15121435

Nahid, S., Kumar, R. P., Acharya, P., Kumar, K., & Purohit, S. (2025). Forecasting urban expansion in Delhi-NCR: integrating remote sensing, machine learning, and Markov chain simulation for sustainable urban planning. *GeoJournal, 90,* 72. https://doi.org/10.1007/s10708-025-11317-5

DOI: 10.15320/ICONARP.2025.337

Ni, H., Wang, D., Zhao, W., Jiang, W., Mingze, E., Huang, C., & Yao, J. (2024). Enhancing rooftop solar energy potential evaluation in high-density cities: A Deep Learning and GIS based approach. *Energy and Buildings, 309*, 113743. https://doi.org/10.1016/j.enbuild.2023.113743

Nizamani, M. M., Qureshi, S., Tarashkar, M., Zhang, H., Zhou, Q., & Lai, Z. (2025). Ethical AI: Human-centered approaches for adaptive and sustainable urban planning and policy. *Land Use Policy*, *157*, 107650. https://doi.org/10.1016/j.landusepol.2025.107650

Ohlan, R., Ohlan, A., Chhikara, S., & Singh, T. (2025). Bibliometric analysis and review of world trade organization research: Suggesting future avenues using WOS database. *Journal of the Knowledge Economy, 16,* 3741–3771 https://doi.org/10.1007/s13132-024-02134-1

Omrani, H., Tayyebi, A., & Pijanowski, B. (2017). Integrating the multi-label land-use concept and cellular automata with the artificial neural network-based Land Transformation Model: an integrated ML-CA-LTM modeling framework. *GIScience & Remote Sensing, 54*(3), 283–304. https://doi.org/10.1080/15481603.2016.1265706

Park, J., & Yang, B. (2020). GIS-Enabled Digital Twin system for sustainable evaluation of carbon emissions: A case study of Jeonju City, South Korea. *Sustainability, 12*(21), 9186. https://doi.org/10.3390/su12219186

Patil, V., Khadke, Y., Joshi, A., & Sawant, S. (2024). Flood mapping and damage assessment using ensemble model approach. *Sensing and Imaging, 25,* 15. https://doi.org/10.1007/s11220-024-00464-7

Peng, Z., Lu, K., Liu, Y., & Zhai, W. (2023). The pathway of urban planning AI: From planning support to plan-making. *Journal of Planning Education and Research, 44*(4), 2263–2279. https://doi.org/10.1177/0739456x231180568

Pflugmacher, D., Rabe, A., Peters, M., & Hostert, P. (2019). Mapping pan-European land cover using Landsat spectral-temporal metrics and the European LUCAS survey. *Remote Sensing of Environment, 221,* 583–595. https://doi.org/10.1016/j.rse.2018.12.001

Pushpalatha, V., Mallikarjuna, P. B., Mahendra, H. N., Rama Subramoniam, S., & Mallikarjunaswamy, S. (2025). Land use and land cover classification for change detection studies using convolutional neural network. *Advances in Computational and Applied Geosciences, 5*(2), 100227. https://doi.org/10.1016/j.acags.2025.100227

Quan, S. J. (2024). Comparing hyperparameter tuning methods in machine learning based urban building energy modeling: A study in Chicago. *Energy and Buildings, 317*, 114353. https://doi.org/10.1016/j.enbuild.2024.114353

Riaz, M. T., Riaz, M. T., Rehman, A., Bindajam, A. A., Mallick, J., & Abdo, H. G. (2024). An integrated approach of support vector machine (SVM) and weight of evidence (WOE) techniques to map groundwater potential and assess water quality. *Scientific Reports, 14*(1). https://doi.org/10.1038/s41598-024-76607-3

Rizeei, H. M., Pradhan, B., & Saharkhiz, M. A. (2019). Allocation of emergency response centres in response to pluvial flooding-prone demand points using integrated multiple layer perceptron and maximum coverage location problem models. *International Journal of Disaster Risk Reduction, 38,* 101205. https://doi.org/10.1016/j.ijdrr.2019.101205

Salele, B., Dodo, Y. A., Sani, D. A., Abuhussain, M. A., Abdullaeva, B. S., & Brysiewicz, A. (2023). Run-off modelling of pervious and impervious areas using couple SWAT and a novel machine learning model in cross-rivers state

Nigeria. *Water Science & Technology, 88*(7), 1893–1909. https://doi.org/10.2166/wst.2023.304

Sampurno, J., Ardianto, R., & Hanert, E. (2022). Integrated machine learning and GIS-based bathtub models to assess the future flood risk in the Kapuas River Delta, Indonesia. *Journal of Hydroinformatics, 25*(1), 113–125. https://doi.org/10.2166/hydro.2022.106

Samuel, A. L. (1959). Some studies in machine learning using the game of checkers. *IBM Journal of Research and Development, 3*(3), 210–229. https://doi.org/10.1147/rd.33.0210

Sanchez, T. W., Shumway, H., Gordner, T., & Lim, T. (2023). The prospects of artificial intelligence in urban planning. *International Journal of Urban Sciences, 27*(2), 179–194. https://doi.org/10.1080/12265934.2022.2102538

Santos, B., Gonçalves, J., Martins, A. M., Pérez-Cano, M. T., Mosquera-Adell, E., Dimelli, D., Lagarias, A., & Almeida, P. G. (2021). GIS in architectural teaching and research: Planning and heritage. *Education Sciences, 11*(6), 307. https://doi.org/10.3390/educsci11060307

Scholten, H. J., & Stillwell, J. (2013). *Geographical information systems for urban and regional planning*. Germany: Springer Science & Business Media.

Schrammeijer, E. A., Malek, Ž., & Verburg, P. H. (2022). Mapping demand and supply of functional niches of urban green space. *Ecological Indicators, 140,* 109031. https://doi.org/10.1016/j.ecolind.2022.109031

Segura-Méndez, F. J., Pérez-Sánchez, J., & Senent-Aparicio, J. (2023). Evaluating the riparian forest quality index (QBR) in the Luchena River by integrating remote sensing, machine learning and GIS techniques. *Ecohydrology & Hydrobiology, 23*(3), 469–483. https://doi.org/10.1016/j.ecohyd.2023.04.002

Seydou, K. D., Morenikeji, W., Diouf, A., Dicko, K., Erdanaev, E., Loewner, R., & Okhimamhe, A. A. (2024). Dynamics of Zinder's urban landscape: Implications for sustainable land use management and environmental conservation. *Sustainability, 16*(23), 10263. https://doi.org/10.3390/su162310263

Shao, Y., Yin, Y., Xue, Z., & Ma, D. (2023). Assessing and comparing the visual comfort of streets across four Chinese megacities using ai-based image analysis and the perceptive evaluation method. *Land, 12*(4), 834. https://doi.org/10.3390/land12040834

Sierra, S., Ramo, R., Padilla, M., & Cobo, A. (2025). Optimizing deep neural networks for high-resolution land cover classification through data augmentation. *Environmental Monitoring and Assessment, 197*, 423. https://doi.org/10.1007/s10661-025-13870-5

Sinčić, M., Gazibara, S. B., Rossi, M., & Arbanas, S. M. (2025). Comparison of conditioning factor classification criteria in large-scale statistically based landslide susceptibility models. *Natural Hazards and Earth System Sciences, 25*(1), 183–206. https://doi.org/10.5194/nhess-25-183-2025

Smith, T. R. (1984). Artificial intelligence and its applicability to geographical problem solving. *The Professional Geographer, 36*(2), 147–158. https://doi.org/10.1111/j.0033-0124.1984.00147.x

Sobieraj, J., Marín, M. F., & Metelski, D. (2023). Mapping of impervious surfaces with the use of remote sensing imagery: Support Vector Machines classification and GIS-based approach. *Archives of Civil Engineering*, *69*(3), 129-146. https://doi.org/10.24425/ace.2023.146071

Srivanit, M., Pattanasri, S., Phichetkunbodee, N., Manokeaw, S., Sitthikankun, S., & Rinchumphu, D. (2024). Analysis of sensitive urban form indicators of flood susceptible prediction based on machine learning models. *Global Journal of*

DOI: 10.15320/ICONARP.2025.337

Environmental Science and Management, 10(1), 15–28. https://doi.org/10.22034/gjesm.2024.01.02

Su, L., Chen, W., Zhou, Y., & Fan, L. (2023). Exploring city ımage perception in social media big data through deep learning: A Case Study of Zhongshan City. *Sustainability, 15*(4), 3311. https://doi.org/10.3390/su15043311

Sun, C., Zhang, F., Zhao, P., Zhao, X., Huang, Y., & Lu, X. (2021). Automated simulation framework for urban wind environments based on aerial point clouds and deep learning. *Remote Sensing, 13*(12), 2383. https://doi.org/10.3390/rs13122383

Tang, Y., Feng, F., Guo, Z., Feng, W., Li, Z., Wang, J., Sun, Q., Ma, H., & Li, Y. (2020). Integrating principal component analysis with statistically-based models for analysis of causal factors and landslide susceptibility mapping: A comparative study from the loess plateau area in Shanxi (China). *Journal of Cleaner Production, 277,* 124159. https://doi.org/10.1016/j.jclepro.2020.124159

Tokarčík, O., Blišťan, P., Kovanič, Ľ., Peťovský, P., & Topitzer, B. (2024). Assessment of the usability of open data in Slovakia in the context of mapping and evaluating Blue-Green Infrastructure. *Geographia Cassoviensis, 18*(2). https://doi.org/10.33542/gc2024-2-02

Trinh, L. H., Pham, V. T., Tran, X. B., Nguyen, V. T., Vu, X. C., Tong, T. H., & Le, V. P. (2024). Mapping impervious surface change from remote sensing and GIS data: A case study in Hochiminh city, Vietnam. *Ecological Questions, 35*(3), 1–14. https://doi.org/10.12775/eq.2024.030

Venter, Z. S., & Sydenham, M. A. K. (2021). Continental-scale land cover mapping at 10 m resolution over Europe (ELC10). *Remote Sensing, 13*(12), 2301. https://doi.org/10.3390/rs13122301

Wan, T., & Ma, Y. (2022). Urban planning and design layout generation based on artificial intelligence. *Mathematical Problems in Engineering, 2022,* 1–10. https://doi.org/10.1155/2022/8976943

Wang, J., & Liu, Z. (2014). A bibliometric analysis on rural studies in human geography and related disciplines. *Scientometrics, 101*(1), 39–59. https://doi.org/10.1007/s11192-014-1388-2

Wang, L., Pijanowski, B., Yang, W., Zhai, R., Omrani, H., & Li, K. (2018). Predicting multiple land use transitions under rapid urbanization and implications for land management and urban planning: The case of Zhanggong district in central China. *Habitat International, 82*, 48–61. https://doi.org/10.1016/j.habitatint.2018.08.007

Wang, S., Ou, H., Chen, P., & Lin, T. (2024). Implementing policies to mitigate urban heat islands: Analyzing urban development factors with an innovative machine learning approach. *Urban Climate, 55,* 101868. https://doi.org/10.1016/j.uclim.2024.101868

Wang, Z., Zhu, Z., Xu, M., & Qureshi, S. (2021). Fine-grained assessment of greenspace satisfaction at regional scale using content analysis of social media and machine learning. *The Science of the Total Environment, 776,* 145908. https://doi.org/10.1016/j.scitotenv.2021.145908

Wu, C., Wang, Y., Wang, J., Kraak, M., & Wang, M. (2024). Mapping Street Patterns with Network Science and Supervised Machine Learning. *ISPRS International Journal of Geo-Information, 13*(4), 114. https://doi.org/10.3390/ijgi13040114

Xiao, T., Yin, K., Yao, T., & Liu, S. (2019). Spatial prediction of landslide susceptibility using GIS-based statistical and machine learning models in Wanzhou County, Three Gorges Reservoir, China. *Acta Geochimica, 38*(5), 654–669. https://doi.org/10.1007/s11631-019-00341-1

Xu, Y., Chen, R., Du, H., Chen, M., Fu, C., & Li, Y. (2025). Evaluation of green space influence on housing prices using machine learning and urban visual intelligence. *Cities, 158,* 105661. https://doi.org/10.1016/j.cities.2024.105661

Yagoub, M. M., Tesfaldet, Y. T., Elmubarak, M. G., & Hosani, N. A. (2022). Extraction of urban quality of life indicators using remote sensing and machine learning: the case of Al Ain City, United Arab Emirates (UAE). *ISPRS International Journal of Geo-Information, 11*(9), 458. https://doi.org/10.3390/ijgi11090458

Yan, L., & Zhiping, W. (2023). Mapping the literature on academic publishing: A bibliometric analysis on WOS. *SAGE Open, 13*(1). https://doi.org/10.1177/21582440231158562

Yao, Y., Li, X., Liu, X., Liu, P., Liang, Z., Zhang, J., & Mai, K. (2017). Sensing spatial distribution of urban land use by integrating points-of-interest and Google Word2Vec model. *International Journal of Geographical Information Science, 31*(4), 825–848. https://doi.org/10.1080/13658816.2016.1244608

Yao, Y., Yin, H., Xu, C., Chen, D., Shao, L., Guan, Q., & Wang, R. (2022). Assessing myocardial infarction severity from the urban environment perspective in Wuhan, China. *Journal of Environmental Management, 317,* 115438. https://doi.org/10.1016/j.jenvman.2022.115438

Ye, N., Wang, B., Kita, M., Xie, M., & Cai, W. (2019). Urban commerce distribution analysis based on street view and deep learning. *IEEE Access, 7,* 162841–162849. https://doi.org/10.1109/ACCESS.2019.2951294

Yu, J., Zeng, P., Yu, Y., Yu, H., Huang, L., & Zhou, D. (2022). A Combined Convolutional Neural Network for Urban Land-Use Classification with GIS Data. *Remote Sensing, 14*(5), 1128. https://doi.org/10.3390/rs14051128

Zafar, Z., Zubair, M., Zha, Y., Fahd, S., & Nadeem, A. A. (2024). Performance assessment of machine learning algorithms for mapping of land use/land cover using remote sensing data. *The Egyptian Journal of Remote Sensing and Space Science, 27*(2), 216–226. https://doi.org/10.1016/j.ejrs.2024.03.003

Zappone, A., Di Renzo, M., & Debbah, M. (2019). Wireless networks design in the era of deep learning: Model-Based, AI-Based, or both?. *IEEE Transactions on Communications, 67*(10), 7331–7376. https://doi.org/10.1109/tcomm.2019.2924010

Zheng, Y., Wang, Y., Wang, X., Wen, Y., & Guo, S. (2024). Managing landscape urbanization and assessing biodiversity of wildlife habitats: A study of bobcats in San Jose, California. *Land, 13*(2), 152. https://doi.org/10.3390/land13020152

Zhu, X. X., Tuia, D., Mou, L., Xia, G., Zhang, L., Xu, F., & Fraundorfer, F. (2017). Deep Learning in Remote Sensing: A comprehensive review and list of resources. *IEEE Geoscience and Remote Sensing Magazine, 5*(4), 8–36. https://doi.org/10.1109/mgrs.2017.2762307

Zhu, Y., Mao, Y., Yuan, M., Zhang, K., & Lv, C. (2023). Global research productions pertaining to design for safety: A bibliometric analysis based on WOS database. *Buildings, 13*(6), 1515. https://doi.org/10.3390/buildings13061515

Zou, L., Song, Y., & Cervone, G. (2024). Geospatial big data: Theory, methods, and applications. *Annals of GIS, 30*(4), 411–415. https://doi.org/10.1080/19475683.2024.2419749

DOI: 10.15320/ICONARP.2025.337

Resume

Ahmet Sekeroglu is an urban and regional planner and academician. He received his bachelor's degree from Amasya University, Faculty of Architecture, Department of Urban and Regional Planning. He completed both his master's and doctoral studies at Gazi University, Graduate School of Natural and Applied Sciences, Department of Urban and Regional Planning. Between 2017 and 2024, he served as a research assistant at Amasya University in the same department. Since 2024, he has been working as an Assistant Professor (Dr.) at Amasya University, Department of Urban and Regional Planning. His academic and professional interests focus on urban planning, renewable energy, Geographic Information Systems (GIS), spatial analysis and modelling.

Kadir Tolga Celik is a landscape architect and academician. He received his bachelor's degree from Karadeniz Technical University, Faculty of Forestry, Department of Landscape Architecture. He completed both his master's and doctoral studies at the same university, Graduate School of Natural and Applied Sciences, Department of Landscape Architecture. Between 2019 and 2024, he served as a research assistant at Amasya University, Department of Urban Design and Landscape Architecture. Since 2024, he has been working as an Assistant Professor (Dr.) in the same department. His academic and professional interests focus on Geographic Information Systems (GIS), urban open and green spaces, street furniture, natural disasters, and site selection analysis.

ICONARP – Volume 13, Issue 2 / Published: 31.12.2025

ICONARP
International Journal of Architecture and Planning
Received: 01.05.2025 Accepted: 19.12.2025
Volume 13, Issue 2/ Published: 31.12.2025
DOI: 10.15320/ICONARP.2025.338 E- ISSN: 2147-9380
Research Article
ICONARP

The Impact of UXd in Lean Product Development and Design Processes; The Case of Automotive Industry

Fuat Ali Paker*

Abstract

In the last two decades, lean product development and design processes, which have rapidly penetrated the automotive industry companies with all their functions and spread globally, have come to life with measurements, benchmarks and flow maps on value creation or value addition in new product project stages. In the literature review, two customer-oriented approaches, namely lean product development and user experience design, have been widely adopted within the discipline of new product design. However, the lack of comparative efficiency measurements or studies addressing their integration in scientific publications constitutes the primary motivation of this research. Furthermore, the selection of the research scope and boundaries is based on convenience sampling, enabled by direct qualitative research with companies managerial or design positions in the Turkish automotive supplier industry. The main objective of this study is to conduct a comparative analysis aimed at integrating user experience activities with lean product development process flows, and to reveal metric values that enhance efficiency through overall system optimization. On the other hand, the most important recommendation of the study is that the basic process will benefit positively by including user experience activities, which are the most important application of customer-oriented design approaches, into the highly efficient lean product development flow. Therefore, the study conducted with the mixed research method was completed under the preference of quantitative face-to-face interview method in the in-depth questioning of the qualitative numerical data obtained by the questionnaire method. User experience activities, which are newer and less widespread than lean product development processes, have also revealed the frequency of project-based, customer-oriented design activities, along with the demographic organizational structure of the participating companies in the automotive industry, such as the age of establishment, number of employees, number of designers, etc.

Keywords:
Industrial design process, Lean product development process, User experian design

*Department of Industrial Design, Faculty of Architecture and Design, Konya Technical University, Konya, Türkiye
Email: apaker@ktun.edu.tr

To cite this article: Paker, F., A. (2025). The Impact of UXd in Lean Product Development and Design Processes; The Case of Automotive Industry. *ICONARP International Journal of Architecture and Planning,* 13 (2), 625-644. DOI: 10.15320/ICONARP.2025.338

INTRODUCTION

The main reason for the introduction of lean product development and design processes by automotive industry companies in the last half of the 1990's was to focus on the targeted users and their needs through new vehicle design or innovation on the product that the user will pay for (Womack, et al., 1990; Womack, and Jones, 1996; Liker, 1998; Paker, 2021). Therefore, in the lean product development processes that the Toyota group has put into practice from theory to practice, the fact that there is no loss in the new and innovation values that the customer or user accepts the price, and that it comes to life in the criteria involved in customer preference and acceptance, comes to life today with user experience activities.

A review of the literature on customer-oriented new product design processes reveals two dominant focal areas in contemporary practice: the first centres on lean product development, while the second focuses on user experience research. Accordingly, although these two approaches exhibit distinct focal points and process perspectives and are widely represented in the literature, their respective efficient aspects are measured in this study and proposed as a hybrid system. In addition, due to a convenience-based field access preference, the research population and boundaries are defined through face-to-face interviews conducted with project managers and product designers employed in the Turkish automotive supplier industry. The main purpose of this study is to compare the integration of user experience activities and lean product development process flow, and to reveal the metric values on the axis of optimization of the whole and increasing its efficiency. Furthermore, in the last two decades from the 2000's to the present, lean design processes and the accompanying optimized new product focus have led to new product and development phases that can dominate the market, thus bringing about severe competitive needs for automotive industry companies (Levitt, 1965; Jones, and Womack, 2002; Paker, 2020; Paker, 2022). In other words, this area of specialization, which started as 'interface' and 'semiotics' research within the communication and electronics sector, which entered our lives in the 2000's, and then had the basic title of 'user experience research and design' in scientific studies, although it seems to be an upper subject heading independent of lean product development and design processes, it has formed the focal point, perhaps the cause-effect link, of the new product design flow that has become lean. When we examine the reasons for sustainable global companies in the automotive industry to start user experience studies or lean design processes; Competitive advantage, Economic growth or regional and global expansion, Customer loyalty, Creating and promoting main and sub-brands, Development of social responsibility projects, Productivity increase, Development of critical parts or research and development on the global axis, similar basic reasons are included in the literature (Liker, 2004; Morgan, and Liker, 2006; Paker, 2022). Therefore, user

DOI: 10.15320/ICONARP.2025.338

experience studies that have recently been introduced in different sectors under severe competition conditions, the sustainability of innovations in the automotive industry on a global basis at regional or company level (autonomous vehicle levels (0- 5) and country-based development), the implementation of lean product development and industrial design processes with the culture or success of leanizations have led to important comparative measurement and scale results (Levitt, 1965; Thomas, and Singh, 2006; Paker, 2022). Lean design process stages (design management), or the high efficiency, time or cost-oriented stage fiction in the design and development flow brought about by the lean culture and concept in company employees, has ultimately structured the current industrial design steps of the new product within the scope of new technology and new customer habits for the last twenty years. In other words, at each step or each design verification step in the lean product development and industrial design phases, user experience outputs with integrated impact on continuous improvement and defined test values or phase transition checklist are targeted as project outcomes (Levitt, 1965; Paker, 2020; Paker, 2022; Palacı, 2024). On the other hand, today, the implementation of industrial design stages based on lean and user experience research and design studies with a higher approach has revealed the ability to create or add value focused on user experience in the new product together with lean concepts in order to gain competitive advantage under different variables in the local or global market with the final, newly designed product. Considering the different variables in different regions under the aforementioned user experience studies, according to the data for the years 2020- 22, for which national automotive industry companies regularly share statistics, %38 of government-funded R&D projects are new automotive product or innovation process management activities (Palacı, 2024; Saraç, and Arslan, 2024). In addition, another output of the shared research is that %41 of government-funded R&D projects are marketing or organizational innovation management studies (Chiffi, et al., 2022; Duggan, et al., 2023; Palacı, 2024; Saraç, and Arslan, 2024). Therefore, the distribution of these variables in the total value of the research in the specified date range revealed %28.5 as organizational innovation management and %33.6 as innovation management in marketing (Chiffi, et al., 2022; Duggan, et al., 2023). The main reason for the inclusion of user experience studies or lean new product development and industrial design processes in automotive industry companies is defined as increasing profitability in a sustainable way with cost reduction in increasing values (Chiffi, et al., 2022). In addition, being able to offer online or offline services with new technology-equipped products or products, together with the simplification of all managerial processes in the organizational structure, has brought sustainable value creation to the forefront. In the aforementioned simplified automotive industry, it is revealed that the design goals and approaches in the focus of user experience studies in products,

workflow and managerial processes, global and local marketing, organizational structure and activities provide benefits by creating commercial value (Chiffi, et al., 2022; Brophy, et al., 2023; Eaton, et al., 2023). On the other hand, mergers, acquisitions, supply management in global brands and companies in the automotive industry, communization in supply channels and critical parts manufacturing or R&D, use of common platform structure in critical parts suitable for mass production such as motor chassis, similar main and sub-brand based mergers-partnerships-acquisitions, similar new approaches are also among the outputs of lean design management and leanizations (Law, et al., 2014; Chiffi, et al., 2022; Duggan, et al., 2023; Eaton, et al., 2023). In today' s new automotive industry products, new online and offline services designed according to increasing and diversifying user experience study outputs; new variables such as autonomy level, online service and security with remote access, energy economy (alternative fuels), basic life and personalized comfort habits (eating, drinking, sleeping, cleaning, communication, etc.), communicated road or fuel and parking areas, and similar new variables reveal their importance day by day within the scope of user experience studies in national and international economies. In this context, as of 2023, our country ranked 43 rd with 38.9 points among 138 countries in user experience research and design or innovation coefficient evaluation on a global scale (Chiffi, et al., 2022; Duggan, et al., 2023; Palacı, 2024; Saraç, and Arslan, 2024). On the same axis, automotive industry companies that design new products for the current life model and habits created by new technologies and high comfort standards have focused on the high competitive success brought about by the variables in the industrial design process stages revealed by user experience studies in order to achieve global profitability and international economic development. Therefore, customer habits formed by new products developed under highly competitive conditions, together with user experience-oriented online services in the global communication network, are at the center of the user experience study steps as the golden key of these industrial design stages. Under the same approach, user experience studies have become an inevitable function for the survival of leading automotive industry brands, where new product design technologies and new online services that come with new product design technologies determine high comfort standards and habits, along with sustainable simplification for local and global success (Paker, 2020; Paker, 2021; Paker, 2022).

As a result, this study aims to examine the user experience studies under lean product development and design processes and their main effects in the flow together with design and research and development center managers and employees in 220 automotive main and sub-industry companies that have implemented lean product development and industrial design processes within the national automotive industry companies that constitute the defined field research area. The lean

DOI: 10.15320/ICONARP.2025.338

processes in practice of national automotive main and sub-industry companies in the research area, which constitute the boundary conditions determined by the approach in question, and user experience studies on a global scale or factors affecting the basic design flow, new products or technologies and online service design models, reasons or resistance of the user and designer in the face of innovation were examined together with the employees involved in the in-depth research.

Therefore, the first research question is to define and cascade innovation targets with newly introduced user experience activities that can bring customer-oriented needs and demands to the forefront of highly efficient lean product development and design processes, revealing the need to optimize the entire process. The research method, which is appropriate for the purpose of the study, has been established under the aforementioned approach. Today, the rise in living standards, the increase in integrated comfort areas, individual instant communication and the instant change in needs and demands have led to the need to design the online-offline service fiction together with the new product. This need for new product design also defines new environmental technology needs. However, determining service design scenarios or scenarios generated by online-offline customer preferences requires new user experience research methods that focus on the use-user interface and customer needs in a service-user approach rather than lean product development processes with high engineering efficiency.

LITERATURE REVIEW

Liker (1998) and Womack (1996) compared the manufacturing and new product development functions of intercontinental global automotive industry firms (North American and Japanese Automotive Industry Firms) with a focus on productivity (Womack, et al., 1990; Womack, and Jones, 1996; Liker, 1998; Jones, and Womack, 2002; Liker, 2004). Along with "The machine that changed the world", in which the same researchers defined the concept of just-in-time production at the end of the 1980's, "Toyota's way; Lean product development and design processes", published in the second half of the 1990's and spread in the automotive industry in the 2000's, defined losses by measuring the methods of focusing on product innovations that the customer will pay for or achieving cost-oriented innovation (Womack, et al., 1990; Liker, 2004; Morgan, and Liker, 2006). In their joint research, Liker (2004) and Morgan (2006), while focusing on lean product development and industrial design processes, focused on two variables as productivity outputs; value creation or value addition on the new product, defining them separately in the study and comparing them in detail in all sections and stages of the article with a cross-continental firm focus (Liker, 2004; Morgan, and Liker, 2006). The study, which also included cultural habits, also clearly identified losses in value creation or value

addition on the final new product in fourteen consecutive steps in patterns based on industrial design processes and engineering phase transition tests or design verification steps. In another approach, these two function definitions, which constitute a consecutive intertwined whole belonging to the same researcher, together with the concept of leanizations in global automotive industry companies, revealing the global competition variables or effects of global competition variables or effects, market share and profitability results, and their use in different sectors, the commonality of different approaches as "lean design methods and repetitive structure in new product for sustainable commercial product success" (Mishra, 2022; Longaigh, et al., 2023; Ryan, et al., 2023; Trubetskaya, et al., 2023).

The secondary main heading within this framework brings and includes the design of new products and integrated online new services and technologies, the design of new or significantly improved communication technologies on the product, online and offline communication channels, sales, service or distribution, security, payment and delivery and similar innovations (Norman, 2009; Hokkanen, et al., 2015; Vukovac, et al., 2019; Lallemand, et al., 2015). In addition, in online and offline service-oriented product innovation; solutions developed to reduce unit quantity, security, procurement, delivery or logistics costs, to increase regional or global expansion, to design or deliver new or significantly improved product technologies are revealed as environmental variables outside the focus of the study subject of the literature research (Nielsen, 1993; Norman, 2009; Law, et al., 2014; Lallemand, et al., 2015). Therefore, sales or marketing innovation, which is the last two functions of the three-basic user experience study models in the literature; together with the industrial design approaches of the new product, packaging, product architecture or product positioning, product hierarchy-position-oriented sales channels, after-sales services, promotion, pricing, similar new sales, marketing techniques and methods are also included in the state-supported R&D incentives in our country. Customer orientation in the organizational structure within the four basic user experience methods defined in this section affects the organizational structure, regional or global structuring, manufacturing, marketing, sales and service channels and strategic approaches of the automotive industry or other manufacturing industry companies together with their commercial practices. Therefore, organizational structure and management under these user experience studies result in brand mergers, acquisitions, mass production of different brands or I&D and R&D centre's among today' s automotive industry companies.

RESEARCH METHOD

The current lean product development processes and customer-oriented design approaches used by the automotive main and sub-industry employees included in the field study of the research were

DOI: 10.15320/ICONARP.2025.338

calculated and analysed with a survey application under the statistical software model. While the first field study of the study was conducted with a questionnaire application, the second field study was conducted with face-to-face interviews with a quantitative approach. Therefore, the study conducted with the mixed research method was completed under the preference of quantitative face-to-face interview method in the in-depth questioning of the qualitative numerical data obtained by the questionnaire method. User experience activities, which are newer and less widespread than lean product development processes, have also revealed the frequency of project-based, customer-oriented design activities, along with the demographic organizational structure of the participating companies in the automotive industry, such as the age of establishment, number of employees, number of designers, etc. In the research; While the number of employees in automotive main and sub-industry companies, the age of the organization, and the techniques used in new projects constitute the fixed variables, the use of lean product development and user experience activities, preference for in-process or end-of-process work, the type of integration into the existing process, internal or external procurement of user experience studies, process setup and management support, the formation of new project objectives and the maintenance of in-process innovation objectives, the supply of qualified employees for user experience activities, customer demanded new technology investment, the impact of firms' financial resources and capital structure on the process, the impact of government support in new product development and design projects, new design and innovation promotion barriers and similar factors are considered as moving variables.

The boundaries chosen for the research, its limitations or its universe and the defined field are an important and decisive financial power for nations, which is periodically measured in international economic evaluations, together with heavy competition conditions in local and global dimensions.

In today's automotive industry, high comfort standards, redefined, updated and developed with the lean culture, have come to life by becoming lean under the new sustainable regulations of environment and energy resources together with the new life model. On the other hand, user-oriented innovations (autonomous driving and its levels (0-5)), artificial intelligence services (online and offline; route alternatives, self-parking, charging and other support services) in vehicles with or without drivers), the desire to increase the comfort of life in today's vehicle use, and the desire to increase the comfort of life in today's vehicle use, pioneering user experience-oriented concepts specific to the automotive sector, compared to other industries, are coming to the fore day by day. The second research question of the study is to determine customer-oriented demands and needs with sustainable methods together with new online-offline service technologies for product development-design under user experience-oriented inputs, especially

in the automotive industry; or to investigate in-depth efficiency. The most important intertwined difference between user experience research, which has recently been introduced in today's industries under heavy competition, and the concept of lean in automotive industry applications is to achieve lean in customer-oriented new product functions by identifying the value-creating and non-value-creating tasks in new product development and industrial design processes, and defining efficiency and optimization measurements guided by the priority map of the process. In addition, the revelation of some difficulties or obstacles in the user experience and design stages on the concept of simplification in terms of protecting or guiding sustainable values increases the innovation effect in the theoretical and practical projects that can be carried out in the future, as well as revealing the main purpose of the research. Therefore, the purpose of starting the research is to examine in depth the negative and positive effects of the factors affecting the user experience research or lean design process flow of the employees of the new product development and industrial design department of the company together with the operating age of the automotive industry companies in the defined comparison structure included in the research in terms of lean product development and design processes. In other words, the effect of the lean product development and industrial design processes that have been in operation for a long time in the automotive industry companies participating in the study has been revealed in terms of the presence of customer-oriented user experience research, which has recently started to be put into operation, in the defined or undefined flow steps, the high number of employees, the fiction or management of online-offline service technologies in new products.

The starting point of the method used in the study is the flow steps of the industrial design discipline, in the literature examined in terms of user experience research and design processes, it has been tested linearly that as the number of employees of the company increases in different sectors, the existing product and service design also increases the tendency to innovate or develop new technology with a competitive focus. On the other hand, under the concepts brought by lean product development processes to today's automotive industry, with customer and cost-oriented approaches or process optimizations in new product design, the answer to the research questions on user experience studies with similar variables had a positive effect. The answers given by the employees involved in the new product development and design processes in the national main and subsidiary automotive industry, the results of the second face-to-face field research, are analysed in detail in the findings section of the study, and their synthesis is presented in the same section. In the first field study where the boundaries of the research were determined, the size of the national automotive main and supplier industry companies, the age of the participating companies and the number of models in the product range or the main and supplier

DOI: 10.15320/ICONARP.2025.338

industry brand cooperation, the lean product development process examples in customer or user experience oriented applications and the effect or reverse effect of the effect or reverse effect, together with the functions with which it is cross-related, revealed equal or different results. Therefore, with this study, the reasons for the automotive main and sub-industry companies using lean product development processes to carry out user experience activities defined as customer-oriented (whether user experience research and design processes are used within or outside the lean product development stages or as a separate research process in an independent time interval) were determined; customer-oriented product range reduction or increase, customer-oriented product options reduction or increase, entering environmental sectors with customer-oriented products, customer-oriented online and offline service design and technology development, increasing new local or global market share, entering new local or global markets or creating new markets, meeting customer demands and needs, reducing or increasing production flexibility with the product, reducing or increasing production flexibility with the product, reducing customer-oriented product or production cost and increasing profit-income, reducing energy consumption or environmental damage, main or sub-branding, increasing brand dependency or brand awareness as the most important factors. In addition, in the research, while the number of employees, the age of the organization, the techniques used in new projects constitute the fixed variables in automotive main and sub-industry companies; while the use of lean product development and user experience activities, preference for in-process or end-of-process work, type of integration into the existing process, internal or external supply of user experience studies, process setup and management support, formation of new project targets and protection of in-process innovation targets, supply of qualified employees for user experience activities, customer demanded new technology investment, the effect of financial resources and capital structure of the firms on the process, the effect of government support in new product development and design projects, new design and innovation promotion barriers and similar factors are accepted as moving variables in the study. Resistance or support in user experience research and design processes, high risk of habituation of user experience study outputs in practice, high cost of customer-oriented demand and need costs or additional product functions, financial resource investment status of the organization in the establishment of user experience studies or sufficient capital, number of qualified employees for user experience research or experience acquisition period, integration of lean product development and industrial design processes according to user experience research outputs, preference of user experience working methods, customer involvement in new product design process or end-of-process testing, top management support or profitability impact on lean product development or user experience studies, impact of government

supported R&D and I&D incentives; are outcome-oriented variables that need to be measured and planned in the study.

MATERIALS AND DATA

The field study of the research was carried out by including lean product development (R&D) and industrial design (I&D) employees and company managers in the automotive main and sub-industry of the country. Therefore, along with the automotive main industry companies, supplier sub-industry companies that produce new parts and technology under common processes for brands in global product manufacturing are also included in the study. Regardless of the size and structure of the supplier companies in question and their cooperation structure, automotive supply industry companies were identified and visited by random sampling, and firstly, the questionnaire method and then face-to-face interview techniques were applied in the study area. Therefore, a two-stage field study was planned with 60 employees from 6 automotive main industry companies and 180 employees from 18 sub-industry companies, totalling 240 white-collar employees. In the first phase of fieldwork, the questionnaire method was used for quantitative measurements and assessments, while in the second part of the sequential fieldwork, one-on-one interview notes were used for in-depth synthesis of quantitative data. In other words, mixed research method was preferred in the study.

In the first field studies, before the questionnaire application, the participating automotive main and sub-industry employees were briefed on lean product development or design processes, as well as customer-oriented user experience research and design processes. Therefore, additional short repeated explanations were given for questions that were not understood during the questionnaire administration, and firms were revisited for employees who were not present in the firm. In addition, a total of 20 employees could not be included in the study due to 15 of them being pregnant, 3 of them taking annual leave and 2 of them working abroad. As a result, while 240 participants were planned for the field research of the study, a total of 220 employees participated. Quantitative and qualitative field data were collected in January, February and March 2022 in 24 automotive main and sub-industry companies with 220 questionnaires and face-to-face interviews with audio recordings. Additionally, a 5-point/ Likert-type scale was used in the survey conducted in the field study. On the other hand, in the one-on-one interviews after the successive questionnaire surveys, the lean and user experience research processes, the knowledge and impact level scales or co-different methods and innovation enhancing techniques related to the inclusion of user experience research in the lean product development flow or the implementation of user experience research in the start-finish timing, the demographic characteristics of the company and their training and tendencies related to the lean product development flow were archived

DOI: 10.15320/ICONARP.2025.338

under audio recording through one-on-one interviews. The reasons for lean or user experience management, strategy or new product design and customer-management resistance of automotive main and sub-industry companies are revealed by synthesizing the quantitative data obtained under the survey results and in the light of qualitative one-to-one interviews. In order to reach the findings of the research, SPSS 20.0 statistical data analysis program was used after the questionnaire application and the results were evaluated under the mathematical model. Therefore, in the aforementioned statistical studies, parametric tests, linear regression and t-test formations, frequency analyses were carried out within the study. However, in statistical calculations and test model results, it was observed that the distribution was not normal and it was revealed that the resulting value varied. The CA (Cronbach's Alpha) reliability coefficient in the statistical evaluation correlation of the questionnaire application, which constitutes the first field study, was calculated as 0.85, and the high result or evaluation of this value was included under the results that should be checked within the research findings. The dependent variable, which constitutes the main hypothesis of the research, is determined as the positive effect of user experience studies in lean product development processes on the final new design product, while the independent variable is fixed as the age of the automotive industry companies implementing lean product development processes and the number of employees in lean product development and industrial design processes. Therefore, the ratio of the variables determined in the study to the independent variables was modelled under the test and analysis structure within the hypothesis boundaries of the research. The reasons for including user experience research, which constitutes the first field study of the research, in the basic processes, survey application results and participant distributions are given below (Table 1).

Table 1. The reasons for automotive main and supplier industry companies to engage in user experience activities sub-lean product development processes.

	Discrete Variables: significant or insignificant	Strongly Disagree	Disagree	No Idea	Agree	Strongly Agree
1	Design of new technology for a new product or service	2	13	16	**33**	44
2	Common part design for the same or different product family	2	13	16	**33**	44
3	Design for Competition and Market Share	0	0	6	**35**	**67**
4	Lean Product Development- Design for Efficiency	0	4	4	**33**	**67**
5	UXr User Experience Studies	0	3	10	20	**75**
6	UXd Design for Customer Loyalty	8	17	25	27	31
7	Designing Critical Common Parts for the Supply Chain	4	13	19	24	48
8	Energy- Design for environmental protection	9	14	25	22	38
9	Design for Global-Local Market Expansion	18	15	8	10	57
10	Critical co-design for Master and Sub Brands	1	4	11	28	**64**
	Total	44	96	140	265	**535**

When the reasons for automotive main and sub-industry companies to perform user experience studies under lean product development processes are analysed, it is observed that each variable in the questionnaire is answered as “agree or strongly agree” for each participant. Therefore, when the questions in the questionnaire are evaluated according to the response rates, design for competition and market share (67+ 35) ranks first, while UXd- oriented studies for

customer loyalty, meeting their demands and needs (75+ 20 people), and the answer to the question of design for lean product development and efficiency is also marked as “strongly agree” for the majority of participants (67+ 33 people). The management's support for user experience research, which constitutes the independent variables of the study, and the participant distribution of the fixed variables were realized as can be seen in Table 2.

Table 2. Impact of user experience activities sub-lean product development and industrial design processes.

	Discrete Variables: significant or insignificant	Strongly Disagree	Disagree	No Idea	Agree	Strongly Agree
1	Lean product development and user experience studies are carried out in every project	26	26	44	52	**72**
2	User experience studies are outsourced as a service	**41**	**63**	70	34	12
3	User experience studies are part of the lean product development process	12	36	76	**62**	**34**
4	User experience studies are done before the lean product development process	8	8	58	**98**	**48**
5	The customer is involved in the user experience work process from start to finish	6	34	58	**68**	**54**
6	At the end of the user experience work process, the customer is included for testing	32	52	90	30	16
7	User experience studies are supported by company management	**82**	**58**	42	22	16
8	We have qualified employees from different disciplines for user experience studies	**42**	**60**	74	20	24
	Total	208	274	442	**352**	264

When the barriers or variables that positively affect the integration of user experience studies into lean product development processes are examined in Table 2; it is revealed that the participants (98+48) supported the highest “agree and strongly agree” to the question that user experience studies are done before the lean product development process. In addition, among the influence factors, the rate of customer involvement in the user experience work process from beginning to end (68+54) and user experience work is included in the lean product development process (62+34) constituted another high preferred influence rate (Table 2). The fact that the investment risk posed by the fixed variables in Table 2 is very high and that customers are included in the flow at the end of the process in terms of user experience research has created a moderate impact rate. Another important finding of the assessment is that senior management's support for user experience research is negative or predominantly in the form of “strongly disagree”.

DATA ANALYSIS

The fieldwork questions and the stratification of the moving variables supporting the main hypothesis of the research are correlated under the software results of the test application under the parametric (Chi-Square) model (Table 3). In other words, the analyses of the nonparametric test results are presented in Table 3 below (H1: There is a significant direct proportional relationship between the age of the automotive main and sub-industry company and the frequency of periodic user experience research).

DOI: 10.15320/ICONARP.2025.338

Table 3. The main link between the age of automotive main and supplier industry companies and the interval of conducting user experience research (Demographic Structure).

	Company Activity	User Experience Yes	User Experience No	Total	X2	sd	p
Operation Time of Automotive Company (years)	1- 5	30	10	40	6,251	4	0,181
	5- 10	28	34	62			
	10- 15	12	6	18			
	15- 20	24	12	32			
	20 +	42	18	60			
	Total	136	80	212			

AIC Age of Activity (Year)	User Experience Research Interval (Number of Projects/Year) 0	5	10	15	20	25
1- 5						
5- 10	Minumum					
10- 15						
15- 20						
20+	Maximum					

According to the results of the first field research survey, as seen in Table 3 above, a significant relationship is calculated under the statistical software model between the working age of the automotive main and sub-industry company and the frequency of project-based periodic realization of user experience studies under the statistical software model, as the p-value is greater than 0.05. While the rate of conducting user experience studies together with the lean product development process is calculated as 22% when the automotive companies participating in the field research have been operating for at least five years, the user experience research period increases to 35% with the lean product development process in organizations with increasing operating age or at least twenty years; again, the calculation result from the same statistical mathematical model. Looking at the general calculation results of the statistical software model, it is another important study finding that 63% of the companies included in the research carried out user experience studies and design together with lean product development. On the other hand, in the secondary research question supporting the research hypothesis; H2: There is a significant relationship between the number of employees in automotive main and sub-industry companies and the rate-period of realizing lean product development process and user experience studies. Since a graded structure was established between the fixed variables of the research, nonparametric tests or Chi-Square test structure was applied. The calculations and findings regarding this test structure are presented in Table 4 below.

Table 4. The relationship between the number of employees in the automotive main and sub-industry companies and the frequency of conducting user experience research.

	Industrial Designer	User Experience Activity		Total	X2	sd	p
		Yes	No				
Employees of Automotive Companies (Main and Supply)	1- 25	18	26	44	24,380	4	0,005
	25- 50	42	**44**	86			
	50- 75	**22**	10	32			
	75- 100	**16**	0	16			
	100 +	**38**	0	38			
	Total	**136**	80	216			

Company Employees (R&D Person)	Ratio of Number of Employees to Frequency of User Experience Studies					
	0	1	2	3	4	5
10- 100						
100- 500	Minumum					
500- 1.000						
1.000- 1.500						
1.500- Over	Maximum					

Although the frequency of user experience study and design increases in direct proportion to the employee population in each of the automotive main and sub-industry companies participating in the research, it is among the main findings of the study that it provides a positive significant relationship and effect calculated under the statistical software model (Table 4). On the other hand, it was determined that the high number of employees in each of the automotive main industry companies included in the research positively affected the frequency of performing user experience studies and risk mitigation from the independent variables. While the rate of user experience studies and design of organizations with two hundred and fifty or more employees in the automotive supply industry companies in the field study was calculated with a rate of 27%, the rate of performing user experience activities in the automotive supply industry companies with a lower number of employees between 10 and 250 people was calculated under the statistical model to be 30% and below (Table 4). Nevertheless, as the number of employees of the automotive main and sub-industry companies, which mainly participated in the research under the statistical model, increased, user experience activities and studies increased, and therefore customer-oriented design and approaches may also increase.

FINDINGS AND DISCUSSION

Kindly Findings Product-dependent service design or customer-oriented approaches that spread with the new product, the design goals of online-offline service technologies pass through the fiction of user experience studies. Lean product development flow and process optimization, which provide process efficiency together with customer-oriented approaches in the development of today's automotive industry products, ensure the protection and continuity of project design goals under time and cost gains. With this efficiency, customer demands and needs remain secondary, creating significant risk factors in the commercial success of the new product. On the other hand, the most

DOI: 10.15320/ICONARP.2025.338

important recommendation of the study is that the basic process will benefit positively by including user experience activities, which are the most important application of customer-oriented design approaches, into the highly efficient lean product development flow. The step-by-step addition of customer-user-oriented design goals to the lean product development process flow, determining, updating and controlling the impact, and getting support from user experience research for similar functions are explained at every stage of the study. User experience activities and new product design processes, which came to life in the communication technologies sector and continue their journey in today's pioneering automotive sector, are an important development for customer-oriented approaches included in scientific, theoretical and practical study outputs.

The distribution of the number of employees in the automotive main and sub-industry companies participating in the research is given in Table 5 below. Therefore, when the ratios in Table 5 are analysed, it is seen that 39.8% of the employees of the automotive supply industry companies have between 100 and 500 employees. On the other hand, only 17.6% of the automotive companies in the field study have 1500 employees or more (Table 5). The automotive main industry companies constitute the majority of this ratio.

Table 5. Number of employees in automotive main and sub-industry companies (persons-experience).

Number of Employees in Automotive Company (Person)	N	%
10- 100	220	20,4
100- 500	*430	39,8
500- 1000	160	14,8
1.000– 1.500	80	7,4
1.500- Over	190	17,6
total	1.080	100
*mod	24	

Number of Company R&D Employees	Ratio of Number of Automotive Company Employees to User Experience Studies					
	0	1	2	3	4	5
10- 100						
100- 500						
500- 1000						
1.000– 1.500						
1.500- Over						

During the interviews with newly established organizations, which constitute the lowest values between the age and number of employees of the automotive industry companies in Table 5, the importance of customer-oriented approaches and the information that their participation in the company will be established as soon as possible are indicators of the high benefit of the issue by the sector. In Table 6 below, the distribution between the installation age of the automotive main and sub-industry companies participating in the research and the frequency of user experience is calculated. When the automotive industry companies are analysed according to the duration of their activities in Table 6, it is observed that the companies with the oldest installations have a high frequency of user experience; however, it is a field observation that companies with new installations have also implemented user experience studies through outsourcing.

Table 6. Age of automotive main and sub-industry companies (years-experience).

Age of Automotive Companies (years)	N	%
1-5	200	18,5
5-10	310	**28,7**
10-15	90	8,3
15-20	180	16,7
20- Over	300	**27,8**
total	1080	100
*mod		

Age of Automotive Companies (years)	User Experience Study Frequency of Automotive Industry Companies				
	0	10	20	30	40
1- 5					
5- 10					
10- 15					
15– 20					
20- Over					

While the automotive main and sub-industry companies participating in the research are predominantly composed of enterprises with 5-10 years of establishment with a rate of 28.7%, it is revealed that the year of operation of the most intensive enterprises that we encounter most frequently in the secondary value is organizations with an establishment age of more than 20 years with a rate of 27.8% (Table 6). Therefore, the proportion of the oldest automotive main and sub-industry companies with an establishment age of 5-10 years is above half of the total number of organizations participating in the research. In addition, the statistical development of the last ten years of "patent, utility model and design registration" applications and registrations obtained from the information registered in the database of the Turkish Patent and Trademark Office was examined (Table 7).

Table 7. Development of patents, utility models and design registrations of local automotive main and sub-industry companies (Saraç, 2024; Palacı, 2024).

Development of Design Registration Year in Automotie Companies									
Year		2015	2016	2017	2018	2019	2020	2021	2022	2023
Number of applications	F.K:12-18	10	0	20	20	20	40	40	70	90
Development of Patent Application Year in Automotive Companies										
Year		2015	2016	2017	2018	2019	2020	2021	2022	2023
Number of applications	F.K:12-18	0	0	0	0	0	0	10	10	50
Development of Utility Model Registration Year in Automotive Companies										
Year		2015	2016	2017	2018	2019	2020	2021	2022	2023
Number of applications	F.K:12-18	20	20	40	10	40	50	20	60	50

In Table 7, according to the patent, utility model, industrial design registration and application tables made to the Turkish Patent and Trademark Office every year, which are officially directed by the Ministry of Science, Industry and Technology, the number of design registration applications across Turkey (2016) shows an increase every year, while utility model applications fluctuate with ups and downs (Saraç, 2024; Palacı, 2024). Therefore, it is seen in Table 7 that the registration applications in terms of intellectual, industrial and property rights in the automotive industry are not sufficient and at the desired level. However, although the international product class of automotive industry products is defined as 12 and 18, the international product

DOI: 10.15320/ICONARP.2025.338

codes of iron and steel industry products or different sector classes are not included in the research.

Since our country is also an important production and assembly center in the European and global automotive sector, this research suggests that the way to increase the national economic return is to improve global and local sales-marketing strategies or conditions and to transform into larger organizations that manufacture and assemble in different countries through user experience research and similar customer-oriented studies. However, another study suggestion is that national R&D and investment incentives are not sufficiently utilized, and that more emphasis should be placed on customer-oriented approaches or user experience studies for the design of high value-added products brought about by high global competition in automotive industry products.

In the second field research, which progressed linearly with the results of the first field research, it was found that almost all of the automotive industry companies are motivated to carry out customer-oriented approaches or user experience study and design activities. The fact that the issue is known by the companies included in the study or that it is important for the continuity of the company has facilitated the study. Therefore, the companies that participated in the research strengthened the observation part and the final findings of the study by sharing information, documents and ongoing projects and samples due to the content, benefits and importance of the subject. In addition, as seen in Table 7 above, it is observed that patent and design registrations have increased positively over the years and are in an upward trend.

RESULTS AND CONCLUSION

Under the statistical mathematical model, a constant proportion, a significant relationship was found between the number of employees in the automotive industry companies in the first research question supporting the main hypothesis of the research and the rate of realization of customer-oriented approaches or user experience activities. Therefore, a positive and positive effect was calculated between the number of employees in automotive industry companies and the frequency of customer-oriented approaches or user experience activities. According to the general characteristics of automotive industry firms such as the ratio of white and blue-collar employees or years of employment, employee profile, product sales ratios, market share, ownership structure of the organization, etc., which constitute the initial information and preferences of the study; the results of previous researches have given variable results under the established mathematical model. In the research conducted in the national automotive industry, it has been observed that organizations with an establishment age of more than 10 years and companies with an establishment age of more than 20 years have more customer-oriented design approaches, where the interval between user experience design

and activities is more frequent. The different perspective brought by the same approach results in an increase in the number of employees involved in lean product development and design processes, thus increasing customer-oriented evaluations in stage transitions and increasing functional specialization and cooperation structure between departments. This is considered to have a positive impact on the diffusion success of customer-oriented design approaches. Nevertheless, the success in the implementation of customer-oriented design or user experience activities in old companies that new entrants to the automotive industry can take as a model, and the positive or negative aspects of the process flow in their preferred method, may bring the company's mobility to be more flexible and faster in the future, and thus competitive and market success.

Suggestions at the micro and macro level for this study to be carried out by different researchers or renewed research topic brought about by this approach: the relationship of existing process stages with innovation, the impact of user experience activities provided internally and externally, the efficiency comparison of customer-oriented design approaches, creating a comparison model between two different regions, more comprehensive research by expanding similar variables and more different results may reveal. Therefore, the user experience research and design activities or customer-oriented design approach levels of automotive industry companies' independent of lean product development and design processes can be examined more comprehensively. Ultimately, this research will serve as a guide for companies that are keen on a customer-centred design approach and want to set up user experience activities, and will provide guidance on the customer's preferred goal and reason for innovation or the barriers they will face. Based on the research results obtained with the employees of automotive industry companies, organizations can easily make rational decisions about new investments in new design. The findings obtained from the survey, which is the first field study of the research, suggest and present a decision-making model for companies planning customer-oriented new design and customer-oriented redesign of existing products. Customer-oriented design capability, especially in leaner automotive industry companies, the benefit of user experience study and design activities is recommended in organizations in order to achieve high profit margins in local or global markets or to create new markets. Along with new product design, service design is of great importance in increasing online-offline technologies, increasing service efficiency and commercial success and profitability of companies with products, user experience activities and formation fiction, process integration. It has become an inevitable necessity for the global competitiveness and profitability in the automotive industry to be built in sustainable values and variables, together with the user experience-oriented new product that forms customer preferences, together with

DOI: 10.15320/ICONARP.2025.338

the user experience-oriented design of online-offline service design, under lean processes, in today's industrial organizations.

REFERENCES

Brophy, P., Trubetskaya, A., and McDermott, O. (2023). Implementing a customised lean six sigma methodology at a compound animal feed manufacturer in Ireland. *International Journal of Lean Six Sigma, 14(5),* 1075-1095. https://doi.org/10.1108/IJLSS-08-2022-0169

Duggan, J., Cormican, K., McDermott, O. (2023). Lean implementation: analysis of individual level factors in a biopharmaceutical organisation. *International Journal of Six Sigma, 14(2),* 309–334. https://doi.org/10.1108/IJLSS-10-2021-0184

Chiffi, D., Moroni, S., & Zanetti, L. (2022). Types of technological innovation in the face of uncertainty. *Springer, Philosophy & Technology, 35(4),* 1-17. https://doi.org/10.1007/s13347-022-00587-3

Eaton, R., Noonan, J., and McDermott, O. (2023). Enhancement of a data management system using design for lean six-sigma, lean, green and sustainability. *Advances in Information and Communication Technology. Springer International Publishing, Switzerland, 668(1),* 297-306. https://doi.org/10.1007/978-3-031-25741-4_25

Hokkanen, L., Väänänen- Vainio-Mattila, K. (2015, May 25-29). UX work in startups: current practices and future needs, in: agile processes in software engineering and extreme programming. *Springer International Publishing, Switzerland, 16(1*), 81–92. https://doi.org/10.1007/978-3-319-18612-2_7

Jones, D. T., and Womack, J. P. (2002). *Seeing the whole, mapping the extended value stream.* Lean Enterprise Institute Press, U.S.

Lallemand, C., Gronier, G., & Koenig, V. (2015). User experience: a concept without consensus? Exploring practitioner's perspectives through an international survey. *Computers in Human Behavior, 43(1),* 35-48. https://doi.org/10.1016/j.chb.2014.10.048

Law, E. L. C., Van Schaik, P., Roto, V. (2014). Attitudes towards user experience (UX) measurement. *International Journal Human-Computer Studies, 72(6),* 526–541. https://doi.org/10.1016/j.ijhcs.2013.09.006

Levitt, T. (1965). Exploit the product life cycle. *Harvard Business Review, 43*, 81–94. https://hbsp.harvard.edu/product/65608-PDF-ENG

Liker, J. K. (1998). *Becoming lean, productivity.* Productivity Press, U.S. https://doi.org/10.4324/9780367805111

Liker, J. K. (2004). *The Toyota way: 14 management principles from the world's greatest manufacturer.* McGraw-Hill Press, U.S.

Longaigh, B., Noonan, J., Trubetskaya, A., and McDermott, O. (2023). Strategic facility and space planning utilising design for lean six-sigma. *International Journal of Sustainable Engineering, 16(1)*, 1-13. https://doi.org/10.1036/0071392319 alphabetically.

Mishra, M. N. (2022). Identify critical success factors to implement integrated green and Lean Six Sigma. *International Journal of Lean Six Sigma, 13(4),* 765-777. https://doi.org/10.1108/IJLSS-07-2017-0076

Morgan, J. M., & Liker, J. K. (2006). *The Toyota product development system: Integrating people, processes, and technology.* Productivity Press, U.S. https://doi.org/10.4324/9781482293746

Norman, D. (2009). *The design of future things*. Basic Books Press, U.S.

Nielsen, J. (1993). *Usability engineering*. Morgan Kaufmann Academic Press, U.S.

Paker, F. A. (2020). The “static” and “dynamic” design verification stages of the lean development process: automotive industry. *World Journal of Engineering and Technology, 8(1),* 74-91. https://doi.org/10.4236/wjet.2020.81008

Paker, F. A. (2021). Lean product development process with design verification stages in the value stream of automotive industry. *Journal of Transportation Technologies, 11(1)*, 37-60. https://doi.org/10.4236/jtts.2021.111003

Paker, F. A. (2022). Autonomous vehicle design in lean product development processes for value stream map. *Journal of Transportation Technologies, 12(1),* 744-777. https://doi.org/10.4236/jtts.2022.124043

Palacı, M. (2024). *Yeni ürün geliştirme sürecinde pazarlama ile finans ve ar-ge etkileşiminin işletmelerin sürdürülebilir rekabet üstünlüğüne etkisi: ar-ge merkezli işletmeler üzerine bir araştırma* (Publication No. 41962) [Doctoral dissertation, Uludag University, Bursa, Turkey]. ProQuest Dissertations and Theses Global. https://hdl.handle.net/11452/41962

Ryan, A., McDermott, O., and Trubetskaya, A. (2023). Application of design for lean six-sigma to strategic space management. *The TQM Journal, 35(9),* 42-58. https://doi.org/10.1108/TQM-11-2022-0328

Saraç, H., & Arslan, E. (2024). How does r&d expenditure affect employment and growth? Understanding the impact of sectoral r&d expenditures: The case of Turkey. *Fiscaoeconomia, 8(2),* 779-806. https://doi.org/10.25295/fsecon.1432766

Thomas, M., & Singh, N. (2006). Design for lean six sigma (DFLSS): philosophy, tools, potential and deployment challenges in automotive product development (No. 2006-01-0503*). SAE Technical Paper, 1,* 1-503. https://doi.org/10.4271/2006-01-0503

Trubetskaya, A., McDermott, O., and Ryan, A. (2023). Application of design for lean six-sigma to strategic space management. *The TQM Journal, 35(9),* 42-58. https://doi.org/10.1108/TQM-11-2022-0328

Vukovac, P. D., Džeko, M., Stapić, Z., & Orehovački, T. (2019). User experience design and architecture of IoT ecosystem employed in student’s activities tracking. *Advances in Intelligent Systems and Computing Journal, Springer International Publishing, 777(1),* 440-452. https://doi.org/10.1007/978-3-319-94706-8_48

Womack, J. P., Jones, D. T., & Roos, D. (1990). *The machine that changed the world*. MacMillan Press, U.S.

Womack, J. P., & Jones, D. T. (1996). *Lean thinking*. Simon and Schuster Press, U.S.

Resume

Fuat Ali Paker is a assistant professor in the Industrial Design, Department of the Konya Technical University, Konya, Turkey. He graduated from the Industrial Design Department of the Mimar Sinan University in 1995. He completed his master’s studies in the Industrial Design Department of the Mimar Sinan University in 2007. He got his Ph.D. degree from the Industrial Design Department of the Istanbul Technical University in 2019. He has attended several national and international congresses; summer schools and workshops related to industrial design process of the autonomous vehicle and automotive design. He has written 2 books and more than 20 papers on UXr, automotive design process and lean-new product development system. He worked as a design researcher or project manager in many national and institutional or company projects. He has awards about vehicle design, new product development and design management.

DOI: 10.15320/ICONARP.2025.338

ICONARP
International Journal of Architecture and Planning
Received: 04.07.2025 Accepted: 20.12.2025
Volume 13, Issue 2/ Published: 31.12.2025
Research Article *DOI: 10.15320/ICONARP.2025.339 E- ISSN:2147-9380*
ICONARP

Evaluating the Impact of Spatial Design on Users in Adaptive Reuse Projects: The Case of the Karapınar Grain Warehouse

Hatice Çınar*

Abstract

The preservation and use of historic buildings as immovable cultural heritage are important for the continuity of a building's life. When assigning a new function to buildings beyond their original use, meeting the needs of the city and the public, as well as ensuring socio-cultural and economic sustainability, are important considerations for selecting an appropriate function. When the integration of the new function with the existing building is successful, user satisfaction and the sustainability of the function yield positive outcomes. Based on this, in this study, which investigates the impact of spatial design on users through the adaptive reuse of an immovable cultural asset, the historic grain warehouse located in the center of Konya, Karapınar District, currently serving with a 'book-café' function, was selected as the field study. The aim of the study is to analyze the new function of the warehouse building functionally and physically through spatial analysis criteria and user opinions. In this context, users' experiences were evaluated holistically within the framework of spatial analysis criteria using semi-structured interviews, one of the qualitative research methods. The findings of the study reveal that the adaptively reused building largely meets user expectations in architectural, technical, and environmental terms. It was determined that the building increases its symbolic value in the region, compensates for the lack of social spaces, that interior identity and the feeling the space leaves on individuals are important for users, and that thermal comfort has a direct effect on the duration of users' stay in the space. However, the insufficient perception of the historical identity in the user experience indicates that the historical context should be more effectively integrated into the design in such adaptive reuse projects.

Keywords:
Adaptive reuse, Karapınar Grain Warehouse, Semi-structured interview, Spatial analysis

*Department of Interior Architecture, Faculty of Architecture and Design, Selcuk University, Konya, Türkiye
Email: haticecinar@selcuk.edu.tr

To cite this article: Çınar, H. (2025). Evaluating the Impact of Spatial Design on Users in Adaptive Reuse Projects: The Case of the Karapınar Grain Warehouse. *ICONARP International Journal of Architecture and Planning,* 13 (2), page numbers. 645-664 DOI: 10.15320/ICONARP.2025.339

INTRODUCTION

Contemporary urbanization has brought about identity-less and unplanned developments along with environmental problems. Nevertheless, historic buildings that continue to exist in cities are among the fundamental elements of urban identity. Over time, these buildings, which lose their functions, often fail to adapt to changing socio-cultural and physical conditions. However, the contemporary conservation approach aims to preserve the architectural, aesthetic, and cultural characteristics of these buildings while transferring their original identities to the future (Yalaz and Yaldız, 2020).

Within the scope of the study, the adaptive reuse process of the historic grain warehouse located in Karapınar was examined, and the spatial effects of the building on users were analysed. The reason for selecting the Karapınar Grain Warehouse is that the Karapınar district has a significant agricultural identity within the Konya Plain and is historically located on the Silk Road route. Grain warehouses are important examples of rural industrial heritage in Anatolia, reflecting production and storage processes in rural contexts. However, in the literature, these structures are generally discussed through large-scale examples in urban settings, while small-scale examples located in rural areas are limited. In this respect, the Karapınar Grain Warehouse adds originality to the study by addressing adaptive reuse and user experience together within a rural context.

A qualitative research method was adopted as the research methodology. In this context, it was aimed to evaluate the Karapınar Grain Warehouse, which was determined as the study material, functionally and physically through spatial analysis criteria and user opinions within the framework of its new function as a book-café. Through the analyses conducted, it is anticipated that user satisfaction increases when the integration of the new function with the building is achieved. As the research design, a case study, which is among qualitative methods, was adopted. This design was considered appropriate to analyse the warehouse building from a user-centered perspective within the context of its new function as a book-café and to evaluate the extent to which the building's place in memory is compatible with its current condition. Within the scope of the study, purposive sampling was preferred to obtain in-depth data. Interviews were conducted with a sample group of 10 participants selected from among book-café users. In this context, both observation and semi-structured interviews were used as data collection tools. Spatial analysis criteria were structured under four main headings: historical, environmental, architectural/spatial, and structural technical factors. The findings obtained through the qualitative data collection process were evaluated using content analysis and were systematically analysed and presented through MAXQDA software.

DOI:10.15320/ICONARP.2025.339

LITERATURE REVIEW

The concept of adaptive reuse is important for sustaining and preserving historic buildings that have entered a process of deterioration over time in accordance with contemporary conditions. Such buildings may lose their originality due to reasons such as physical deterioration or the inability to respond to the needs of the era (Erkovan Yılmaz, 2022). Historical buildings are subject to effects such as functional obsolescence, structural wear and tear, and technological advancements over time (Sungur, 2024). For this reason, national and international standards for conservation have been developed to ensure the sustainability of these buildings. Among the most important of these are the 1931 Athens Conference and the 1964 Venice Charter (Erder, 1977).

The concept of adaptive reuse has been associated with several important turning points in international conservation since the Venice Charter up to the present day (Özçakır, 2024). The first of these is the Appleton Charter for the Protection and Enhancement of the Built Environment published in 1983, which emphasizes the importance of assigning an appropriate function to a building with minimal intervention in cases where its original function cannot be sustained. The Charter for the Conservation of Historic Towns and Urban Areas (Washington Charter, 1987) highlight the necessity of respecting the integration of scale and plot size with the existing spatial order during the adaptation of historic buildings. In the Charter on the Built Vernacular Heritage (1999), it is argued that reuse processes should respect the integrity, character, and form of the building while adapting it to contemporary living standards. The ICOMOS–IFLA Principles Concerning Rural Landscapes as Heritage (2017) recommend the development of long-term management strategies for adaptive transformation in rural landscape areas. The ICOMOS Guidance on Fortifications and Military Heritage (2021) provides comprehensive recommendations in terms of accessibility. The most recent document on adaptive reuse, the International ICOMOS Charter for Cultural Heritage Tourism published in 2022, addresses issues of transformation and adaptation within a more comprehensive framework. This charter emphasizes that, through adaptive reuse and cultural heritage tourism, it is possible to enhance the adaptive capacities of communities and contribute to the creation of more resilient and adaptive communities in the face of disasters (Özçakır, 2024). At the national level, the legal framework for the protection of cultural heritage in Türkiye is defined by Law No. 2863 on the Conservation of Cultural and Natural Assets. According to the legislation, it is emphasized that the original qualities of registered buildings should be preserved and that these buildings should be integrated into social life through contemporary uses (Law No. 2863 on the Conservation of Cultural and Natural Assets, 1983). In the Venice Charter, the long-term conservation of monuments is emphasized, while in the ICOMOS Charter on the Built Vernacular

Heritage (1999), principles of integrity in the adaptation of traditional buildings to new functions are highlighted (Ahunbay, 2017).

Adaptive reuse aims not only to preserve a building but also to reintegrate it into society, thereby ensuring its sustainability (Aydın & Yaldız, 2010; Aydın & Okuyucu, 2009). According to Kuban (2000), the process of adaptive reuse differs from traditional interventions, because assigning a new function to a building means incorporating it into a new architectural design process. Therefore, adaptive reuse should also be regarded as a social responsibility (Kılıç, 2015). For this reason, this process requires a multidimensional design approach that is socio-cultural and technical in nature.

In recent years, the scope of architectural heritage has expanded, and industrial buildings have also been considered among the cultural assets that require conservation (Şekerci & Akıner, 2021). Adaptive reuse projects revitalize the historical and cultural values of these structures and provide social benefits (Lewis, 2013). Kuban (2000) emphasizes that historic buildings gain value through transformations over time, highlighting that a building becomes enriched with different cultural layers from different periods.

For a structure to be sustainable, it must be reusable or convertible (Şen, Kaya & Alpaslan, 2018). In an architectural context, sustainability aims to meet spatial needs without disrupting the natural balance (Sev, 2009). In this context, the ecological, economic, social, and cultural dimensions of structures must be considered. Additionally, principles such as energy efficiency should also be evaluated during the design process for historical structures (Çelebi et al., 2008). The principle of sustainability requires that the historical environment be planned in accordance with today's needs while ensuring its active use (Kuban, 2000). Integrating cultural heritage into daily life, ensuring its economic contribution, and passing it on to future generations are also fundamental objectives of this process (Kuşçuoğlu & Taş, 2017). The sustainability approach, based on continuous development, is considered an effective strategy for improving and repurposing historical structures (Bullen, 2011).

In conclusion, the conservation of historic buildings is important for the continuity of cultural heritage. Adaptive reuse contributes to architectural, cultural, social, and economic values by enabling these structures to integrate with contemporary life. When adaptive reuse projects and practices in Türkiye are examined, a rich variety of examples can be found across different cities and periods. Notable examples in Istanbul include the Kasımpaşa Salt Warehouse (DDB Salt Warehouse), the Hasanpaşa Gasworks (Müzegazhane), and the Terkos Pump Station (Istanbul Water Civilizations Museum), which received the National Architecture Award in the Conservation–Sustenance category under the Building Branch. Similarly, in Konya, adaptively reused structures such as the Tantavi Warehouse (Tantavi Culture and Art Center) and the Historic Tekel Building (Depot No. 4), which possess

DOI:10.15320/ICONARP.2025.339

railway industrial heritage value, stand out as significant examples that have recently been reintegrated into urban life.

METHODOLOGY AND METHODS

Adaptive reuse projects require a multifaceted examination of aspects such as the building's physical condition, cultural memory, and sustainability. These elements need to be investigated in detail from a user-centered perspective. Therefore, a qualitative research method was preferred within the scope of the study. The qualitative research method helps to gain an in-depth understanding of individuals' evaluations on a particular subject (Creswell, 2013, p. 48). Within the scope of this study, it was aimed to evaluate the spatial analysis criteria of the adaptively reused building and its new function based on user opinions. It was anticipated that ensuring the compatibility of the new function with the building would increase user satisfaction and contribute to socio-cultural sustainability.

In the study, the case study design was used as a qualitative research method. According to Creswell (2013), a case study is the holistic examination of real-life phenomena within a specific context through multiple data sources. Within the scope of the study, the user-centred analysis of the Karapınar Book Café and the place of the building in historical memory were evaluated holistically. The building was analysed within the framework of the research problem based on the participants' perspectives. Below, the research area, sample group, data collection, analysis process, and findings are presented respectively.

Research Site

Karapınar District is a rural settlement located to the east of Konya, standing out with agriculture and animal husbandry. The historical grain warehouse located in the district was constructed by the Turkish Grain Board (TMO) in the 1950s. This structure shares common characteristics with similar buildings constructed throughout Türkiye by the TMO or cooperatives between 1950 and 1980. As one of the important examples of Anatolian rural industrial heritage, the building was formerly used as a grain warehouse in Karapınar. The building is in the centre of Karapınar, on İnönü Street in the Hankapı Neighborhood. In its immediate surroundings, there are important public buildings such as the Karapınar Government House, the City Hall, and the Karapınar District Governorship (Figure 1).

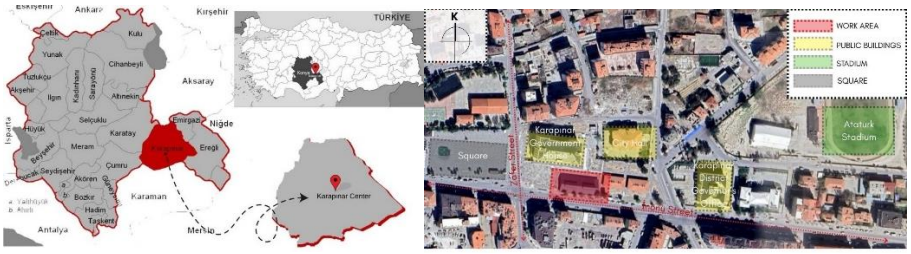


Figure 1. Location and immediate surroundings analysis of the study area (Google maps, edited by the author).

The structure is notable for its traditional load-bearing masonry walls built with local stone, the use of stone-brick combinations, and wooden window and door frames. During the restoration process, later-added concrete elements were removed, revealing the original stone texture. The rectangular, single-story building features a spacious interior and a hipped metal roof, with clerestory windows allowing for natural light and ventilation. The large wooden entrance doors were used for transporting goods (Figure 2).

Figure 2. The Karapınar Grain Warehouse before restoration (Konya Metropolitan Municipality archive).

This historic building, which had gradually lost its function over time, was taken into a restoration process by Konya Metropolitan Municipality in 2020. Within the scope of the restoration, the stone walls were cleaned using pressurized water and chemical treatments. The plaster layers were removed to reveal the original stone texture. Damaged roof elements were renewed using materials like the originals, and the roof lantern was preserved. In the interior, the symmetrical flooring layout was maintained, and the floor was finished with traditional patterned ceramic tiles. Window and door frames were also renewed using wooden materials (Figure 3).

Figure 3. Restoration process of the Karapınar Grain Warehouse (Konya Metropolitan Municipality archive).

DOI:10.15320/ICONARP.2025.339

The building, which was opened to the public in 2022 as a "Book Café," has been reintegrated into the Karapınar district with its public space character. The building was designed with an open-plan layout within an enclosed area of 800 square meters (Figure 4).

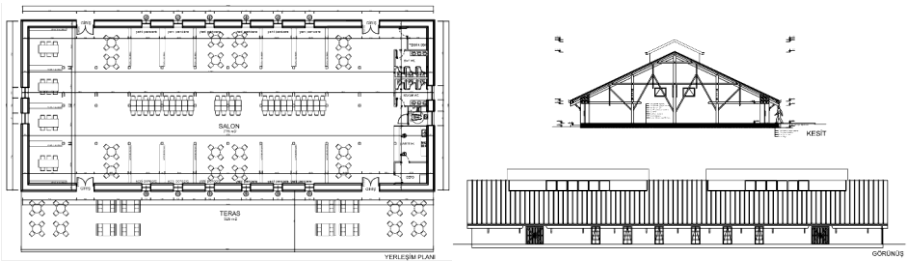


Figure 4. Site plan, section, and elevation drawings of the Karapınar Grain Warehouse (Konya Metropolitan Municipality archive).

With its new function, the building aims to provide an environment where especially young people can study and socialize. The Karapınar Book Café was conceived as a space intended to enhance reading habits and foster a sense of cultural sharing among young people (Figures 5).

Figure 5. The Karapınar Grain Warehouse after the completion of restoration (Personal archive).

Sampling

In qualitative research, data are obtained through appropriate tools from individuals who have directly experienced the subject or the problem (Creswell, 2013, p. 45). In this study, data was gathered from a sample group consisting of Book Café users. Sampling in qualitative studies is often carried out using probability-based or purposive strategies (Yıldırım & Şimşek, 2021). According to Creswell (2014), purposive sampling involves the intentional selection of participants based on specific criteria that allow for a variety of perspectives related to the research problem. Accordingly, purposive sampling was used to allow for in-depth analysis.

Since qualitative research is mostly based on observations and interviews, it does not require large samples, because after a certain point the data begins to repeat (Morse, 2016; Shenton, 2004). Moreover,

this facilitates a more detailed examination of the sample (Baltacı, 2019, p. 373). A pilot study was first conducted with three participants, after which a sample of ten individuals was selected from among Book Café users based on criteria such as educational background, profession, visit frequency, and purpose of visit. The participants' educational and occupational data are presented in Figure 6.

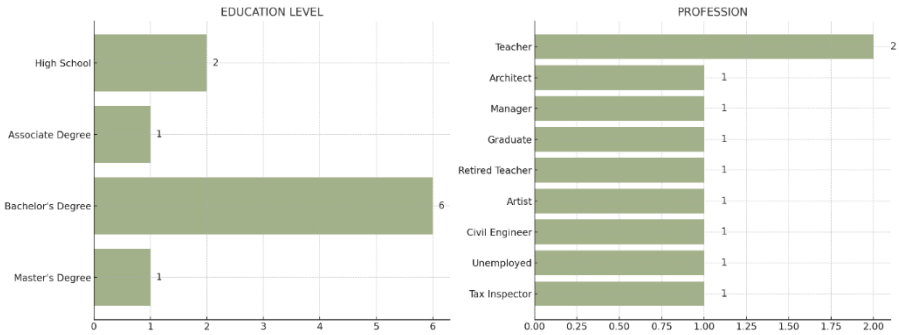


Figure 6. General data of the sample group.

In Figure 6, it is observed that most participants have a higher education level and that there is diversity in terms of occupational groups. Data regarding the participants' reason for visit, duration of visit, and frequency of visit are presented in Figure 7.

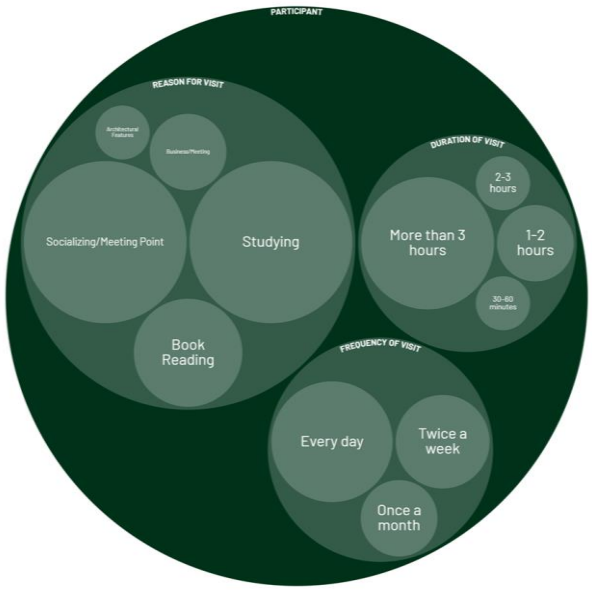


Figure 7. Visit data of the sample group.

According to Figure 7, the most important reason for participants' visits to the building are socializing/meeting, studying, and reading books. These findings indicate that the building functionally responds to a wide range of needs. The fact that participants spend long periods of time in space suggests that the building provides a positive level of comfort. Moreover, the data on the frequency of visits indicates that participants use the building daily.

DOI:10.15320/ICONARP.2025.339

Data Collection

In qualitative research, the data collection process develops in stages (Creswell, 2013, p. 146). In this process, methods such as observation, structured and semi-structured interviews, focus group studies, and text analyses are used (Forrester & Sullivan, 2018). Researchers employ multiple methods to increase data validity and reliability (Baltacı, 2019, p. 374). Within the scope of this study, observation and interview techniques were applied together.

Observation is a data collection method used to examine participants' behaviors or to understand the scope of the subject (Baltacı, 2019; Bengtsson, 2016; Merriam & Grenier, 2019; Crabtree & Miller, 1999; Fossey et al., 2002). Types of observation vary as participant, non-participant, and covert. In participant observation, the researcher is involved in the process. In non-participant observation, the researcher observes the process from the outside (Baltacı, 2019; Golafshani, 2003; Morse, 2016; Patton, 1990; Seidman, 2006; Strauss & Corbin, 1990). This type of observation enables an in-depth understanding of behaviors by observing them from within (Yıldırım & Şimşek, 2021, pp. 173–175). Within the scope of this study, the 'participant observation' method was preferred in the book café space.

The other data collection tool used in the study is the interview. The interview method enables access to information that cannot be directly observed, such as individuals' experiences and perceptions (Baltacı, 2019; Bengtsson, 2016; Seidman, 2006). This method allows for understanding participants' inner worlds and revealing their perspectives (Baltacı, 2019, p. 374). In the interview method, there are different techniques such as structured, semi-structured, unstructured, and focus group interviews (Marshall, 1996). Within the scope of the study, a semi-structured interview method consisting of open-ended questions was preferred. In this way, an in-depth examination of the research questions was made possible.

The interview questions used in the study were developed based on similar studies by Aydın & Okuyucu (2009), Kılıç (2015), Onay & Yazıcıoğlu (2015), Müezzinoğlu et al. (2020), Emsen & Örmecioğlu (2020), and Elmalı Şen & Selçuk (2024). The questions were divided into two main groups: general questions and subjective questions related to the research aim. General questions focused on demographic data such as participants' profession, age, education level, frequency of visits, and duration of stay. Subjective questions were structured according to spatial analysis criteria under four main headings: historical, environmental, architectural/spatial, and structural-technical factors. The subcomponents of these criteria were also categorized at a thematic level (Table 1).

Table 1. Spatial analysis criteria, sub-criteria, and sample primary and exploratory questions related to these criteria

Spatial Analysis Criteria	Spatial Analysis Sub-Criteria	Sample Primary and Exploratory Questions
Historical Factors	Historical analysis of the building Interventions made to the building Compatibility of the new function with the building	Primary Question In your opinion, what kind of image does this building have in Karapınar? How do you think people describe this place? Exploratory Questions Do you think it contributes to the promotion of the district? How do you think this place has been represented or embedded in oral culture among people?
Environmental Factors	Deficiencies and needs of the region Transportation and accessibility The building's iconic status within the city	Primary Question How do you evaluate this place in terms of its location? What are your thoughts regarding ease of transportation and accessibility? Exploratory Questions Is it easy to access by public transportation? Is it sufficient in terms of accessibility for people with disabilities?
Architectural and Spatial Factors	Spatial organization Interior identity Flexibility	Primary Question From an architectural perspective, what kind of impression does the interior space and overall design of the building leave on you? Exploratory Questions Do you think the building preserves its historical identity? Which interior details attract your attention?
Structural and Technical Factors	Lighting – visual comfort Heating / ventilation Acoustics – auditory comfort	Primary Question What are your thoughts on the lighting and ventilation comfort of the space? Exploratory Questions Do you find the natural lighting sufficient? Does the interior feel spacious or stuffy?

Semi-structured interview questions were approved ethically by the Ethics Committee of Selçuk University Faculty of Architecture and Design with decision number 04, dated March 17, 2025. The semi-structured interview data was obtained in March 2025 through face-to-face interviews conducted with participants on both weekdays and weekends.

During the interview process, it is important that questions are asked clearly and understandably, and that additional probing questions are used to deepen the topic when necessary (Creswell, 2002; Makatouni, 2002). Therefore, primary descriptive questions were followed by exploration questions to deepen discussion (Table 1). Audio recording is a key tool for data preservation and transcription (Merriam, 2023). Accordingly, with participants' consent, interviews were recorded and the data were coded and included in the analysis in line with validity and reliability principles. Within the scope of the study, three pilot interviews were first conducted to review the questions, followed by detailed interviews with 10 participants. Interview data were coded as "P1, P2… P10" and transcribed into written form.

DOI:10.15320/ICONARP.2025.339

Data Analysis

In qualitative research, data are analysed using various methods such as descriptive analysis, content analysis, discourse analysis, and text analysis (Baltacı, 2019). Content analysis reveals the relationships between concepts through an inductive approach and systematically constructs themes, categories, and codes (Baltacı, 2019; Yıldırım & Şimşek, 2021). Within the scope of this research, the content analysis method was preferred.

In content analysis, data are analysed in four stages. These are coding, the determination of code–category–theme, the organization of data, and finally the interpretation of findings (Baltacı, 2019; Eysenbach & Köhler, 2002; Miles & Huberman, 1994). Within the scope of this study, the process was conducted within the framework of these four stages. The data coding and analysis process was carried out using Maxqda software. Maxqda was preferred because it facilitates the organization, visualization, and analysis of qualitative data (Creswell, 2013).

Validity and Reliability

In scientific research, validity and reliability are related to the data collection tools used in the study, the research design, and the analysis process. In quantitative research, there are various measurement methods to ensure validity and reliability. In qualitative research, however, it is not possible to determine validity and reliability in a definitive manner (Guba & Lincoln, 1994; Shenton, 2004). According to Lincoln and Guba, validity and reliability in qualitative research are ensured through the criteria of credibility, transferability, dependability, and confirmability. In addition, coding directly affects these criteria (Baltacı, 2019). In this study, data were obtained through observation, semi-structured interviews, and content analysis using Maxqda software. Thus, the validity and reliability of the research were strengthened. Furthermore, the codes and categories used in the study were developed by drawing on similar studies in the literature. The codes were independently examined through peer review, compared in line with the architectural literature, and subsequently a code set was created. This process strengthened the credibility and confirmability of the research.

FINDINGS AND DISCUSSION

The findings were evaluated using the content analysis method. Within the scope of the study, the data obtained from semi-structured interviews were analysed through themes, categories, and codes based on spatial analysis criteria. The findings were visualized using the MAXQDA qualitative data analysis software. The relationships among codes, categories, and themes were presented graphically. The findings were addressed holistically based on frequency values and qualitative data derived from participants' statements. Accordingly, a total of 4

themes, 12 categories, 37 codes, and 280 frequency values were obtained in the study (Table 2).

Table 2. The table of themes, categories, codes, and frequencies used in the study

Theme	Historical Factors	Environmental Factors	Architectural and Spatial Factors	Structural and Technical Factors
Category	3	3	3	3
Code	5	11	12	9
Frequency	31	70	100	79

According to Table 2, the theme with the highest frequency is Architectural and Spatial Factors. This indicates a strong alignment between architectural design and user expectations. The Structural and Technical Factors theme, which ranks second, reveals that these factors are decisive in terms of user comfort. The Environmental Factors theme, in third place, is evaluated in the context of the building's relationship with its surroundings. The Historical Factors theme, which has the lowest frequency, shows that participants referred less frequently to issues such as historical identity. This suggests that users primarily focus on the current function of space and their experiential engagement with it. All themes are examined in detail below within their respective contexts.

- The *Historical Factors* theme, which addresses how users evaluate the building's relational perceptions of cultural memory and its new function, is presented in the hierarchical code-subcode model in Figure 8.

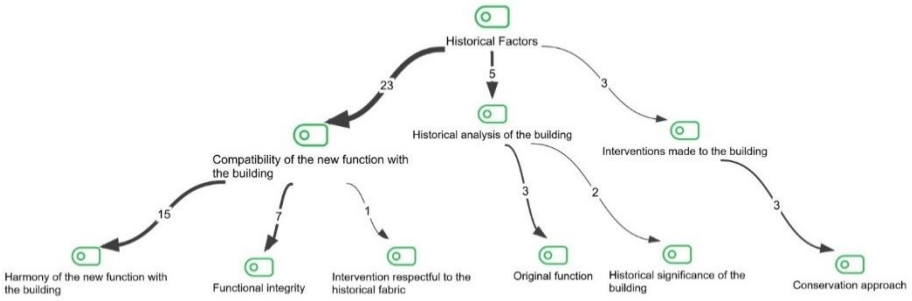


Figure 8. Hierarchical code-subcode model of the Historical Factors theme.

When the code distribution of the Historical Factors theme is examined, the category with the highest frequency is compatibility of the new function with the building. This indicates that participants positively evaluate the compatibility of the book café's new function with the historic structure. In particular, the codes compatibility of the new function with the building and functional integrity support this finding. User comments such as P4's "*The conversion into a book café is very successful*", and P9's "*Although there are similar structures in the area, it is gratifying that this one has been preserved in this way*", support these findings. Similarly, P8 noted, "*This building does not just relate*

DOI:10.15320/ICONARP.2025.339

directly to Karapınar's social and cultural structure but elevates and enriches it. Architecturally, it is quite visionary for Karapınar." The relatively low frequency of the code respectful intervention on the historical fabric points to a limited level of sensitivity expressed regarding this aspect. Under the category historical analysis of the building, the codes' original function and historical significance of the building show a moderate level of awareness overall. It can be said that participants perceive the historical context of the building more superficially. Likewise, users appear to have little awareness of the restoration processes and conservation efforts related to the building.

- The *Environmental Factors* theme, which addresses the multifaceted relationship users establish with the building within its social, cultural, and regional context, is shown in the hierarchical code-subcode model in Figure 9.

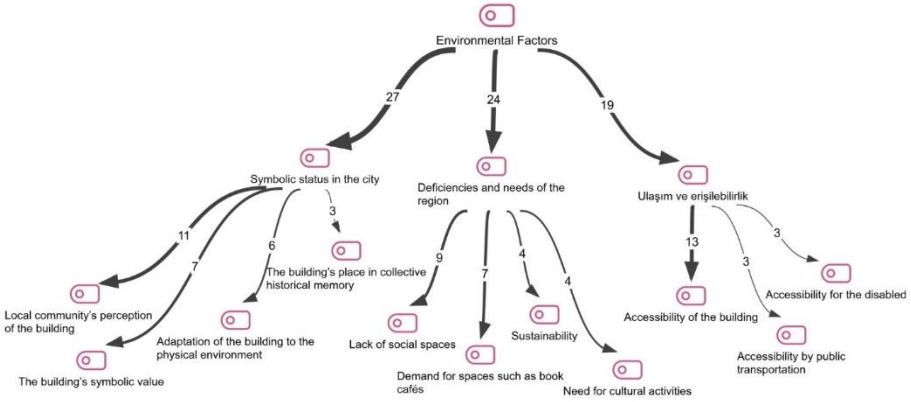


Figure 9. Hierarchical code-subcode model of the Environmental Factors theme.

Analysis of the code distribution within the Environmental Factors theme shows that participants' meaning-making relationships with the building and its surroundings are as strong as their spatial experience. The category with the highest frequency, the building's imaginal status in the city, provides important information in relation to the context of the building's location. Codes such as the meaning attributed to the building by the local community, the building's symbolic value, and its place in historical memory reveal that the building is perceived as an element of collective memory and identity. Statements by users P4 "*It also has a very strong place in oral culture; both students and the public have embraced this place. It also contributes to the promotion of the district because visitors from outside find it different and impressive,*" P5 "*This place has a very positive image among the public. It is defined as an elite library*," and P6 "*This place can be defined as an educational hub in Karapınar*" support these data. These views indicate that the building has become a reference point in urban memory and has been endowed with symbolic meaning by the local community. The codes within the category deficiencies and needs of the region reveal users' demands for social and cultural spaces in the building's surroundings. In particular, the prominence of the codes lack of social spaces and demand for spaces such as a book café indicates that the functional transformation of the

building responds to an environmental need. The statements of users P1 "*Karapınar really needed such a building…*" and P8 "*…Showing that activities independent of technology are also possible is very meaningful for students. This environment increases the sense of social belonging*" support these data. Lower-frequency codes such as need for cultural activities and sustainability indicate that users evaluate the space as a socialization environment. P6 emphasized the importance of this finding by stating, "*I think that the activities and the atmosphere increase the sense of social belonging.*" It is also observed that the codes transportation and accessibility and ease of access to the building have notably high frequencies. As reflected in P5's statement "*Its location is quite central and easy to access…*" the ease of access to the space is considered by most participants as a factor that encourages use.

- The *Architectural and Spatial Factors* theme, which analyses design decisions, spatial organization, and interior experience that directly affect users' relationship with the physical environment in a multidimensional way, is depicted in the hierarchical code-subcode model in Figure 10.

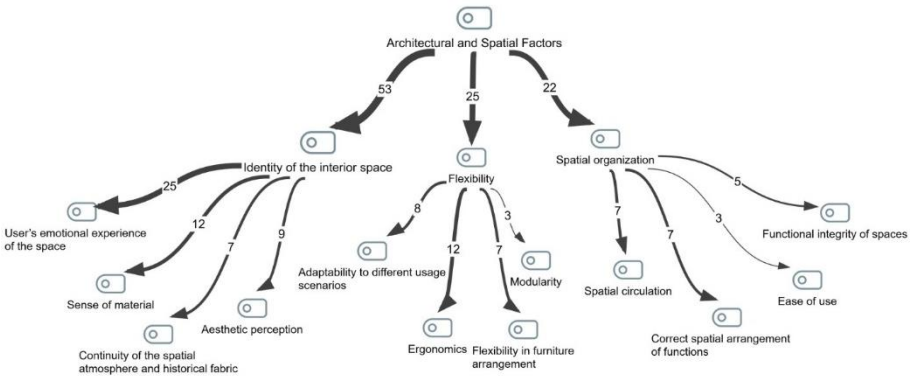


Figure 10. Hierarchical code-subcode model of the Architectural and Spatial Factors theme.

According to the graph, the category with the highest frequency is Interior identity. Codes under this category such as the feeling the space leaves on the user, material sensation, and spatial atmosphere/ continuity of historical fabric show that users form a strong emotional and sensory connection with space. Participants' comments support these strong codes: P2 said, "*The architecture of the book café is quite impressive.*" P3 stated, "*I like the interior. It makes me feel like I am not in Karapınar.*" P5 remarked, "*When entering from outside, I feel like stepping into a peaceful environment.*" Codes such as material perception and aesthetic perception reveal that space possesses perceptual value. The statements of participants P6 "*From an architectural perspective, the building leaves an authentic impression with its stone walls and wooden roof*" and P8 "*The wooden structure of the interior gives a sense of warmth. The column details where stone and wood intersect are striking. It creates a spacious and profound feeling*" indicate that participants evaluate the space as having a strong identity. Under the flexibility category, codes such as ergonomics, adaptability to different usage scenarios, and modularity reflect the space's ability to respond to

DOI:10.15320/ICONARP.2025.339

changing needs. The statement by P9 "*The layout encourages social interaction. Thanks to the face-to-face arrangement, users can engage with each other more easily*" demonstrates that the design is flexible and adaptable. The spatial organization category relates to the functional planning and orientation of the space. Codes such as spatial circulation, appropriate placement of functions, and functional integrity of spaces indicate that users evaluate the space in terms of ease of wayfinding and the relationships between different areas.

- The *Structural-Technical Factors* theme, which addresses users' evaluations of the building in relation to the physical environment, is presented in the hierarchical code-subcode model in Figure 11.

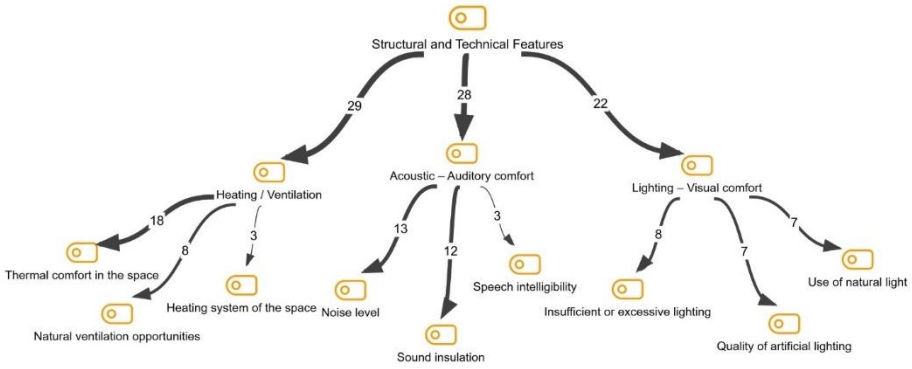


Figure 11. Hierarchical code-subcode model of the Structural and Technical Factors theme.

According to the graph, it is shown that the three categories under this theme have an equal effect on user comfort. In particular, the high frequency of the code thermal comfort in the space indicates that temperature conditions determine the duration of time spent inside the building. The statements P3 "*There were times when I felt cold in winter, and in summer it becomes difficult to stay when it is too hot.*" and P6 "*In summer, it can be difficult to stay here for a long time due to the heat.*" support this. This situation reveals that thermal comfort is important for user satisfaction in working spaces such as book cafés. The category acoustic- auditory comfort, which ranks second, reveals users' expectations regarding sound. The prominence of the codes noise level and sound insulation shows that the quietness of the environment is critical for activities such as reading and concentrating. Statements such as P10 "*Temperature is not impressive, but the noise is disturbing. When it is very noisy, I do not prefer to stay in the space.*" show that users evaluate acoustic comfort. The third category, lighting-visual comfort, was evaluated through light perception. The fact that the codes insufficiency or excess of light, use of natural light, and quality of artificial lighting have close frequencies indicates that users evaluate lighting quality holistically. The statement P1 "*Due to artificial lighting, the space causes a loss of time perception, because natural light comes from a very limited point.*" supports this data. It is observed that lighting arrangements that support users' visual comfort and concentration are important in this space.

In summary, according to the findings, it has been revealed that the spatial analysis criteria indicate that participants perceive a meaningful integrity between the building and its current function. It has been determined that the building strengthens its symbolic image in the region, compensates for the lack of social spaces, and that the interior spatial identity and the feeling the space leaves on individuals are considered important. In addition, it has been identified that thermal comfort within space affects the duration of users' stay. Moreover, the study also presents significant relational findings among the criteria at the levels of themes, categories, and codes in Figure 12.

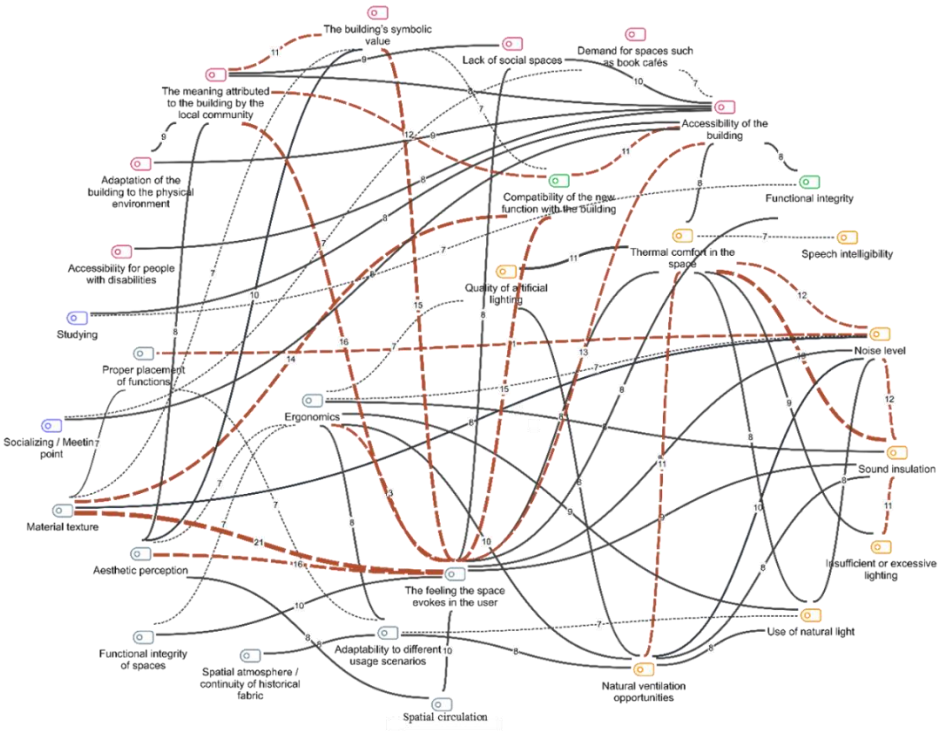


Figure 12. Code co-occurrence (code proximity) model of spatial analysis criteria.

According to the code co-occurrence model, codes analysed within the four spatial criteria interact, overlap, and complement each other. This underscores the importance of a holistic spatial analysis approach across themes. The model shows that the high-frequency code the feeling the space leaves on the user intersects with many structural and sensory codes such as aesthetics, material, thermal comfort, lighting, ergonomics, and acoustics. This indicates that user experience is a central criterion in spatial design. Strong relationships were identified especially between the codes the feeling the space leaves on the user and thermal comfort, aesthetic perception and quality of artificial lighting, as well as ergonomics and sound insulation. These connections reveal that architectural experience is shaped by technical and physical conditions and that user satisfaction is directly linked to visual and auditory comfort. Furthermore, the relationship between functional integrity and functional coherence of spaces and between compatibility of new function with the building and meaning attributed to the building

DOI:10.15320/ICONARP.2025.339

by the local community demonstrates the importance of spatial planning in adapting historic buildings to new functions. Similarly, the link between lack of social space and socializing/meeting point codes indicate that environmental expectations align with the design. The connection between ease of access to the building and thermal comfort, and between noise level and user experience shows that considering accessibility and technical comfort together enhances environmental functionality. Although less frequent, the codes functional integrity and spatial circulation provide qualitative insights that should be considered in the adaptive reuse process.

CONCLUSION AND RECOMMENDATION

In this study, the adaptive reuse process of a historic grain warehouse in Karapınar was examined, and its spatial effects on user experience were investigated. Accordingly, the Karapınar Grain Warehouse, selected as the study material, has been evaluated functionally and physically through spatial analysis criteria and user opinions within the framework of its new function as a book café.

Within the scope of the study, under the theme of Historical Factors, users evaluated the building functionally. The integration of the new function with the space is satisfactory from the users' perspective. However, users have limited knowledge about the historical process of the building. This situation emphasizes the importance of conveying historical awareness to users in adaptive reuse studies. For future adaptively reused historic buildings, it is recommended to provide users with information about the historical process of the building. In such studies, the historical identity of the building and the transformations it has undergone can be conveyed through tools such as permanent and temporary exhibitions, informative panels, and archival photographs in interior spaces. In this way, it is considered that a bridge can be established between the new function of the building and its identity in historical memory, thereby creating a sense of historical awareness.

Within the scope of the study, Environmental Factors were interpreted by users through the social and cultural interaction that the space establishes with its surroundings. In particular, the high demand of the local community for social needs indicates that this building is viewed positively in the region. Adaptively reused buildings create an experiential field together with their immediate surroundings. It is observed that the open and enclosed social spaces around the building increase users' social interactions and support collective use. Therefore, in adaptively reused buildings, environmental factors should be evaluated in terms of accessibility, socialization, interaction, and the strengthening of environmental perception.

Under the theme of Architectural and Spatial Factors, users evaluated the space in a multidimensional manner. The importance they attach to interior spatial identity indicates that this building leaves a lasting impression in users' memory. At the same time, users finding the space

flexible and functional shows that the building can respond to contemporary needs. These results indicate that architectural and spatial design decisions in adaptive reuse projects directly affect user experience. In future similar adaptive reuse projects, it is important to develop user-centered and experience-based approaches.

Within the scope of the study, users evaluated Structural and Technical Factors by considering auditory, thermal, and visual comfort elements of space. In this respect, it can be stated that technical solutions that place user needs at the centre are important for spatial sustainability in the adaptive reuse process of buildings.

As a result, it has been determined that in the transformation of the Karapınar grain warehouse into a book café, the new function is largely compatible with the building and that user satisfaction is high. In addition, the high demand for the building by users has indirectly contributed to its economic sustainability at the local level. In this context, this adaptively reused building makes meaningful contributions to the Karapınar district in socio-cultural and socio-economic terms.

REFERENCES

Ahunbay, Z. (2017). *Tarihi çevre koruma ve restorasyon*. YEM Yayınevi.

Aydın, D., & Okuyucu, Ş. E. (2009). Yeniden kullanıma adaptasyon ve sosyokültürel sürdürülebilirlik bağlamında Afyonkarahisar Millet Hamamının değerlendirilmesi. *Megaron*, *4*(2), 80–91.

Aydın, D., & Yaldız, E. (2010). Yeniden kullanıma adaptasyonda bina performansının kullanıcılar üzerinden değerlendirilmesi. *METU Journal of the Faculty of Architecture*, *27*(1), 1–22. https://doi.org/10.4305/metu.jfa.2010.1.1

Baltacı, A. (2019). Nitel araştırma süreci: Nitel bir araştırma nasıl yapılır? *Ahi Evran Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, *5*(2), 368–388. https://doi.org/10.31592/aeusbed.598299

Bullen, P. A., & Love, P. E. D. (2011). Adaptive reuse of heritage buildings. *Structural Survey*, *29*(5), 411–421. https://doi.org/10.1108/02630801111182439

Creswell, J. W. (2002). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research*. Prentice Hall.

Creswell, J. W. (2013). *Nitel araştırma yöntemleri* (Y. Dede, Çev.). Siyasal Kitabevi.

Çelebi, G. Ü., Gültekin, A. U., Harputlugil, U. G., Bedir, M., & Tereci, A. (2008). *Sürdürülebilir mimarlık*. TMMOB Mimarlar Odası Sürekli Mesleki Gelişim Merkezi. https://arch516.cankaya.edu.tr/uploads/files/1_SURDURULEBILIR_MIMARLIK%281%29.pdf

Emsen, H. H., & Örmecioğlu, H. T. (2020). Üniversite kütüphanelerinin mekânsal tasarımının kullanıcı üzerindeki etkisine ilişkin istatistiki bir çalışma: Akdeniz Üniversitesi Merkez Kütüphanesi örneği. *Türk Kütüphaneciliği*, *34*(2), 187–207. https://doi.org/10.24146/tk.696331

Erder, C. (1977). Venedik Tüzüğü tarihi bir anıt gibi korunmalıdır. *ODTÜ Mimarlık Fakültesi Dergisi*, *3*(2), 167–190. http://jfa.arch.metu.edu.tr/archive/0258-5316/1977/cilt03/sayi_2/167-190.pdf

DOI:10.15320/ICONARP.2025.339

Erkovan, N. Y. (2022). Geleneksel yapıda sürdürülebilirlik bağlamında uyarlamalı yeniden kullanım önerisi: Antalya/Gazipaşa Gümrük Binası. *İdealkent*, *13*(38), 2870–2897. https://doi.org/10.31198/idealkent.1070307

Eysenbach, G., & Köhler, C. (2002). How do consumers search for and appraise health information on the world wide web? Qualitative study using focus groups, usability tests, and in-depth interviews. *BMJ*, *324*(7337), 573–577. https://doi.org/10.1136/bmj.324.7337.573

Forrester, M. A., & Sullivan, C. (2018). *Doing qualitative research in psychology: A practical guide*. Sage.

Fossey, E., Harvey, C., McDermott, F., & Davidson, L. (2002). Understanding and evaluating qualitative research. *Australian and New Zealand Journal of Psychiatry*, *36*(6), 717–732. https://doi.org/10.1046/j.1440-1614.2002.01100.x

Golafshani, N. (2003). Understanding reliability and validity in qualitative research. *The Qualitative Report*, *8*(4), 597–606. https://doi.org/10.46743/2160-3715/2003.1870

Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (pp. 105–163). Sage.

ICOMOS. (1999). *Charter on the built vernacular heritage*. https://www.icomos.org/images/DOCUMENTS/Charters/vernacular_e.pdf

ICOMOS. (2013). *ICOMOS Türkiye Mimari Mirası Koruma Bildirgesi*. http://www.icomos.org.tr/Dosyalar/ICOMOSTR_tr078419%2020015421926 02.pdf

Kılıç, E. C. (2015). *Tarihi yapılar için yeniden işlevlendirme kriterleri ve Ali Paşa Hanı örneklemesi* (Yüksek lisans tezi, İstanbul Teknik Üniversitesi, Sosyal Bilimler Enstitüsü). https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp

Konya Büyükşehir Belediyesi Arşivi. (n.d.*). Karapınar Tarihi buğday ambarı çizimleri* [Çizim]. Kurumsal Arşiv.

Konya Büyükşehir Belediyesi Arşivi. (n.d.*). Karapınar Tarihi buğday ambarı fotoğrafı* [Fotoğraf]. Kurumsal Arşiv.

Kuban, D. (2000). *Architectural dimension of historic environment protection: Theory and practice* (ISBN: 9789757438960). Yapı Endüstri Merkezi.

Lewis, R. H. (2013). *Re-architecture: Adaptive reuse of buildings with focus on interiors* (Lisans tezi, Manipal University, Faculty of Architecture, India).

Makatouni, A. (2002). *What motivates consumers to buy organic food in the UK? Results from a qualitative study*. British Food Journal, *104*(3/4/5), 345–352. https://doi.org/10.1108/00070700210425769

Marshall, M. N. (1996). Sampling for qualitative research. *Family Practice*, *13*(6), 522–526. https://doi.org/10.1093/fampra/13.6.522

Merriam, S. B. (2023). *Nitel araştırma: Desen ve uygulama için bir rehber* (Çev. S. Turan). Nobel Akademik Yayıncılık.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd ed.). Sage Publications. https://doi.org/10.1177/109821409902000122

Morse, J. M. (2016). *Mixed method design: Principles and procedures*. Routledge.

Müezzinoğlu, M. K., Noraslı, M., & Sungur, M. (2020). Taşınmaz bir kültür varlığının yeniden işlevlendirilmesine yönelik sistematik analiz. *The Journal of International Lingual Social and Educational Sciences*, *6*(1), 113–123. https://doi.org/10.34137/jilses.572504

Onay, N. S., & Yazıcıoğlu, D. A. (2015). Functional continuity in adaptive reuse of historic buildings: Evaluating a studio experience. *American Journal of Educational Research*, *3*(6), 674–682. 10.12691/education-3-6-2

Özçakır, Ö. (2024). Yeniden işlevlendirme praksisini Venedik Tüzüğü'nden günümüze uluslararası belgeler üzerinden okumak. *Mimarist*, *(3)*, 65–71. https://mimaristdergi.org/storage/upload/pdfs/1731236076-tr.pdf

Patton, M. Q. (1990). *Qualitative evaluation and research methods* (2nd ed.). SAGE Publications.

Seidman, I. (2006). *Interviewing as qualitative research: A guide for researchers in education and the social sciences* (3rd ed.). Teachers College Press.

Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information*, *22*(2), 63–75. https://doi.org/10.3233/EFI-2004-22201

Strauss, A., & Corbin, J. (1990). *Basics of qualitative research: Grounded theory procedures and techniques*. Sage Publications.

Sungur, M. (2024). Adaptive Reuse Suggestions in Interior Architecture Education: A Registered Workshop in Ankara. *ICONARP International Journal of Architecture and Planning*, *12*(2), 780–803. https://doi.org/10.15320/ICONARP.2024.304

Şen, D. E., & Selçuk, B. S. (2024). Kütüphane tasarımlarının öğrencilerin görsel algıları üzerindeki etkileri: Ondokuz Mayıs Üniversitesi Tıp Fakültesi örneği. *Türk Kütüphaneciliği*, *37*(2), 83–108. https://doi.org/10.24146/tk.1222569

Şen, H., Kaya, A., & Alpaslan, B. (2018). Sürdürülebilirlik üzerine tarihsel ve güncel bir perspektif. *Ekonomik Yaklaşım*, *29*(107), 1–47. https://doi.org/10.5455/ey.39101

Türkiye Cumhuriyeti. (1983). *2863 Sayılı Kültür ve Tabiat Varlıklarını Koruma Kanunu*. https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=2863&MevzuatTur=1&MevzuatTertip=5

Yalaz, E. T., & Yaldız, E. (2020). Yeniden kullanım sonrası yapısal müdahalelerin değerlendirilmesi: Tantavi Ambarı örneği. *Artium*, *8*(2), 105–117.

Yıldırım, A., & Şimşek, H. (2021). *Sosyal bilimlerde nitel araştırma yöntemleri* (12. baskı). Seçkin Yayıncılık.

Resume

Hatice Çınar graduated from the Department of Interior Architecture and Environmental Design at Selçuk University Faculty of Fine Arts in 2010. She received her master's degree in architecture from the Graduate School of Natural Sciences at Selçuk University in 2015. In 2021, she completed her PhD in Architecture at the Graduate School of KTO Karatay University. Her main research interests include adaptive reuse, rural architecture, small housing, ergonomics, and interior architecture education. She has been working as an academic staff member in the Department of Interior Architecture at Selçuk University since 2013.

DOI:10.15320/ICONARP.2025.339

ICONARP
International Journal of Architecture and Planning
Received: 02.05.2025 Accepted: 16.12.2025
Volume 13, Issue 2/ Published: 31.12.2025
Research Article *DOI: 10.15320/ICONARP.2025.340 E- ISSN:2147-9380*
ICONARP

The Evaluation of the Glocalization Strategy of the Second-Wave Coffee Shops with Respect to the Interior Design

Turgut Kalay*
Ayşenur Kandemir**

Abstract

This study examines how Starbucks, as a global brand, employs glocalization strategies in its interior design by incorporating local architectural elements into standardized global formats. The primary objective is to analyze how local and global elements are integrated into the design of the second-wave coffee shops, a globally recognized brand, and to evaluate the balance between these elements from a design perspective. To achieve this, six Starbucks stores, selected as the sample for the current study, located in the EMEA (Europe, Middle East, and Africa), Asia-Pacific, and Japan regions were examined. The research focused on key interior design components, including vertical structural elements, flooring, ceiling features, openings, furniture, and decorative details, assessing them within the framework of local and global characteristics. A qualitative research approach was adopted, employing content analysis to systematically evaluate the selected stores. The originality of this study lies in its structured examination of how glocalization strategies manifest in interior spaces through regional variations. The findings reveal that local elements such as ceiling types, materials, and seating styles were consistently integrated to reflect regional identities, while standardized lighting and furniture layouts preserved the brand's global coherence. Thus, the findings show that integrating local motifs into spatial design enables global brands to establish a meaningful connection with the local cultural context while maintaining their global identity. This balance not only enhances user experience but also reinforces brand identity through culturally resonant spaces. Overall, the research underscores the significance of preserving cultural codes in interior design as a means of fostering commercial success for global brands. By offering a framework for incorporating glocalization strategies in spatial design, this study provides valuable insights for designers and brands aiming to achieve cultural sustainability while maintaining a strong global presence.

Keywords: *Cultural code, Global identity, Glocalization, Interior design, Local motifs.*

*Faculty of Architecture, Kütahya Dumlupınar University, Kütahya, Türkiye. (*Corresponding author*)
Email: turgut.kalay@dpu.edu.tr

**Faculty of Art and Design, İstanbul Nişantaşı University, İstanbul, Türkiye.
Email: aysenur.kandemir@nisantasi.edu.tr

To cite this article: Kalay, T., & Kandemir, A. (2025). The Evaluation of the Glocalization Strategy of the Second-Wave Coffee Shops with Respect to the Interior Design. *ICONARP International Journal of Architecture and Planning,* 13 (2), 665-687. DOI: 10.15320/ICONARP.2025.340

INTRODUCTION

Globalization has become a phenomenon that permeates all aspects of life, with the advent of new communication technologies and the internet enabling cultures to transcend national borders. In this process, American culture has emerged as a global phenomenon, while local cultures have interacted with this global culture (Serinkaya, 2022: 12). Global brands, to establish a presence in diverse geographies, must balance maintaining global standards with adapting to local dynamics (Kurtuldu, 2016: 37). In this context, the concept of 'glocalization' has emerged, signifying a transformative process in which global and local elements coexist and complement one another (Roudometof, 2016: 392). Glocalization is particularly evident in design, especially in interior spaces. Global brands integrate local cultural motifs and materials into the interior design of stores in different regions, preserving regional identity while maintaining their global brand image (Alaali and, 2019: 894). For instance, modern design principles can be enriched with local artworks, architectural details, and traditional materials to create a unique design language.

This study hypothesizes that the application of glocalization by global brands in interior design enables the creation of spaces that are both compatible with local identities and aligned with global standards. Although existing literature explores the application of glocalization in design, systematic studies focusing on the balance of local and global elements in interior design remain limited. For instance, Torkington (2012) highlights how villas in Portugal's Algarve region combine elements of both English colonial and traditional Algarve architecture. Küçük and Bilgiç (2022) examine how local culture is integrated into hotel designs through glocalization strategies. Shelby et al. (2022) note that while local elements are included in the design, dominant global influences can result in a conflicting identity. These studies underscore that glocalization in spatial design is a dynamic process.

This research distinguishes itself from existing studies by focusing on how the components of global brands' interior designs differ regionally within the framework of glocalization strategies. It systematically examines how these interior elements balance local and global features while also aiming to provide insights into future directions for interior design guided by glocalization strategies.

The study hypothesis is that “The study aims to contribute to the discipline of interior architecture by analyzing in detail how Starbucks applies glocalization strategies in its interior designs and how local and global elements are integrated. The qualitative research method of content analysis was chosen as the methodological approach. According to Saban (2009: 833), "Content analysis involves systematically reviewing printed, visual, and similar materials to analyze them thematically according to specific categories". Accordingly, the analysis in this study focused on six interior design components. These components are vertical structural elements, flooring, ceiling design,

DOI:10.15320/ICONARP.2025.340

openings, furniture, and decorative details. These components were chosen based on their direct relevance to spatial identity and cultural expression in interior architecture. A thematic coding scheme was developed through an inductive approach following a preliminary review of the selected store images. Initial categories were determined based on recurring spatial features observed in the interior photographs. These included themes such as the use of traditional materials, local construction techniques, cultural decorative motifs, the integration of modern furniture, and branding consistency. The categories were later grouped into two overarching themes: local elements and global elements, aligned with the conceptual framework of glocalization (Roudometof, 2016: 392; Alaali & Pitsaki, 2019: 894). Each selected Starbucks interior was analyzed based on high-resolution visual data sourced from official Starbucks media channels. Data were coded manually by the researcher using a descriptive coding method, marking the presence and interpretation of each identified element across the six cases. Descriptions were supported with visual evidence, and codings were noted in a comparative table (Table 2).

To systematically evaluate interior designs in terms of glocalization, the study focuses on Starbucks stores as the subject of analysis. Globally, Starbucks operates 18,424 stores in North America and 21,775 stores in international markets. The EMEA region has approximately 4,582 stores, the Asia-Pacific region has about 5,626 stores, and Japan has 1,986 stores (Starbucks Corporation, 2024). To explore how the components of global brands' interior designs differ regionally within the context of glocalization strategies, six Starbucks stores were selected for the study, two stores each from the EMEA (Europe, the Middle East, and Africa), Asia-Pacific, and Japan regions (Table 1).

Table 1. Starbucks Stores Selected as Samples from EMEA, Asia-Pacific, and Japan Regions

Region	***Country-City***	***Name***
EMEA	England-Sheffield	*Sheffield's Carbrook Hall Starbucks*
EMEA	France-Paris	*Starbucks Boulevard des Capucines*
Asia-Pacific	South Korea-Seoul	*Starbucks Famille Park*
Asia-Pacific	South Korea-Daegu	*Starbucks Daegu Jongro Goteak*
Japan	Japan-Kyoto	*Starbucks Coffee Kyoto Ninenzaka Yasaka Chaya*
Japan	Japan-Ise	*Ise Naiku-mae Starbucks*

By reviewing images from the brand's official website, a purposive sampling method, one of the non-probability sampling techniques, was used to select stores that reflect the local cultural texture of their region and stand out with unique design elements. The interior design of these Starbucks stores will be analyzed to detail the impact of glocalization strategies on the discipline of interior architecture and explore their potential applications.

THE SECOND-WAVE COFFEE SHOPS

Coffee, derived from the seed of the fruit of a tree belonging to the Coffea genus in the Rubiaceae family, has transcended its role as a mere

beverage and become an integral part of social interaction and daily life across the globe. Coffee shops, once considered simple points of sale, have gradually transformed into central venues of social life. As Şeker and Özata (2022: 194) emphasize, coffee is not merely a drink but also carries cultural, social, and symbolic meanings. Likewise, coffee shops serve not only as consumption spaces but as environments in which social interaction, cultural exchange, and symbolic experiences are fostered.

According to the International Coffee Organization (ICO), coffee constitutes the second most valuable global commodity market after crude oil. The development of coffee culture has historically been defined in three distinct waves (Baruönü Latif and Örs, 2018: 151). The first wave emerged in the early 20th century and included instant coffee products such as Nescafe, Folgers, and Maxwell House, which were designed for rapid preparation and mass consumption. This period emphasized convenience and accessibility. The second wave began in the 1960s and was characterized by the rise of coffeehouse chains such as Starbucks and Caribou Coffee. This era popularized espresso-based beverages like lattes, cappuccinos, and mochas, transforming coffee from a utilitarian product into a sensorial and cultural experience. Coffee consumption became increasingly associated with pleasure and socialization. The third wave, in contrast, emphasizes the artisanal and cultural value of coffee, treating it as a high-quality product akin to wine, cuisine, or music. This movement values transparency in production, ethical sourcing, and sophisticated brewing techniques.

Although the second wave began in the 1960s, it reached full momentum after the 1980s, particularly through the global expansion of Starbucks, which significantly influenced both the economic and socio-cultural dimensions of coffee consumption (Şeker and Özata, 2022: 194). Second-wave coffee culture sought to enhance the user experience by offering a variety of beverages and fostering a comfortable environment. As consumers encountered new coffee types, such as espresso and latte, coffee chains evolved into a recognizable business model, paving the way for globally known brands. Consequently, coffee shops adhering to the principles of the second wave emerged in numerous countries (Kahya and Zencir Çiftçi, 2022: 1254).

More than just serving beverages, these new-generation establishments aimed to offer experiential spaces rooted in cultural exchange and social interaction. Unlike first-wave coffee shops, which prioritized speed and standardization, second-wave shops emphasize a richer customer experience through specialized drinks, unique atmospheres, and higher service quality. Spatial design became a critical factor in this evolution: materials, seating arrangements, and lighting were all strategically selected to promote prolonged user engagement.

These contemporary coffee shops played a pivotal role in the evolution of global coffee culture and laid the foundation for early examples of glocalization strategies. Notably, brands such as Starbucks -

DOI:10.15320/ICONARP.2025.340

key representatives of the second wave - began to integrate local architectural and interior elements into their store designs in different regions, aiming to evoke a sense of belonging among users. In this way, interior spaces were shaped by the cultural contexts of their locations through the inclusion of local artistic elements and architectural forms. This practice not only ensured the continuity of global brand identity but also embedded local aesthetic values within the design, fostering a deeper connection with the surrounding cultural environment.

As a result, second-wave coffee shops have emerged not only as consumption spaces but also as hybrid spatial identities situated at the intersection of global and local cultures. They represent a design approach that seeks equilibrium between maintaining global brand coherence and ensuring the visibility and relevance of local cultural codes.

GLOCALIZATION

Local culture refers to the cultural processes and heritage shaped by a society's traditions, beliefs, and practices (Uyan Dur, 2015: 445). In contrast, globalization operates independently of these cultural processes, promoting similar lifestyles and consumption patterns worldwide (Gök, 2014: 9). Although globalization and localization are often seen as opposing concepts, their combination has given rise to the concept of "glocalization" (Öztürk and Çivici, 2018: 72). The Britannica Encyclopedia defines glocalization as "the simultaneous occurrence of both universalizing and particularizing tendencies in contemporary social, political, and economic systems" (Blatter, 2022). This concept was first materialized in the 1970s when Japanese companies adapted their products to meet the needs of various regional markets. By considering local consumer needs, glocalization strategies have made globalization more localized (Dilek et al., 2015: 4). The adaptation of global practices to local contexts allows for the preservation of global identity while offering solutions tailored to local needs (Öztürk and Çivici, 2018: 72). Glocalization also enables global phenomena and objects to adapt to diverse traditions in fields such as fine arts, architecture, and interior design (Bagina, 2021: 24).

In architecture and interior design, "local" refers to designs influenced by a region's history, cultural heritage, traditions, and environmental conditions, while "global" reflects design concepts inspired by ideas and experiences from around the world (Al-Qawasmi, 2006: 293). Spatially, glocalization involves aligning global design approaches with local cultural, material, and aesthetic characteristics. This strategy allows for the integration of innovative design approaches with the historical and socio-cultural contexts of the spaces where they are implemented. Thus, in interior design, glocalization fosters a balance between global and local elements, contributing to designs that are more meaningful and contextually relevant.

The Role of Glocalization in Interior Design: The Integration of Local and Global Elements

Like every concept and phenomenon concerning humanity, globalization, which emerged as a result of advancing technology, has influenced architecture and interior design disciplines that create spaces for individuals (Nalçakan and Polatoğlu, 2008: 80). In interior design, globalization has particularly fostered a global culture and spatial understanding dominated by American influence (Gökce and Kaya, 2020: 36). The globalization of culture has led to the direct transplantation of spatial designs from one culture to another, resulting in the degeneration of local cultures, cultural conflicts, and standardization in design (Serinkaya, 2022: 12). Shopping malls, skyscrapers, luxury hotels, and office plazas are prime examples of such spaces (Yavuzçehre, 2013: 201). To mitigate these negative effects, integrating global products or designs with local characteristics presents a sustainable design strategy (Özer, 2018: 124). This approach, known as glocalization, seeks to establish a balance between regional and global elements by blending the two. In this process, some designs emerge spontaneously from the cultural background and experiences of the designer, while others are intentionally created to serve the principles of glocalization. Spaces designed with a familiar and comforting atmosphere for local communities enhance the sense of belonging while offering users from other cultures an opportunity to experience and understand the local culture (Küçük and Bilgiç, 2022: 338). The integration of global elements into local design or vice versa is not merely an aesthetic or cultural concern; it is also a strategic approach aimed at enhancing user and customer loyalty (He and Wang, 2017: 473).

STARBUCKS' GLOCALIZATION STRATEGY: A GENERAL OVERVIEW

Founded in 1971 in Seattle, Starbucks has become one of the world's most recognized coffee chains through its unique business model and innovative approaches (Aiello and Dickinson, 2014: 306). The company operates in two main divisions, North America and International, with a total of 40,199 stores. Starbucks has 18,424 stores in North America, which includes the U.S. and Canada, and 21,775 stores in its international markets, covering China, Japan, Asia-Pacific, Europe, the Middle East, Africa, Latin America, and the Caribbean. The majority of licensed stores are managed by the Europe, the Middle East, and Africa (EMEA) division and The Hong Kong Support Center (HKSC), which oversees 15 markets in the Asia-Pacific region. Co-operated stores are located in Austria, China, Italy, Japan, Switzerland, and the United Kingdom, with some countries hosting both licensed and co-operated stores. As of 2024, there are approximately 4,582 stores in the EMEA region, 5,626 in Asia-Pacific, and 1,986 in Japan (Starbucks Corporation, 2024).

DOI:10.15320/ICONARP.2025.340

A key factor behind Starbucks' success in expanding its store count outside North America lies in its adoption of a glocalization strategy, blending global standards with local tastes and cultural dynamics (Aiello and Dickinson, 2014: 317). With Howard Schultz's involvement in 1981, Starbucks evolved from merely selling coffee beans to becoming a brand offering a full coffee experience. Under Schultz's leadership, the company took its first steps toward international growth in 1987 and went public in 1992. During this rapid expansion, the "Third Place" concept played a significant role, providing customers with a comfortable space to socialize outside their home and workplace (Musonera, 2021: 12). At its core, Starbucks' global strategy embodies the principle of "global consistency with local touches" (Aiello and Dickinson, 2014: 318). The company embraced a localized design approach by revising its design strategy in 2009 (Aiello and Dickinson, 2014: 303). Starbucks incorporates region-specific elements into its interior designs to integrate local identities into its stores worldwide. For example, a store in Hanoi features wall art made from bamboo by local artists (Alaali and Pitsaki, 2019: 896). Starbucks' glocalization strategy has enabled its successful global expansion. By merging local touches with global standards, this strategy serves as a model for other global brands aiming to balance regional adaptation with global consistency.

THE ANALYSIS OF GLOCALIZATION THROUGH STARBUCKS INTERIOR DESIGN EXAMPLES

The Tudor style, which emerged during the Tudor period in England (1485–1603), represents a design approach that evolved during the late medieval architectural era (Harun et al., 2020: 3). Arising from transformations in the later stages of Gothic architecture, this style is considered a significant phase in English architectural history. The walls of interiors designed in the Tudor style were typically covered with a thin layer of plaster, with oak wood panels used to protect the space from moisture (Figure 1) (Reeves-Smyth, 2007: 311). Ceilings and the surroundings of fireplaces were often decorated with plaster embellishments (Reeves-Smyth, 2007: 304).

Figure 1. A view of a Tudor-style interior (Coşkun, 2018: 22).

Carbrook Hall, constructed in Tudor style in England in 1960, now serves as a Starbucks. The interior design approach combines the preservation of historical architectural elements with modern design solutions to meet contemporary user needs. The intricately carved wooden panels and the plaster-embellished ceiling strongly reflect the historical architectural character of the building. Additionally, the fireplace serves as a key element highlighting the space's historical identity (Figure 2).

Figure 2. The vertical and horizontal elements designed in Tudor style within the interior of Carbrook Hall (Carbrook Hall, Attercliffe Common Sheffield, 2019.

The wooden tables, brown leather armchairs, and other seating elements in the space reflect Starbucks' global design language while harmonizing with the oak panels and the fireplace in terms of material and color. These furnishings not only complement the historical texture but also align with Starbucks' global identity tailored to modern user needs (Figure 3). This approach exemplifies the adaptation of the global to the local by blending local historical identity with modern features. While repurposing a historic structure for a commercial brand carries the risk of losing its original context, this risk has been minimized at Carbrook Hall through careful preservation of the space's historical elements. This example demonstrates the tangible contribution of glocalization to design and the preservation of a space's cultural context.

Figure 3. The modern furniture at Starbucks Carbrook Hall reflecting the brand's corporate identity (Carbrook Hall, Attercliffe Common Sheffield, 2019).

DOI:10.15320/ICONARP.2025.340

In France, the Baroque style represents a significant period in architectural history, characterized by palaces and monumental structures that reflected the power and authority of the monarchy (García, 2020). Key elements of this style include dramatic lighting, dark color palettes, intricate embellishments, mythological frescoes, and grand sculptures (Öztürkoğlu, 2023: 813). Doors and windows were adorned with elaborate forms, and decorative details often featured wreaths, reliefs, goblets, and scrolls (Uçar et al., 2011: 20). Recessed surfaces were used to emphasize contrasts of light and shadow, while marble materials and mirrors enhanced the effect of reflections (Camcı and Şekerci, 2022: 28). Decorative motifs frequently included "C" and "S" shapes, shell patterns, segmented surfaces, gold gilding, and oval medallions (Çetin, 2017: 412). Ceilings were often decorated with trompe l'oeil frescoes depicting images of heaven and the sky. The interior of the Palace of Versailles embodies all these characteristics of the Baroque style (Uçar et al., 2011: 20). For instance, some rooms in the palace feature herringbone-patterned Baroque flooring (Różańska et al., 2011: 264).

The ceiling of Starbucks Boulevard des Capucines in Paris is adorned with frescoes depicting mythological scenes, intricate botanical motifs in gold leaf, and recurring angel figures. Completed with dark colors, this ceiling design reflects the legacy of French Baroque and diverges from the standard interior design of the coffee chain. Corinthian column capitals gilded with gold, marble-clad columns, and crystal chandeliers evoke the luxurious and opulent spirit of the Baroque period while enhancing the dramatic use of light. The walls feature empty frames created with gold leaf and half-Corinthian pilasters, forming a richly segmented surface design. The diagonally arranged wooden flooring combines French Baroque architectural traditions with modern furniture, creating a balanced atmosphere (Figure 4).

Figure 4. The structural elements in the interior of Starbucks Boulevard des Capucines (Page, 2024).

Large mirrors, similar to those found in Baroque structures like the Hall of Mirrors at the Palace of Versailles, are also present in Starbucks Boulevard des Capucines. These mirrors add depth to the space and enhance the dramatic reflection of light within the interior. The furniture used throughout the space features modern and minimalist lines that reflect Starbucks' global design language. However, despite their modern design, the brass tones on tables and railings, along with the dark hues of the seating elements, harmonize well with the Baroque aesthetic of the space. While crystal chandeliers are predominantly used as lighting elements, functional and minimalist lighting fixtures are also

included in the modern seating areas (Figure 5). This combination allows Starbucks to integrate its global design approach with the traditional architectural character of the local interior, creating harmony between the two. Overall, Starbucks Boulevard des Capucines exemplifies successful glocalization by merging the opulent design principles of the Baroque style with modern design elements. This interior design not only preserves the historical essence of Paris but also seamlessly incorporates Starbucks' global design philosophy with the local architectural heritage.

Figure 5. Furniture and Decorative Elements in the Interior of Starbucks Boulevard des Capucines (Page, 2024).

Traditional Korean architecture is epitomized by the Hanok, a sustainable and nature-integrated type of housing. Hanok features natural materials, passive heating and cooling systems, and spatial arrangements that foster a strong connection between people and nature (Ryoo and Youn, 2019: 6557). Its structural elements, such as wooden columns, are placed on stone foundations without nails or adhesives, ensuring both durability and harmony with the environment (Polat and Çelikel, 2023: 63). The windows of Hanok often utilize changhoji, a translucent paper made from mulberry tree bark, which softens sunlight, provides comfortable lighting, and supports air circulation while maintaining coolness during summer (Park and Fouser, 2015: 106). Additionally, Cheongsachorong, traditional Korean silk lanterns, are both aesthetic and culturally significant lighting elements (Kobayashi, 2013: 226).

The Starbucks Famille Park store in South Korea incorporates distinct local design elements inspired by Hanok. Wooden panels, designed with translucent materials, echo the changhoji used in traditional Hanok windows, integrating traditional Korean methods of light control into modern interior design. Nearly unprocessed wooden columns, inspired by Hanok's structural elements, carry cultural significance while also serving aesthetic and functional purposes. Large circular pendant lights in the space draw inspiration from Cheongsachorong, traditional Korean lanterns (Figure 6). These lights, with their warm and soft glow, enhance the ambiance while providing a cultural reference. Together, these elements blend modern design with traditional Korean architectural principles, creating a harmonious and culturally resonant interior.

DOI:10.15320/ICONARP.2025.340

Figure 6. Structural and Lighting Elements in the Interior of Starbucks Famille Park (Kang, 2020).

The wooden chairs and tables, communal seating areas, and metal lighting fixtures in Starbucks Famille Park reflect the brand's global identity. The choice of wood and leather materials, combined with a brown-green color palette, harmonizes with the wooden structural elements of the space (Figure 7). The modern furniture and functional spatial organization, frequently used in Starbucks stores, create a balance between the global brand identity and local design. Thus, Starbucks Famille Park presents an interior that caters to modern needs while reflecting Korea's cultural codes through a contemporary design approach. This integration effectively combines architectural sustainability with cultural continuity.

Figure 7. Furniture in the Interior of Starbucks Famille Park (Kang, 2020).

In traditional Korean architecture, wooden roofs are classified into four groups based on the number of beams: three-beam, five-beam, seven-beam, and nine-beam structures. Three-beam roofs are typically used in warehouses and residential buildings, five-beam roofs are common in homes, and seven-beam roofs are often reserved for temples and palaces (Kim et al., 2009: 50).

The roof of Starbucks Daegu Jongro Gotaek reflects the high-columned roof type found in traditional Korean architecture. The minimally processed wooden beams and columns are clearly visible as the building's primary structural system. Additionally, the use of wooden panels and changhoji in sliding doors, as seen in Hanok houses, highlights a design language harmonious with nature while referencing traditional architecture (Figure 8).

Figure 8. Structural Elements in the Interior of Starbucks Daegu Jongro Gotaek (Starbucks Korea Opens New Store in Historic Wooden Building, 2022.

In Korean architecture, small and portable furniture is preferred to allow spaces to adapt to various needs (Lee and Moon, 2010: 444). Cushions and small tables support multifunctional usage, offering a practical design solution (Choi, 2007: 75). The small tables used for dining, known as soban, typically consist of a tabletop, legs, and a base. These tables reflect the flexible and nature-oriented structure of Hanok architecture (Lee and Kim, 2014: 83).

The low wooden tables and cushions in Starbucks Daegu Jongro Gotaek exemplify a modern interpretation of traditional Korean seating arrangements. These furniture pieces preserve cultural codes, emphasizing local identity while addressing users' comfort needs. The natural brown tones of the wooden tables and the light colors of the cushions reference Hanok's focus on wood and nature-based materials. Natural elements such as stones and plants within the space highlight the integration of the natural environment as an extension of the interior. This design aims to balance the preservation of cultural elements with the accommodation of modern user needs. However, the adaptation of traditional elements into modern commercial contexts carries the risk of commodifying local identity. For instance, if the flexible and sustainable nature of Hanok is reduced to an aesthetic element, the cultural heritage could lose its deeper significance. In the case of Daegu Jongro Gotaek, the functionality of local elements has been preserved within their original context, effectively preventing cultural meaning loss and demonstrating the successful application of glocalization strategies in interior design. In another part of the store, a display reflecting Starbucks' corporate identity features modern furniture and lighting elements (Figure 9). This juxtaposition highlights traditional seating and natural lighting in one area while integrating Hanok architecture with modern elements in another, ensuring the brand's corporate identity remains intact.

Figure 9. Traditional and Modern Furniture in the Interior of Starbucks Daegu Jongro Gotaek (Starbucks Korea Opens New Store in Historic Wooden Building, 2022).

In traditional Japanese architecture, some homes lack a ceiling, allowing the roof structure to remain visible from the interior. Among homes with ceilings, the Neda-Tenjyo type, where wooden beams support wooden panels, is commonly seen. Another type, the bamboo

DOI:10.15320/ICONARP.2025.340

lattice ceiling (Sunoko-Tenjyo), features bamboo or wooden strips placed on top of beams (Matsushita, 2004: 82). Ceiling height in traditional Japanese homes is determined by the number of tatami mats in the room. For example, a room with six tatami mats typically has a ceiling height of 182 cm (Matsushita, 2004: 89). Tatami are woven straw mats measuring 182x91 cm that traditionally cover the floors of Japanese homes (Matsushita, 2004: 82). Transitioning from the veranda to a tatami-covered area involves stepping on a kutsunugi, a shoe-removal step, which can be made from either stone or wood (Nagata, 2018: 16; İsmailoğlu and Yetim, 2024: 448).

Another essential feature of traditional Japanese homes is the tokonoma, a wall niche typically elevated slightly above the rest of the room. Decorated with flowers, paintings, or scrolls, the tokonoma is considered the most significant decorative element in a Japanese room (Matsushita, 2004: 26). At Starbucks Coffee Kyoto Ninenzaka Yasaka Chaya, the Sunoko-Tenjyo bamboo lattice ceilinga hallmark of traditional Japanese design is prominently featured. Additionally, the tatami flooring emphasizes the local identity, showcasing a defining characteristic of Japanese architecture. On the right side of the room, a tokonoma serves as a key decorative element (Figure 10). The niche displays a painting and a large ceramic bowl, underscoring its function as a space for exhibiting culturally significant objects. This combination of traditional Japanese elements in the store highlights the integration of cultural heritage with modern commercial design.

Figure 10. Structural Elements in the Interior of Starbucks Coffee Kyoto Ninenzaka Yasaka Chaya (Estiler, 2017).

One of the characteristic features of traditional Japanese architecture is the shoji sliding door. These doors, made of a wooden frame covered with translucent paper, allow natural light to filter into the interior while maintaining a degree of privacy. Shoji embodies the principle of harmonizing the interior with the natural environment, a core aspect of Japanese architecture (Beita and Fujii, 2013: 29). While typically used as doors, shoji can also function as windows or walls facing the exterior (Matsushita, 2004: 19). Another similar element used to separate interior spaces is the fusuma, which is visually and structurally akin to the shoji (Erdemir, 1993: 48).

Additional architectural features include hikae-mado (low-sill windows used for exterior walls), taka-mado (high-sill windows for ventilation), and ranma (ventilation panels located above fusuma or shoji). Another common feature in traditional Japanese houses is the koshi, a wooden lattice that prevents direct visibility into the interior from the outside while allowing occupants to view the exterior (Coaldrake, 1988: 403). Traditional furniture in Japanese homes

includes tansu (chests), hakokaidan (staircase cabinets), zabuton (rectangular cushions with silk, cotton, or linen covers), and chabudai (oval or square low tables). During tea service, circular trays called bon are also used (Koizumi, 1986: 99, 136-137).

In Starbucks Coffee Kyoto Ninenzaka Yasaka Chaya, shoji doors are used to connect the space with its garden. These wooden-framed, paper-covered doors allow sunlight to filter in while partially separating the interior from the exterior. Above the shoji doors, ranma panels are used for ventilation, while hikae-mado low-sill windows are located on either side. These structural elements, entirely derived from traditional Japanese architecture, resolve lighting and ventilation needs using local methods. The furniture includes traditional Japanese elements like zabuton cushions and chabudai tables. Modernized chabudai tables serve as coffee tables, referencing the traditional function of these pieces. On the left side of the space, a seating element and shoe rack, made of wood, align with local design principles while incorporating modern lines that reflect Starbucks' global identity. Behind the seating element, metal grids inspired by the koshi design offer a modern reinterpretation of traditional Japanese aesthetics, balancing local identity with contemporary materials (Figure 11). The incorporation of koshi reflects the balance between privacy and openness, a hallmark of Japanese design philosophy.

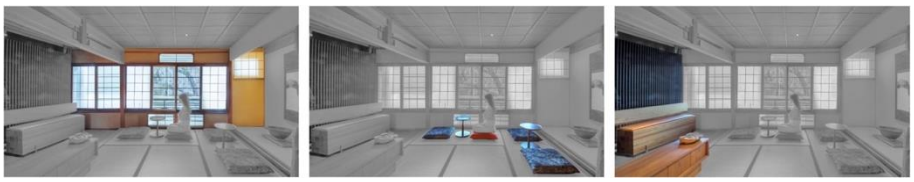


Figure 11. Structural Elements and Furniture in the Interior of Starbucks Coffee Kyoto Ninenzaka Yasaka Chaya (Estiler, 2017).

On the left side of another seating area in Starbucks Coffee Kyoto Ninenzaka Yasaka Chaya, hikae-mado low-sill windows are present. However, instead of the traditional matte paper used in Japanese architecture, the wooden frames of these windows are covered with durable opaque glass suited to commercial needs. This redesign retains the traditional form while adapting it to modern requirements. The space lacks a ceiling, leaving the roof structure directly visible, an approach commonly seen in traditional Japanese homes. A local design element, the kutsunigi shoe-removal step, is also incorporated. Since zabuton cushions are used for seating in this area, guests are required to enter the space barefoot, making the kutsunigi both a functional and decorative feature. At the center of the zabuton, a circular plate can be seen, inspired by the bon, a traditional tray used in Japanese culture for serving tea. This design element symbolizes the tradition of hospitality and serving guests, reflecting an important aspect of Japanese culture (Figure 12).

DOI:10.15320/ICONARP.2025.340

Figure 12. Structural Elements and Furniture in the Interior of Starbucks Coffee Kyoto Ninenzaka Yasaka Chaya (Estiler, 2017).

The ceiling of Starbucks Ise Naiku-mae features the Neda-Tenjyo style, where exposed wooden beams convey the cultural essence of the region through this structural element. Below the service counter, koshi-like wooden details evoke the wooden lattices commonly found in traditional Japanese homes, although in this context, the koshi serves purely decorative purposes. In contrast, the ceiling above the service counter, the wall behind it, and the counter itself are constructed entirely of modern materials. The clean lines of these elements align with the minimalist design principles of Japanese aesthetics while simultaneously reflecting Starbucks' global identity. LED lighting fixtures in the ceiling further contribute to the modern identity of this section (Figure 13). This combination of local elements, such as Neda-Tenjyo and koshi, preserves the cultural codes of Japanese architecture, while modern lighting and technological features reinforce the brand's global identity. As a result, the space successfully balances its connection to Japanese culture with the consistent corporate identity of Starbucks, creating a harmonious blend of tradition and modernity.

Figure 13. Structural Elements and Service Counter in the Interior of Starbucks Ise Naiku-mae (Beautiful New Store Features Traditional Japanese Design, 2021.

FINDINGS AND DISCUSSION

The current study aimed to examine how Starbucks, as a global brand, implements glocalization strategies in its interior designs, balancing local and global elements, and to reveal the impact of these strategies on the discipline of design. The six Starbucks stores analyzed in the study demonstrate that glocalization can be an effective tool in design processes.

The findings of this study reveal that glocalization, as a spatial design strategy, enables a nuanced balance between global brand consistency and local cultural expression. As previously outlined (Table 2), each of the six Starbucks stores analyzed incorporates region-specific architectural and decorative elements while simultaneously preserving the brand's standardized visual identity. These design decisions resonate with the principle of "global consistency with local touches," a strategy Starbucks has systematically implemented since the revision of its design approach in 2009 (Aiello & Dickinson, 2014: 318). These findings align with Roudometof's (2016) assertion that glocalization

enables brands to preserve cultural identities while fulfilling the functional demands of globalization, particularly in interior spatial configurations.

Table 2. Identified Local and Global Elements in the Stores

Store	***Local Elements***	***Global Elements***
Carbrook Hall Starbucks, Sheffield, England	Tudor Style Wooden Panels, Plaster Ceiling Decorations, and Fireplace	Modern Furniture, Corporate Color Palette, Standardized Seating Layout, and Modern Lighting Fixtures
Boulevard des Capucines, Paris, France	Baroque Style Mythological Frescoes on Ceilings, Gold-Gilded Column Capitals, Marble-Clad Columns, Segmented Walls, Herringbone Flooring, Crystal Chandeliers, and Baroque Decorations	Minimalist Modern Furniture, Functional Modern Lighting, Modern Fixtures (Handrails), and Standardized Service Layout
Famille Park Starbucks, Seul, South Korea	Hanok-Inspired Wooden Panels and Columns, Lighting Inspired by Korean Lanterns	Modern and Communal Seating Areas, Modern Lighting Fixtures, and Standardized Service Layout
Daegu Jongro Gotaek Starbucks, South Korea	Hanok-Inspired Traditional Wooden Ceiling, Use of Changhoji, Wooden Beams and Columns, Low Wooden Tables and Cushions, and Natural Stone and Plant Elements Connecting Nature to the Interior	Durable Modern Materials, Modern Furniture, Modern Lighting Fixtures, and Modern Decorative Elements
Kyoto Ninenzaka Yasaka Chaya Starbucks	Bamboo Lattice Ceiling, Shoji Doors, Ranma and Hikae-Mado Windows, Wall Niche (Tokonoma), Tatami Flooring, Traditional Japanese Furniture (Zabuton, Chabudai, Bon), and Kutsunigi	Modern Minimalist Designs and Durable Modern Materials
Ise Naiku-mae Starbucks	Neda-Tenjyo Ceiling, Koshi Wooden Details, Wooden Drawers, and Japanese Garden Elements	Modern Materials, Clean Lines, Modern LED Lighting, Modern Ventilation, and Standardized Service Layout

The findings of this study reveal that glocalization, as a spatial design strategy, enables a nuanced balance between global brand consistency and local cultural expression. As previously outlined (Table 2), each of the six Starbucks stores analyzed incorporates region-specific architectural and decorative elements while simultaneously preserving the brand's standardized visual identity. These design decisions resonate with the principle of "global consistency with local touches," a strategy Starbucks has systematically implemented since the revision of its design approach in 2009 (Aiello & Dickinson, 2014: 318).

Across all case studies, local materials, forms, and motifs have been carefully integrated into Starbucks interiors. This supports Dilek et al.'s (2015: 4) argument that glocalization strategies function by adapting global practices to local socio-cultural and environmental needs. For instance, the Carbrook Hall Starbucks in Sheffield exemplifies the adaptation of historical Tudor architectural elements—plaster ceilings,

DOI:10.15320/ICONARP.2025.340

wood paneling, and a central fireplace—into a modern commercial context. While some scholars (e.g., Shelby et al., 2022) have critiqued such approaches for potentially producing conflicting spatial identities, this example demonstrates a harmonious blend in which the global and local coexist without mutual dilution.

Similarly, the Boulevard des Capucines store in Paris presents a Baroque-inspired spatial narrative through frescoed ceilings, gilded column capitals, and marble finishes. These elements recall the grandeur of Versailles and align with Öztürkoğlu's (2023: 813) observation that Baroque interiors rely on visual richness, mythological themes, and dramatic spatial compositions. Nevertheless, the integration of minimalist furniture and functional lighting elements reflects the global identity of Starbucks, reinforcing the concept of glocalization as a strategy not of compromise, but of contextual negotiation. Similar to the observations made by Alaali and Pitsaki (2019: 894), the integration of regional architectural motifs in Starbucks stores reaffirms the role of glocalization in creating culturally resonant yet globally recognizable brand spaces.

In the East Asian contexts examined - South Korea and Japan - the design strategies reflect a deeper engagement with traditional architecture and philosophy. The use of changhoji, wooden beams, and Cheongsachorong-inspired lighting at Famille Park in Seoul exemplifies what Bagina (2021: 24) describes as the recontextualization of vernacular forms within contemporary global aesthetics. Here, glocalization not only sustains brand familiarity but also celebrates material and cultural sustainability.

Moreover, the Daegu Jongro Gotaek store further underscores this synthesis by incorporating natural materials, low tables (soban), and garden elements, which align with Hanok traditions. This case reveals how glocalization transcends decorative use, functioning instead as a spatial ideology that honors cultural heritage while meeting modern consumer expectations. As noted by Lee and Kim (2014: 83), furniture in Hanok is multifunctional and mobile - qualities that align with contemporary design priorities in global retail environments.

In Japanese examples, such as the Kyoto Ninenzaka Yasaka Chaya and Ise Naiku-mae stores, glocalization becomes an act of cultural embedding. The inclusion of shoji, ranma, tatami, and tokonoma reveals a thoughtful engagement with the spatial codes of traditional Japanese homes. Matsushita (2004) explains that such features are not merely decorative but serve to regulate light, privacy, and spatial hierarchy. The presence of kutsunugi and bon trays in seating areas further demonstrates a ritualistic approach to spatial organization, where global café culture adopts the rhythm of local customs.

From a functional standpoint, the global elements—such as lighting systems, furniture ergonomics, and service layouts—fulfill brand expectations and operational needs. However, their placement and material selection adapt to the regional context, aligning with Özer's

(2018: 124) assertion that sustainable design can emerge from the convergence of global systems and local sensitivities.

Across all case studies, spatial configurations support user engagement, reflecting the second-wave coffee culture's emphasis on experience, comfort, and belonging (Kahya and Zencir Çiftçi, 2022: 1254). Starbucks' adoption of culturally specific interiors not only enhances aesthetic diversity but fosters a deeper psychological connection between space and user. As noted by Şeker and Özata (2022: 194), coffee shops have evolved into spaces of symbolic exchange and social interaction - an identity that is reinforced when local cultural codes are visibly present and meaningfully embedded.

In sum, the study affirms that glocalization in interior design operates at the intersection of cultural preservation, experiential branding, and spatial identity. The Starbucks case studies analyzed here illustrate that when global and local elements are balanced in both aesthetic and functional dimensions, spaces can offer inclusive and context-aware user experiences without compromising brand cohesion. This supports the argument by Alaali and Pitsaki (2019: 894) that global brands can maintain architectural continuity while enhancing cultural relevance by embedding local materiality and symbolism into their store designs.

Nonetheless, it is important to approach glocalization critically. As discussed by Shelby et al. (2022), there remains a risk of cultural commodification, particularly when local elements are reduced to visual motifs devoid of their original meaning. However, the examples in this study demonstrate that with intentional design and cultural literacy, glocalization can serve not merely as a marketing tool but as a methodological approach in interior architecture that supports cultural continuity and spatial authenticity.

Despite the compelling insights offered by the cross-cultural analysis of Starbucks stores, this study is not without limitations. First, the research focused exclusively on six case studies, all of which were analyzed through qualitative visual interpretation and secondary sources. As such, the generalizability of the findings may be limited. The content analysis did not incorporate direct user experience data, interviews, or ethnographic fieldwork, which could have enriched the understanding of how these spaces are perceived and used in real contexts. Future research may benefit from incorporating mixed methods, combining content analysis with user-centered approaches or stakeholder interviews, to deepen the analysis and validate the interpretation.

CONCLUSIONS

In general, the vertical and horizontal structural elements in Starbucks' interiors lend a local identity to the space, whereas modern furniture choices, seating arrangements, and lighting elements preserve the global identity. Global elements such as standardized service layouts

DOI:10.15320/ICONARP.2025.340

and lighting fixtures are seamlessly integrated alongside local features to optimize the user experience. This approach underscores the effectiveness of glocalization as a design strategy that balances cultural preservation with modern functionality. The study has contributed to the literature on the application of glocalization strategies in interior design and provided concrete examples where local and global elements are effectively balanced. It offers a guiding model for global brands on integrating local elements into spatial design. The findings can serve as a reference for other brands in developing their design strategies. While emphasizing the importance of glocalization in design, the study also highlights potential risks associated with this strategy. Issues such as the commodification of cultural heritage in commercial contexts and the loss of meaning in local identity require careful consideration. As demonstrated in the Starbucks example, the preservation of cultural elements not only for aesthetic purposes but also for functional and contextual integration forms the foundation of successful glocalization practices. Future research could focus on examining glocalization strategies employed by global brands across different sectors, further broadening the understanding of how local and global elements can be harmonized in interior design.

REFERENCES

Aiello, G. and Dickinson, G. (2014). Beyond authenticity: a visual-material analysis of locality in the global redesign of Starbucks stores. *Visual Communication, 13*(3), 303-321. https://doi.org/10.1177/1470357214530054

Al-Qawasmi, J. (2006). *Changing trends in architectural design education.* Amman: CSAAR-The Center for the Study of Architecture in the Arab Region.

Alaali, A. and Pitsaki, I. (2019). Experience design at Starbucks: from global brand management to local spatial experiences. *Research Perspectives In the era of Transformations Conference Proceedings of the Academy for Design Innovation Management, 2*(1), 893-907. https://doi.org/10.33114/adim.2019.02.305

Bagina E. (2021). On natural and artificial glocalization. *Project Baikal, 18*(69), 24-31. https://doi.org/10.51461/projectbaikal.69.1841

Beautiful new store features traditional Japanese design. (2021, 24 March). Starbucks Stories Asia. Accessed Sebtember 21, 2024 from https://stories.starbucks.com/asia/stories/2021/new-store-with-traditional-japanese-design/

Beita, E. and Fujii, A. (2013). Harmonization between architecture and nature through traditional Japanese screens. *International Journal of Design & Amp; Nature and Ecodynamics, 8*(1), 29-40. https://doi.org/10.2495/dne-v8-n1-29-40

Blatter, J. (2022, February 23). Glocalization. In *Encyclopedia Britannica.* https://www.britannica.com/money/glocalization

Camcı, K. Ş. and Şekerci, C. (2022). Bilgi ve değer dünyasında mimarlık; Mananın taşlaşması. *STAR Sanat ve Tasarım Araştırmaları Dergisi, 3*(4), 23-34.

Carbrook Hall, Attercliffe Common Sheffield. (2019, 30 December). DLP Consultants. Accessed October 02, 2024 from

https://www.dlpconsultants.co.uk/portfolio/carbrook-hall-attercliffe-common-sheffield/

Çetin, Y. (2017). Batılılaşma dönemi Osmanlı cami mimarisinde mükebbireler. *Kesit Akademi Dergisi, 3*(7), 407-420. https://doi.org/10.18020/kesit.1123

Choi, J. S. (2007). A comparison of characteristics between Danish and Korean farmhouses-in reference to farmhouse plans, use of rooms including furniture arrangement, and building materials. *International Journal of Human Ecology, 8*(1), 67-78.

Coaldrake, W. H. (1988). The gatehouse of the Shogun's Senior Councillor: Building design and status symbolism in Japanese architecture of the late Edo Period. *The Journal of the Society of Architectural Historians, 47*(4), 397-410. https://doi.org/10.2307/990383

Coşkun, B. S. (2018). Risk altındaki tarihi yapıların yeniden işlevlendirilerek hayata döndürülmesi: Astley Castle örneği. *Tasarım Kuram, 14*(25), 17-32. https://doi.org/10.23835/tasarimkuram.415896

Dilek, S. E., Kaygalak, S., Lale, C. and Şanlıöz, H. K. (2015). Otel işletmelerinde küyerelleşme yaklaşımı: İzmir ili örneği. *Dokuz Eylül Üniversitesi İşletme Fakültesi Dergisi, 16*(1), 1-22. https://doi.org/10.24889/ifede.268169

Erdemir, E. (1993). *Culture-space relationship: Japanese traditional residential interiors* (Yayın No. 26943) [Master's thesis, Bilkent Üniversitesi]. YÖK Ulusal Tez Merkezi.

Estiler, K. (2017, 5 July). *The most beautiful Starbucks on earth is in a historic Japanese townhouse.* Hypebeast. https://hypebeast.com/2017/7/starbucks-kyoto-nineizaka-yasaka-tea-house-higashiyama

García, C. (2020). Cardinal mazarin's breviary of politics: Exploring parallelisms between the baroque and public relations in a post-truth society. *Public Relations Inquiry, 9*(3), 295-310. https://doi.org/10.1177/2046147x20920805

Gök, G. A. (2014). *Kültürel ürün tasarım süreci ve denemesi: Anadolu mutfağına yönelik günümüz yaşam koşullarına uygun küçük ev aleti tasarımı* (Yayın No. 386135) [Master's thesis, Mimar Sinan Güzel Sanatlar Üniversitesi]. YÖK Ulusal Tez Merkezi.

Gökce, D. and Kaya, A. (2020). Geleneksel kırsal konut tipolojileri üzerinden kültür-mekân ilişkilerinin mekân dizimi yöntemiyle incelenmesi: Düzce ili örneği: Mekân-dizimi yöntemi ile konut-kültür ilişkilerini okumak. *Tasarım+Kuram, 16*(31), 36-56. https://doi.org/10.14744/tasarimkuram.2020.60783

Harun, S. N., Abdul Karim, N., Muhammad, A. and Mohd Sood, S. (2020). Assessment of the historic interior of carcosa heritage building, Kuala Lumpur for building conservation. *Planning Malaysia, 18*(12), 1-11. https://doi.org/10.21837/pm.v18i12.738

He, J. and Wang, C. L. (2017). How global brands incorporating local cultural elements increase consumer purchase likelihood. *International Marketing Review, 34*(4), 463-479. https://doi.org/10.1108/imr-08-2014-0272

İsmailoğlu, S. and Yetim, E. (2024). Reading traditional Japanese architecture through Hayao Miyazaki cinema. *Turkish Online Journal of Design Art and Communication, 14*(2), 445-462. https://doi.org/10.7456/tojdac.1412747

Kahya, Z. and Çiftçi Zencir, E. (2022). Kahvecilik nesillerinin özellikleri üzerine bir araştırma. *Journal of Tourism and Gastronomy Studies, 10*(2), 1252-1271. https://doi.org/10.21325/jotags.2022.1040

Kang, J. (2020, 9 February). *Attention Café-Goers: Take A Look Inside The Most Magical Starbucks Location In Korea.* Koreaboo.

DOI:10.15320/ICONARP.2025.340

https://www.koreaboo.com/stories/attention-cafe-goers-take-look-inside-magical-starbucks-location-in-korea/

Kobayashi, M. (2013). Studies on application of camouflage patterns: To background for design works and presentation. *Research Papers of Osaka Kuzuin Women's University, 3*, 225-230.

Koizumi, K. (1986). *Traditional Japanese furniture.* USA: Kodansha International.

Küçük, E. and Bilgiç, D. E. (2022). Küyerelleşme kavramı kapsamında, kültürün iç mekân tasarımına etkisinin zincir otellerin lobi tasarımları üzerinden irdelenmesi, Marriott Otel örneği. *Journal of Architectural Sciences and Applications, 7*(1), 317-345. https://doi.org/10.30785/mbud.1079105

Kurtuldu, G. (2016). "Starbucks" iş modeli ve globalleşme sürecine kıyasla bir iş modeli olarak "Kahve Dünyası"nın gelişimi ve globalleşmesi. *Kırklareli Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 5*(2), 33-55.

Latif Baruönü, Ö. and Örs, M. (2018). İkinci dalga kahve tercihini etkileyen faktörler: İçtiğimiz kahveleri tanıyor muyuz?. *Journal of Tourism and Gastronomy Studies, 6*(4), 150-173. https://doi.org/10.21325/jotags.2018.302

Lee, D. W. and Moon, D. S. (2010). The study on immaterial role of traditional furniture. *Journal of the Korea Furniture Society, 21*(6), 439-448.

Lee, J. S. and Kim, M. T. (2014). A study on soban (dining table) design applying of Korean traditional architecture. *Journal of the Korea Furniture Society, 25*(2), 79-86.

Matsushıta, S. (2004). *Comparative study of the structure of traditional timber housing in Turkey and Japan* [Unpublished master's thesis]. Middle East Technical University.

Musonera, E. (2021). Strategic marketing case analysis: Starbucks. *Journal of Business and Social Science Review, 2*(11), 12-22. https://doi.org/10.48150/jbssr.v2no11.2021.a2

Nagata, T. (2018). Tarōbō by Rohan Koda: translated into English by Tsutomu Nagata. *Asian Literature and Translation, 5*(1), 11-24. https://doi.org/10.18573/alt.29

Nalçakan, H. and Polatoğlu, Ç. (2008). Türkiye'deki ve Dünyadaki Mimarlık Eğitiminin Karşılaştırmalı Analizi ile Küreselleşmenin Mimarlık Eğitimine Etkisinin İrdelenmesi. *Megaron, 3*(2), 79-103.

Özer, R. (2018). *Kü-yerelleşme perspektifinden sakin şehirler: Yalvaç örneği* (Yayın No. 541741) [Master's thesis, Süleyman Demirel Üniversitesi]. YÖK Ulusal Tez Merkezi.

Öztürk, G. and Çivici, M. E. Ö. (2018). Küyerelleşme kapsamında Türkiye turizm tanıtım afişlerinde somut olmayan kültürel miras öğelerinin kullanımı: Bir gösterge bilim analiz örneği. *Journal of Travel and Tourism Research,* (13), 69-95.

Öztürkoğlu, M. (2023). Predicting various architectural styles using computer vision methods. *Journal of Architectural Sciences and Applications, 8*(2), 811-828. https://doi.org/10.30785/mbud.1334044

Page, J. (2024, 14 June). The historic, weird and wonderful former lives of Starbucks stores across EMEA. Starbucks Stories & News EMEA. https://stories.starbucks.com/emea/stories/2024/the-historic-weird-and-wonderful-former-lives-of-starbucks-stores-across-emea/

Park, N. and Fouser, R. J. (2015). *Hanok: The Korean house: Architecture and design in the contemporary hanok.* USA: Tuttle Publishing.

Polat, A. I. and Çelikel, S. B. (2023). Geleneksel Kore evi Hanok'un Feng Shui ilkeleri ile kutsal mekâna dönüşümü. *Akdeniz University Journal of the Faculty of Architecture, 2*(1), 57-75.

Reeves-Smyth, T. (2007). Community to privacy: late Tudor and Jacobean manorial architecture in Ireland, 1560–1640. Horning, AJ, Ó Baoill, R., Donnelly, CJ, & Logue, P.(eds.) *The Post-Medieval Archaeology of Ireland, c*, 1550-1850.

Roudometof, V. (2016). Theorizing glocalization: Three interpretations 1. *European Journal of Social Theory, 19*(3), 391-408. https://doi.org/10.1177/1368431015605443

Różańska, A., Swaczyna, I., Tomusiak, A. and Koryciński, W. (2011). Design and structure of decorative wooden flooring sets in manor houses. *Annals of Warsaw University of Life Sciences – SGGW Forestry and Wood Technology, 75*, 262-268.

Ryoo, S. L. and Youn, H. C. (2019). The evolutionary use of curved wood in Korean traditional architecture. *Sustainability, 11*(23), 6557-6574. https://doi.org/10.3390/su11236557

Şeker, G. and Özata, F. Z. (2022). Kahvenin ve kahve dükkânlarının değişen tüketim algısı: Üçüncü dalga kahve tüketicileri üzerine fenomenolojik bir araştırma. *Journal of Tourism and Gastronomy Studies, 10*(1), 193-224. https://doi.org/10.21325/jotags.2022.986

Serinkaya, E. Y. (2022). Kültür-iç mekân etkileşiminin konut mutfak tasarımına etkileri. *Tasarım Mimarlık ve Mühendislik Dergisi, 2*(1), 10-19.

Shelby, J., Lindsay, G. and Derr, C. (2022). Contested Identities, Contested Building: Planning for a Glocal Future. *Archnet-Ijar: International Journal of Architectural Research, 16*(3), 671-687. https://doi.org/10.1108/arch-09-2021-0257

Starbucks Corporation. (2023, 1 October). *Store Counts.* Quarterly Results And Supplemental Data. https://s203.q4cdn.com/326826266/files/doc_financials/2024/ar/fy23-annual-report.pdf

Starbucks Korea opens new store in historic wooden building. (2022, 2 October). Starbucks Stories Asia. Accessed Sebtember 13, 2024 from https://stories.starbucks.com/asia/stories/2022/starbucks-korea-opens-new-store-in-historic-wooden-building/

Torkington, K. (2012). Place and lifestyle migration: The discursive construction of 'Glocal' place-identity. *Mobilities, 7*(1), 71-92. https://doi.org/10.1080/17450101.2012.631812

Uçar, T. F., Uçar, T. F., Kılıç, L., Orhon, N. ve Taşçıoğlu, M. (2011). *Görsel kültür.* Eskişehir: Anadolu Üniversitesi.

Uyan Dur, B. İ. (2015). Türk görsel iletişim tasarımı ve kültürel değerlerle bağları. *Journal of International Social Research, 8*(37), 443-453.

Yavuzçehre, P. S. (2013). Küreselleşmenin artan etkisinde Denizli. *İdealkent, 4*(8), 200-227.

Resume

Turgut Kalay received his B.A. in Interior Architecture from Anadolu University and completed his M.A. at Kocaeli University in 2019 with a thesis on studio spaces and ergonomics in interior architecture education. He earned his Ph.D. in Interior Architecture from Mimar Sinan Fine Arts University in 2022. He is currently an Assistant Professor at Kütahya Dumlupınar University. His

DOI:10.15320/ICONARP.2025.340

research interests include interior architecture education, biophilic design, biomimicry, fictional spaces, and interdisciplinary design approaches.

Ayşenur KANDEMİR received her B.A. in Interior Architecture from Akdeniz University in 2019 and completed her Ph.D. at Mimar Sinan Fine Arts University in 2025. She is currently a Research Assistant in the English-taught Interior Architecture Program at Istanbul Nişantaşı University, Faculty of Art and Design. Her research interests include interior theory; furniture and material studies; biomimicry and biomaterials; digital and fictional interior spaces; spatial perception; sustainable design approaches; and interdisciplinary design methodologies.

Research Article

ICONARP
International Journal of Architecture and Planning
Received: 01.05.2025 Accepted: 11.09.22025
Volume 13, Issue 2/ Published: 31.12.2025
DOI: 10.15320/ICONARP.2025.341E- ISSN:2147-9380

ICONARP

User-Centered Design for Coworking Space Interiors

Umut Tuğlu Karslı *
Saadet Aytıs **

Abstract

Coworking spaces, beyond being a physical space, represent a new organizational form and a new living style. Although coworking spaces have been widely studied by human sciences and managerial disciplines, academic studies on their spatial characteristics are limited and they are focused on some specific areas. This paper draws a multi-dimensional framework for spatial characteristics that play an important role in users' satisfaction and preference for a coworking space. In this context the paper aims to determine the user-centered spatial characteristics constituting a guide for interior design of coworking spaces and to introduce design considerations based on the research findings. The spatial characteristics are reclassified under technical, functional and behavioural characteristics (Post-Occupancy Evaluation method); an "user-centered design research for coworking spaces" structured with these characteristics is conducted, and design considerations based on research findings are introduced. The research reveals satisfaction and importance levels of spatial characteristics in coworking spaces; identifies the spatial characteristics with low performance that need to be improved; confirms the importance of spatial characteristics in users' preference for a coworking space and reveals that spatial characteristic preferences differ for users with different characteristics. The key findings regarding the user-centered spatial characteristics are “to consider the spatial configuration of noisy and quiet spaces according to the levels of interaction and privacy for users having different work motivations”, “to provide the arrangement of activity spaces, gathering spaces and workspaces (collaboration spaces and private spaces) allowing flexibility and individual control possibility” and “to create a cozy interior atmosphere with a strong IT infrastructure”. As a practical contribution, this paper provides useful information for owners, managers and designers of coworking space, in the process of renovating or establishing a coworking space.

Keywords: *Coworking spaces, interior design, post-occupancy evaluation, user-centered design, work environments*

* Department of Interior Architecture, Istanbul University, Istanbul, Türkiye. (Corresponding author)
E-mail: umutt@istanbul.edu.tr

** Department of Interior Architecture, Mimar Sinan Fine Arts University, Istanbul, Türkiye.
E-mail: saadet.aytis@msgsu.edu.tr

To cite this article: Karslı, U.T., & Aytıs, S. (2025). User-Centered Design for Coworking Space Interiors. *ICONARP International Journal of Architecture and Planning,* 13 (2), 688-708. DOI: 10.15320/ICONARP.2025.341

INTRODUCTION

The knowledge worker's constant digital connectivity often causes them to become increasingly isolated and deprived of the face-to-face contact that would support the creativity and innovation required by knowledge work. Face-to-face communication is powerful than other means of communication with regard to enabling " *context-specific, complex*" knowledge sharing that facilitates innovation and creativity (Stryker and Santoro 2012; Augustin, 2014), improving knowledge gained through serendipity, and triggering other forms of intimacy allowing knowledge exchange across coworkers and organisations (Mariotti, Pacchi and Di Vita, 2017). Coworking spaces characterised by social interactions, close contacts and learning opportunities based on face-to-face communication are third places where knowledge workers work outside the home and office. These spaces are innovative workplaces that respond to increasing demand by representing the most flexible form of workspace spectrum (Kojo and Nenonen, 2016), where creative or knowledge workers, often free-lancers or self-employed, share workspaces (Mariotti *et al.*, 2017). Coworking spaces are recognised as "*serendipity accelerators*" that offer a dynamic working environment for creative professionals and entrepreneurs who escape social isolation and seek opportunities for collaboration (Moriset, 2013).

Coworking spaces, which the number is increasingly growing, are frequently studied in sociology, business management, workplace psychology and geography fields. The aim of this research is to focus on the field of interior design, where the number of academic research on the subject is limited; to reveal the user-centered spatial characteristics that will determine a guide for interior design of coworking spaces and to introduce design considerations based on research findings.

LITERATURE REVIEW

Types of Coworking Spaces

Coworking spaces have been categorised by different disciplines and academic circles from different perspectives: Kojo and Nenonen (2016), in their research conducted in Finland, mention 6 types of coworking spaces: "*third places, public offices, collaboration hubs, incubators, shared studios and coworking hotels* ". Schmidt, Brinks and Brinkhoff (2014) define coworking spaces as "*innovation and creativity labs*" and categorise innovation and creativity labs under 5 types as a result of 53 case studies conducted in Berlin. These are "*grassroots labs, coworking labs, firm-driven innovation labs, academic-driven innovation labs* and *incubators and accelerators*".

"*Open coworking spaces*" can be public, semi-private or private in terms of the organisation. The term "open" here means that the coworking space is accessible to all users without any selection criteria or with low access conditions. This type of coworking space is the most common type that applies the philosophy of providing a democratic and egalitarian environment, which is the emergence and development

DOI: 10.15320/ICONARP.2025.341

philosophy of coworking culture. In this research, open coworking spaces are categorised as *third places* (Oldenburg, 1999; Kojo and Nenonen (2016), *coworking labs* (Schmidt *et al.*, 2014) and *open innovation and fabrication labs* (Schmidt *et al.*, 2014; Mariotti *et al.*, 2017).

"Academic-driven coworking spaces" are physical places that serve the university's mission to ensure the understanding, dissemination and utilisation of scientific and technological resources (Schopfel, Roche and Hubert, 2015) that will respond changing academic dynamics of the information society. In this research, academic-driven coworking spaces are classified as *learning centres* (Schopfel *et al.*, 2015) defined as a meeting space (Aabø, Audunson and Vårheim, 2010) and a social learning environment (Bilandzic and Foth, 2013), and *academic-driven innovation labs* (Schmidt *et al.*, 2014), which are candidates to replace traditional academic libraries.

"*Firm-driven innovation labs*" are often the physical spaces for innovation processes of large and multinational companies. Companies, research and development organisations, creative industries and universities are selected to use the infrastructure of the lab. In this way, users benefit from company-related resources, while the owners internalise the knowledge created in their labs (Schmidt *et al.*, 2014).

Spatial Characteristics of Coworking Spaces

A literature review is conducted in order to determine spatial characteristics of coworking spaces and they are reclassified under "technical, functional and behavioural" categories of Post-Occupancy Evaluation (POE) method, to create a multi-dimensional and systematic framework, that lacks in current literature, for user-centered design research of coworking spaces.

Lee (2018)'s research focused on preferred features of coworking space users, namely, "*consistent brand identity, access to outdoor nature, access to indoor natural elements, spatial layout and openness, availability of individual workspaces, availability of collaborative spaces, furniture-flexible arrangement, furniture quality, control of lighting, lighting quality, control of acoustic privacy, control of visual privacy* and *thermal comfort".* These features have not been categorised and have been grouped as "environmental features". Weijs-Perrée *et al.*, (2019) offered a broader perspective for characteristics that also included operational features of these spaces. According to literature review of Weijs-Perrée *et al.*, (2019), the physical characteristics of coworking spaces to prefer the space, are "*24/7 access, access to tools, resources and network, good accessibility, coworking host, atmosphere and interior aesthetics, diversity of tenants, event spaces, collaborative spaces, networking events and workshops, flexible workspaces, virtual platform, concentration rooms, flexible lease contract, kitchen spaces, meeting rooms, open layout*".

Sayers (2009)'s thematic analysis is not directly about the spatial characteristics of coworking spaces, however derives ten main themes, namely, *"informality, leisure, aesthetic, time (management), work-station,*

hospitality, innovate, transaction, escape and sociality" to explore how and why people use cafés as a third place to facilitate work and their productivity.

Waxman (2016)'s research explored the physical characteristics that support gathering behaviour and improve place attachment in coffees as a third place, and has found design considerations including "*cleanliness, adequate lighting, a view to the outside, comfortable furniture and appealing aroma*". According to Tuglu Karsli (2020), the design implications to encourage users to prefer a coworking space are, "*accessibility, sustainability, openness and permeability, flexibility, home-like spaces, collaboration spaces, concentration spaces, gathering spaces, technology-assisted spaces and activity-based spaces*". Van de Koevering (2017) researched the relation between characteristics of users and preferred coworking space features by using "*accessibility of the location, atmosphere and interior aesthetics (industrial, modern and homey), diversity in supply spaces, layout of the space, diversity of tenants, reception and hospitality, events and type of lease contract*" attributes and attributes levels.

Ondia, Hengrasmee ve Chansomsak (2019)'s research focused on "privacy", as one of the behavioural space characteristics of coworking spaces. The findings of the research demonstrate that characteristics of the physical environment including of barriers (*walls, screens, floor level changes or color changes*) and fields (*shape, orientation, size and environmental conditions*) are strong tools to regulate users' privacy within a coworking space (Ondia *et al.*, 2019). Privacy and interaction, as two sides of the same coin are two characteristics required for coworking spaces. Orel and Almeida (2019) analysed workplace ambiences in coworking spaces which encourage the possibility of interactivity between individuals and stimulating towards collaboration and their observations focused on two components of workspaces, namely, "the visual and spatial characteristic of observed workspaces (*layout of the space, commonly used functional elements and designed features*) and the mediation system operated by workplace managers (*tools that trigger the interaction, their effectiveness and responsiveness of individuals*).

Meinel, Maier, Wagner and Voigt (2017), conducted a systematic literature review on previous research on creativity enhancing workplaces. They determine categories and characteristics of the physical work environment influencing creativity as "office elements (intangible office elements: "*sound, light, colors, smell and temperature*" and tangible office elements: "*furniture, office equipment, decorative elements, plants, the presence of a window/view and materials and surfaces*"), spatial layout *(flexibility/customization/balance, privacy, office layout, complexity and office size*) and space types (*doodle, relaxing, disengaged and unusual/fun spaces)"* (Meinel *et al.*, 2017).

Remøy and Van der Voordt (2014) researched which property features are significant push and pull factors in relocation of creative organizations. In this research, building features are "*exterior*

DOI: 10.15320/ICONARP.2025.341

appearance, car parking, bike parking, routing, layout flexibility, comfort, space efficiency, interior appearance, technical state, recognisable user, building facilities, security, year of construction, energy performance and commodities logistic" (Remøy and Van der Voordt, 2014).

Categorisation of Spatial Characteristics

POE is an approach for the systematic evaluation of buildings some time after they have been constructed and occupied. POE focuses on building users' needs and provides insight into the results of past decisions related to design and the resulting performance of the space. This information provides a stable basis to create better spaces in the future (Preiser, Rabinowitz and White, 1988). Evaluation research such as POE determines the extent to which environmental features influence users' satisfaction or dissatisfaction; these studies have been conducted in offices since the 1980s (Vischer, 2008b). Vischer (2008a) defined performance categories as *physical, functional and psychological comfort*, while Sanoff (1977) proposed four performance levels: *functional, symbolic, economic and structural*. In Preiser and Vischer's (2005) book, performance criteria are stated as *physical, economic, functional, environmental and service performance*; while Lutzkendorf and Speer (2005) categorised these performance levels as *functional, social, technical, economic, environmental and process performance*. Preiser *et al.*, (1988) argue that the three main categories in building assessment are related to *technical, functional and behavioural* performance. This research uses the "technical, functional and behavioural" performance criteria of Preiser *et al.*, (1988), which are the most commonly used in the literature.

As a result of the literature review to determine a multi-dimensional and systematic framework for spatial variables for coworking spaces, the prominent spatial characteristics are reclassified under "technical, functional and behavioural" spatial variables:

- technical variables,

"daylighting, general lighting, task lighting, acoustic comfort, thermal comfort, natural ventilation, indoor air quality, cleanliness and hygiene, social distance, conservation of energy and resources, IT infrastructure, access to sockets and individual control possibility"

- functional variables,

"location, accessibility, space dimensions, circulation areas, ceiling height, flexibility, furniture dimensions, comfort of furniture, adjustability of furniture, architectural program and spatial layout"

- behavioural variables,

"openness, transparency, hospitality, encouraging serendipity, informality, visual privacy, acoustic privacy, concentration, design aesthetics, brand identity, natural elements, visual connection with nature and interior style".

ICONARP – Volume 13, Issue 2 / Published: 31.12.2025

RESEARCH

The research is conducted to determine the user-centered spatial characteristics constituting a guide for interior design of coworking spaces. The research aims to reveal satisfaction and importance levels of spatial characteristics in coworking spaces; to identify the spatial characteristics with low performance that need to be improved; to confirm the importance of spatial characteristics in users' preference for a coworking space and to reveal that spatial characteristic preferences differ for users with different characteristics. In this context, the research questions addressed in the user-centered design research for coworking spaces are as follows:

- What are the performance levels of spatial characteristics of coworking space?

- Is there a statistically significant relation between satisfaction levels with spatial characteristics and overall satisfaction levels?

- Is there a statistically significant relation between users' motivations to use the space and the importance levels of spatial characteristics?

The user characteristics of coworking spaces are investigated with the "demographic characteristics" of the users and the "characteristics related to users' usage of coworking space". The technical, functional and behavioural variables in the POE approach are adopted in the classification of spatial characteristics (Figure 1).

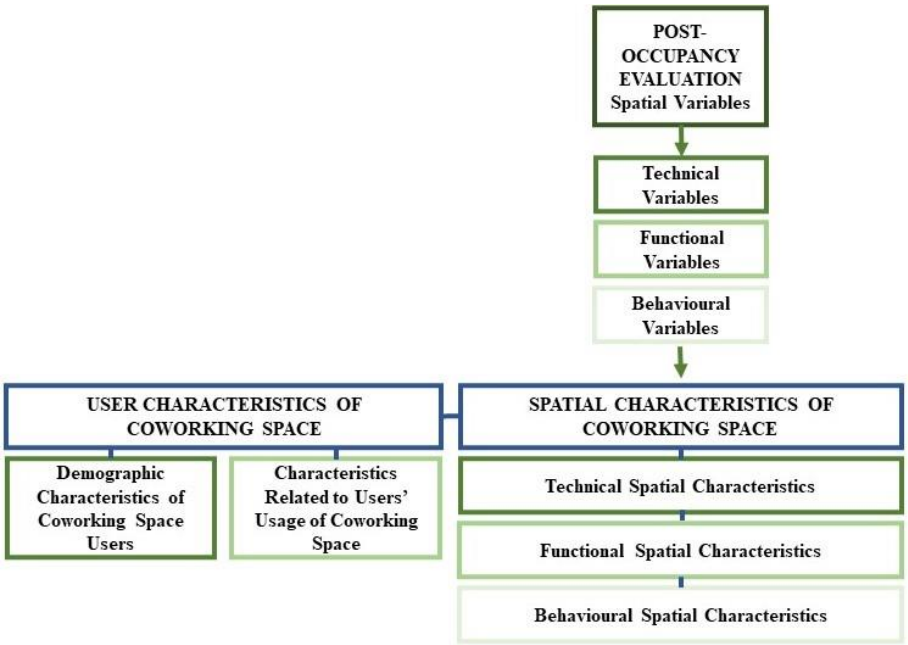


Figure 1. Conceptual model of the research.

The participants of the research are the users of the coworking spaces. The term "user" here includes not only the "customers" who receive service but also the employees (managers, business owners and employees) of the coworking space. The research is conducted based on the voluntary participation of the participants.

DOI: 10.15320/ICONARP.2025.341

Survey

The survey used as data collection tool consists of 2 sections and a total of 41 questions. In the first part of the survey, user characteristics are investigated with "demographic characteristics" (*gender, age, educational level, income status, employment status and employment sector*) and "characteristics related to users' usage of coworking spaces" (*location of coworking space, accessing mode of coworking space, type of coworking space, user role in the coworking space and user motivation for working in coworking space*) questions (Figure 2).

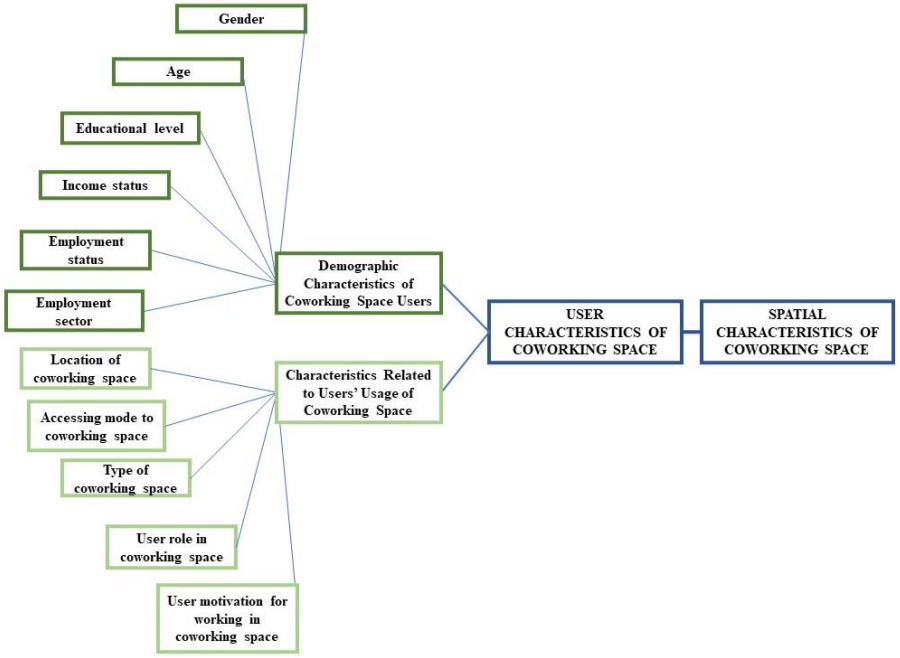


Figure 2. User characteristics.

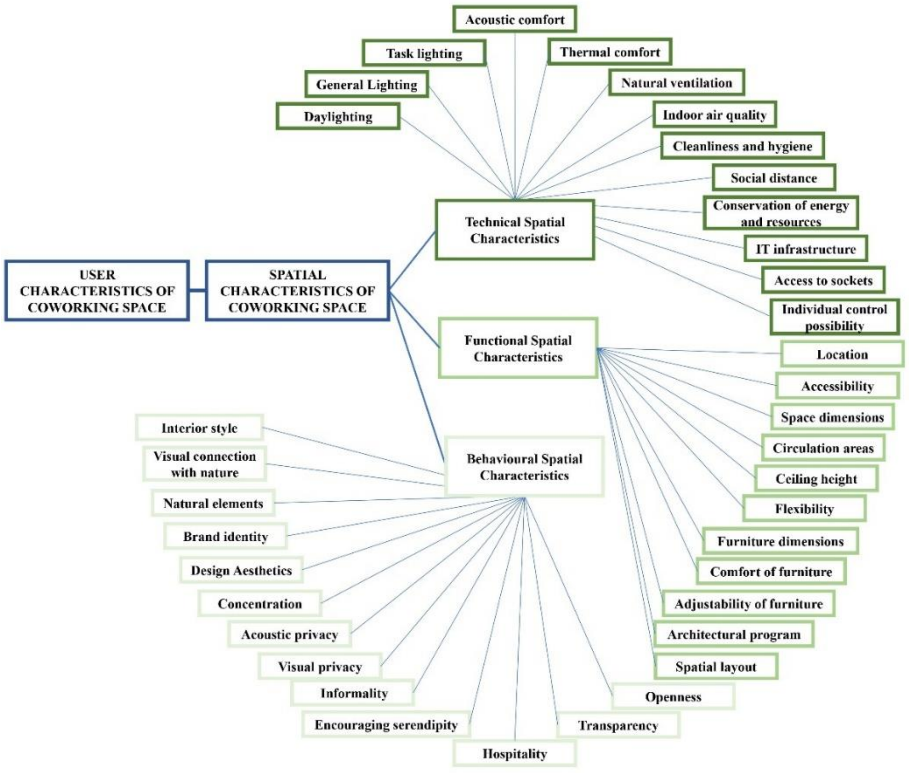


Figure 3. Spatial characteristics.

In the second part of the survey, spatial characteristics are investigated with questions under three sub-sections: technical, functional and behavioural characteristics (Figure 3).

In each sub-section, the participants are asked to rate on a 5-point Likert scale, their level of satisfaction with the spatial characteristics of their most frequently used coworking space and the level of importance of spatial characteristics of their ideal coworking space. At the end of the survey, there are questions to measure the users' overall satisfaction with their most frequently used coworking space and the level of recommendation to their friends/relatives.

Before the data collection process, the contact information of coworking spaces operating in Türkiye are searched on Google, on coworking space web sites and coworking communities web sites in order to access the survey participants, and an invitation letter requesting their collaboration for participation in the research and delivery of surveys to their users is sent to the e-mail addresses of 90 coworking spaces, along with the user-centered design research survey in coworking spaces. The survey is created and submitted online.

Analysis

The data obtained from the surveys are analysed with SPSS Statistics 28 package program. Descriptive statistical analyses are applied to the data for evaluating user characteristics and spatial characteristics. Gap analysis is performed to analyse the differences between the importance and satisfaction levels of spatial characteristics for determining the spatial characteristics with low and high performance. Correlation analysis is applied to determine whether there is a significant relation between satisfaction levels with spatial characteristics and overall satisfaction levels. Finally, correlation analyses for "motivation to use the space" are conducted to compare the importance levels of spatial characteristics according to the "characteristics related to users' usage of coworking space (motivation to use the space)" that may be determinative in coworking space interior design. Reliability analyses are performed for all scales.

User characteristics-demographic characteristics

The survey is submitted by 152 coworking space users. The gender distribution of the participants is balanced; 52.6% of participants are female and 46.1% are male. 2 participants did not want to specify their gender. The age distribution ranges between 18 and 62, with a mean age of 33.92 years and a standard deviation of 10.75.

The educational level of the coworking space users in the sample is generally high. 38.8% Of the participants are bachelor's program graduates, 33.6% are graduate program graduates, 22.4% are associate degree program graduates, and 5.3% are high school graduates.

The income status of the participants ranged between 1 and 9 on a 10-point scale, with a mean of 6.38 and a standard deviation of 1.54. Almost half (47.4%) of the coworking space users in the sample work full-time;

DOI: 10.15320/ICONARP.2025.341

24.3% are students and 20.4% are self-employed. The number of part-time (3.3%) and non-employed (4.6%) participants in the sample is small. The working sectors of the participants are very diverse. The top four most represented sectors are education (30.2%), design/art (16.4%), IT (13.8%) and marketing/consultancy (13.8%).

User characteristics related to coworking space use

The most frequently used coworking spaces are located in 21 different cities in Turkey. More than half (54.6%) of these places are located in Istanbul, the most populous city in Turkey, 11.2% in Ankara, the capital city, 7.2% in Izmir and 4.6% in Antalya. 35.5% of the participants access the place by public transport, 33.6% by car and 21.1% on foot. Only 1.3% of the sample users access the venue by bicycle.

The most frequently used coworking space types of the users in the sample are coworking labs (30.9%), third places (28.9%) and learning centres (22.4%), respectively. The number of users of firm-driven innovation labs (7.9%), open innovation and fabrication labs (5.9%) and academic-driven innovation labs (3.9%) is lower. 68.4% of the 152 participants are customers/members who receive services in the space. 21.7% of the participants are employees, 5.9% are place owners and 3.9% are place managers.

The last questions aimed at determining the characteristics of the users regarding the use of coworking space are related to the motivations of the users to work in the coworking space (5-point Likert scale). The highest mean values among these seven motivations are group work motivation (M=4.20, SD=1.13) and individual work motivation (M=4.03, SD=1.24). Access to technology motivation (M=2.80, SD=1.45) and engaging in hobbies motivation (M=2.81, SD=1.49) are below the average.

FINDINGS RELATED TO THE RESEARCH QUESTIONS AND DISCUSSION

Research Question 1: What are the performance levels of spatial characteristics of coworking space?

The level of satisfaction of the users with the spatial characteristics of the coworking space they most frequently use and the level of importance of spatial characteristics of their ideal coworking space (5-point Likert scale) are analysed and the performance of these characteristics is determined depending on the difference between the importance and satisfaction levels (gap analysis).

The level of satisfaction with the spatial characteristics

Participants are generally satisfied with the space characteristics of the coworking space they most frequently use. Among the **technical characteristics**, the characteristics with the highest level of satisfaction are "IT infrastructure (M=3.93, SD=1.12)", "access to sockets (M=3.89, SD=1.20)" and "cleanliness and hygiene (M=3.81, SD=1.19)", while the characteristic with relatively lower satisfaction level is "acoustic comfort (M=3.40, SD=1.17)". Among the **functional characteristics**, the

characteristics that users are most satisfied with are "ceiling height (M=4.32, SD=.95)", "accessibility (M=4.20, SD=.99)", "location (M=4.10, SD=1.09)" and "space dimensions (M=4.07, SD=1.07)", while characteristics that are above average but have relatively lower satisfaction levels are "adjustability of furniture (M=3.48, SD=1.18)" and "architectural program (M=3.07, SD=1.18)". Among all the spaces evaluated under the “architectural program” characteristic, the most satisfied spaces are *wc* (M=4.04, SD=1.13), *outdoor space* (M=4.02, SD=1.32), *large open workspace* (M=3.91, SD=1.18) while the spaces with low satisfaction levels are *recording studio* (M=2.63, SD=1.41), *fun space* (M=2.78, SD=1.43) and *meditation room* (M=2.85, SD=1.48). The **behavioural characteristics** that users are most satisfied with are "openness (M=3.99, SD=1.11)", "interior style (M=3.90, SD=1.01)" and "transparency (M=3.81, SD=1.10)". Although the level of satisfaction is above the average, the characteristics that are lower than the other characteristics are "visual privacy (M=3.07, SD=1.20)" and "acoustic privacy (M=3.07, SD=1.21)".

Participants are generally satisfied with the "spatial layout (M=3.95 SD=1.01)", which is one of the functional characteristics of the coworking space. An analysis of the differences of the satisfaction levels of the participants according to the spatial layout of the space shows that the satisfaction levels of the users of the combi-plan layout (M=4.28, SD=.86) are significantly higher than those of the users of the open-plan layout (M=3.73, SD=1.07).

When the satisfaction levels of all spatial characteristics are examined, the most interesting relation is that the technical characteristic with the lowest satisfaction levels is "acoustic comfort" and the lowest behavioural characteristics are "acoustic privacy" and "visual privacy". This may be due to the fact that more than half of the participants are users of coworking spaces with open-plan layout (54.6%), which are disadvantageous in terms of visual and acoustic privacy. The fact that the satisfaction of the users of combi plan layout is higher than that of open-plan layout may be due to the acoustic and visual privacy variable. These findings support the organisation of open collaboration spaces as well as workspaces with different levels of silence and privacy in coworking spaces.

The level of importance of spatial characteristics

For the participants, all spatial characteristics of the ideal coworking space are generally important. The high level of overall importance supports the fact that the spatial characteristics questioned in this survey are important issues to be considered.

Among the **technical characteristics**, the characteristics with the highest level of importance are "access to sockets (M=4.59, SD=.73)", "IT infrastructure (M=4.54, SD=.77)", "cleaning and hygiene (M=4.53, SD=.68)" while the characteristics with a relatively lower level of importance compared to other technical characteristics are "conservation of energy and resources (M=3.99, SD=.91)" and "social

DOI: 10.15320/ICONARP.2025.341

distance (M=4.11, SD=.93)". The fact that the three most satisfied technical characteristics and the three most important technical characteristics are the same, positively supports the assertion that users prefer spaces with the spatial characteristics they attach importance to.

Among the **functional characteristics**, the characteristics with the highest level of importance are "accessibility (M=4.66, SD=.67)", "location (M=4.52, SD=.80)", "comfort of furniture (M=4.51, SD=.77)", "spatial layout (M=4.47, SD=.65)" and "space dimensions (M=4.47, SD=.77)". Among all the spaces evaluated under the "architectural program" characteristic, the spaces that users find the most important are *wc* (M=4.64, SD=.68), *outdoor space* (M=4.45, SD=.87), *kitchen+café* (M=4.32, SD=.91), *open private workspaces* (M=4.30, SD=1.06) and *large open workspace* (M=4.28, SD=1.08). Among all the spaces evaluated under the characteristic of "architectural program", the spaces that the users find the least important are *recording studio* (M=2.37, SD=1.41), *fun space* (M=2.51, SD=1.38) and *meditation room* (M=2.70, SD=1.42). These three spaces are also the spaces with the satisfaction levels of the users are the lowest. Analysis of the relevant responses of the spaces with the lowest satisfaction level shows that the "not available/no idea" option (*recording studio* (93/152), *fun space* (94/152), *meditation room* (91/152)) is in the majority. The importance levels may be low due to the fact that these spaces are specific spaces that users use for hobbies, recreation, reflection and relaxation, and that these spaces are not sufficiently functionally arranged in the types of coworking spaces most frequently used by the most represented users in the sample (coworking lab, third place, learning centre) or that users consider these functions other than the working function as secondary needs.

For the participants, "spatial layout (M=4.47, SD=.65)" among the functional characteristics of the coworking space is generally very important. In the research, the users preferred coworking spaces with combi-plan layout (70.4%) rather than open-plan (19.7%) in their ideal coworking space. The reason for this may be that they prefer the freedom to move from large open workspaces that encourage collaboration to private rooms that provide visual and acoustic privacy when needed.

Among the **behavioural characteristics**, the characteristics with the highest level of importance are "interior style (M=4.41, SD=.74)", "concentration (M=4.35, SD=.99)" and "design aesthetics (M=4.34, SD=.88)". Although important, the characteristics with a relatively lower level of importance compared to the other characteristics are "encouraging serendipity (M=3.76, SD=1.24)" and "brand identity (M=3.82, SD=1.28)".

The most popular interior styles of the coworking spaces used by the participants are "modern (n=74)", "cozy (n=70)" and "industrial (n=37)". However, the most preferred interior styles for the ideal coworking space are "cozy (n=105)", "modern (n=76)", "green (environmentally friendly) (n=51)" and "home-like (n=43)". "Industrial (n=29)", which is often referred to as one of the most cited interior styles in the coworking space

literature, has lower rates. “Historic (n=19)", “vernacular (n=12)" and “rustic (n=6)" are the least preferred interior styles. In their ideals, most of the participants prefer to work in a coworking space that creates a sense of home comfort and intimacy rather than a formal office or an isolated home. This motivation may be the reason why "cozy" and "home-like" interior styles, where comfort and convenience are at the forefront, are most preferred.

The performance levels of spatial characteristics

An analysis of the differences between the importance and satisfaction levels of the spatial characteristics (gap analysis) revealed that all of the technical, functional and behavioural spatial characteristics have relatively low performance as the difference is above 0 and these characteristics should be improved.

Among **the technical characteristics**, "acoustic comfort (M=.95, SD=1.23)", "individual control possibility (M=.95, SD=1.38)", "natural ventilation (M=.92, SD=1.18)" and "indoor air quality (M=.91, SD=1.16)" are the characteristics that require the most attention due to their lowest performance.

Among **the functional characteristics**, "comfort of furniture (M=.70, SD=1.19)", “adjustability of furniture (M=.65, SD=1.33)" and "architectural program (M=.65, SD=1.00)" characteristics show lower performance compared to other characteristics. Among the spaces evaluated under the architectural program characteristic, the spaces with relatively low satisfaction despite the high importance levels of the users are found to be *enclosed and separate private rooms* (M=.90, SD=1.32), *personal storage area* (M=.84, SD=1.70), *open private workspaces* (M=.67, SD=1.11).

Among **the behavioural characteristics**, "acoustic privacy (M=1.14, SD=1.44)", "visual privacy (M=.89, SD=1.48)" and "concentration (M=.88, SD=1.38)" are the characteristics that require the most attention due to their lowest performance among other behavioural characteristics.

According to gap analysis, the most remarkable relations are between the technical (acoustic comfort and individual control possibility), functional (enclosed and separate private rooms, personal storage area and open private workspaces) and behavioural (acoustic privacy, visual privacy, and concentration) characteristics with the lowest performance. Suggestions to improve the performance of all of these characteristics may include organizing open large working environments supported by enclosed and separate private rooms and open private workspaces that would also meet the visual and acoustic privacy needs of users, and that would facilitate concentration and focus by minimising noise and distraction. To design workspaces providing more individual control over indoor conditions and equipped with personal storage areas would also allow users to personalise their workspace according to their needs.

DOI: 10.15320/ICONARP.2025.341

Research Question 2: Is there a statistically significant relation between satisfaction levels with spatial characteristics and overall satisfaction level?

Participants are generally satisfied with the coworking space they use (M=3.89, SD=0.94) and generally recommend it to their friends/relatives (M=3.86, SD=1.01).

Correlation analysis is performed to investigate the relation between the users' satisfaction levels with spatial characteristics and their overall satisfaction levels with the coworking space. In the analysis, Pearson correlation coefficient *r* and significance value *p* values are calculated and compared. There is a significant and positive relation between the satisfaction levels and overall satisfaction levels. The strongest relation is observed between "individual control possibility (r=.51, p<.01)", "IT infrastructure (r=.50, p<.01)" and "cleaning and hygiene (r=.46, p<.01)" in **technical characteristics** and "spatial layout (r=.65, p<.01)" and "flexibility (r=.62, p<.01)" in **functional characteristics**. The strongest correlation is observed between the satisfaction levels for *lobby-cozy seating area* (r=.59, p<.01), *personal storage area* (r=.58, p<.01)" and *large open workspace* (r=.57, p<.01) spaces questioned under the characteristic of architectural program among **the functional characteristics** and the overall satisfaction level. In **behavioural characteristics**, the strongest relation is observed in "interior style (r=.69, p<.01)", "hospitality (r=.65, p<.01)" and "design aesthetics (r=.61, p<.01)". Accordingly, the level of satisfaction of the users of the coworking space with these characteristics increases, the overall level of satisfaction with the space increases. With a larger sample, these correlational trends may become more evident and provide more information about the characteristics that should be considered in future design decisions.

Research Question 3: Is there a statistically significant relation between users' motivations to use the space and the importance levels of spatial characteristics?

One of the most important objectives of user-centered design research for coworking spaces is to investigate the differences between user groups in terms of their spatial characteristic preferences, which have a high potential to be determinant in the interior design of these spaces. In this regard, the significant relations between user's levels related to 7 motivations to use the space and importance levels of spatial characteristics are analysed with correlation analysis and the findings are discussed separately for each motivation:

Individual work motivation

Analysing the relations between the participants' individual work motivation levels and their importance levels of spatial characteristics, the most significant and strongest relations with respect to other characteristics are observed to be "access to sockets (r=.30, p<.01)" within **technical characteristics**; "spatial layout (r=.31, p<.01)" within

functional characteristics; *open private workspaces* (r=.28, p<.01) and *phone booth* (r=.28, p<.01) among the spaces evaluated under “architectural program” and, "interior style (r=.39, p<.01)" within **behavioural characteristics**. These findings emphasise that users which use the coworking space for individual work prefer to work in an open and personalised workspace while feeling the presence of others, with a pleasant atmosphere, equipped with easily accessible sockets, and with a phone booth that provides acoustic privacy.

Access to technology motivation

Analysing the relations between the participants' access to technology motivation levels and their importance levels of spatial characteristics, the most significant and the strongest relations with respect to other characteristics are observed to be the "IT infrastructure (r=.29, p<.01)" "access to sockets (r=.27, p<.01)" and "individual control possibility (r=.29, p<.01)" within **technical characteristics**; *makerspace* (r=.28, p<.01) and *reception* (r=.28, p<.01) among the spaces evaluated under “architectural program” and "spatial layout (r=.34, p<.01)" within **functional characteristics** and "interior style (r=.28, p<.01)" within **behavioural characteristics**. These findings emphasise that users which use the coworking space for accessing technology care about quality of IT infrastructure, individual control possibility, the presence of a cozy makerspace that contains technological equipment and devices such as 3D printer, CNC machine, etc., and a reception where they can receive consultancy about the activities and devices.

Creating job opportunities motivation

Analysing the relation between the participants' creating job opportunities motivation level and their importance levels of spatial characteristics, the most significant and the strongest relations with respect to other characteristics are observed to be "IT infrastructure (r=.27, p<.01)" and "individual control possibility (r=.28, p<.01)" within **technical characteristics**; *seminar area* (r=.39, p<.01) and *lobby-cozy seating area* (r=.39, p<.01) among the spaces evaluated under the “architectural program” and "space dimensions (r=.35, p<.01)" within **functional characteristics**; and "encouraging serendipity (r=.35, p<.01)" and "brand identity (r=.36, p<.01)" within **behavioural characteristics**. These findings can be interpreted as a user with a high level of motivation to create job opportunities cares that the coworking space has a large lobby-cozy seating area that acts as a mediator in meeting, chatting and developing new business ideas with other co-workers, and a seminar area with a strong IT infrastructure and teleconferencing facilities that host various activities that increase communication between users. If this type of user is a freelancer, may care about the professional environment and brand identity offered by the space in terms of strengthening the sense of belonging to the coworking space.

DOI: 10.15320/ICONARP.2025.341

Access to activities motivation

Analysing the relations between the participants' access to activities motivation level and their importance levels of spatial characteristics, the most significant and the strongest relations relative to other characteristics are observed to be "IT infrastructure (r=.28, p<.01)" and "individual control possibility (r=.39, p<.01)" within **technical characteristics**; *seminar area* (r=.40, p<.01), *photocopier-printer* (r=.40, p<.01) and *workshop area* (r=.39, p<.01) among the spaces evaluated under "architectural program" and "space dimensions (r=.40, p<.01)" within **functional characteristics**; "brand identity (r=.29, p<.01)" and "encouraging serendipity (r=.28, p<.01)" within **behavioural characteristics**. These findings may indicate that a user with a high level of motivation to access activities prefers a coworking space that hosts events (workshops, conferences); that has a seminar area and a workshop area with sufficient dimensions; that has a strong technological infrastructure and that offers individual control. This type of user also attaches a high level of importance to the fact that the coworking space has spatial characteristics that encourage serendipity and knowledge sharing with other coworkers having common interests.

Group work motivation

Analysing the relation between the participants' group work motivation levels and their importance levels of spatial characteristics, the most significant and the strongest relations relative to other characteristics are observed to be the "IT infrastructure (r=.21, p<.01)", "access to sockets (r=.21, p<.01)" and "individual control possibility (r=.35, p<.01)" within **technical characteristics**; *seminar area* (r=.30, p<.01) and *photocopier-printer* (r=.31, p<.01) among the spaces evaluated under "architectural program" and "spatial layout (r=.40, p<.05)" within **functional characteristics**; and "visual privacy (r=.19, p<.05)" within **behavioural characteristics**. These findings may support the suggestion of organising also seminar/group working spaces for coworking space users with high group working motivation, which are equipped with up-to-date technological equipment and devices, and supporting visual privacy that ensure the confidentiality of the group project.

Engaging in hobbies motivation

Analysing the relations between the participants' engaging in hobbies motivation levels and their importance levels of spatial characteristics, the most significant and the strongest relations with respect to other characteristics are observed to be the "individual control possibility (r=.23, p<.01)" within **technical characteristics**; *makerspace* (r=.38, p<.01) and *workshop area* (r=.27, p<.01) among the spaces evaluated under "architectural program" and "flexibility (r=.22, p<.01)" within **functional characteristics**; and "encouraging serendipity (r=.25, p<.01)" and "interior style (r=.21, p<.01)" within the **behavioural characteristics**. These findings may support the suggestion of organising a makerspace and/or workshop area within the coworking space, for users who are highly motivated to engage in their hobbies, that provide

individual control possibility. These findings also emphasise that this type of user prefers a friendly/cozy coworking space that is arranged with flexible/transformable spaces that support meeting with users having common interests.

Working in an informal environment motivation

Analysing the relation between the participants' working in an informal environment and their importance levels of spatial characteristics, the most significant and the strongest relations relative to other characteristics are observed to be the "IT infrastructure (r=.35, p<.01)" and "individual control possibility (r=.27, p<.01)" within **technical characteristics**; "*lobby-cozy seating area* (r=.36, p<.01)" and *kitchen+café* (r=.34, p<.01)" among the spaces evaluated under "architectural program" and "adequacy of circulation spaces (r=.28, p<.01)" within **functional characteristics** and "encouraging serendipity (r=.39, p<.01)", "informality (r=.39, p<.01)" and "transparency (r=.39, p<.01)" within **behavioural characteristics**. These findings support the organisation of an informal coworking space for a user who is highly motivated to work in an informal environment with spacious circulation spaces, a lobby-cozy seating area and a kitchen+café, which encourages communication and encounters between users thanks to transparent dividers that provide clues about the activities carried out inside the coworking space.

DESIGN CONSIDERATIONS FOR COWORKING SPACE INTERIORS

The user-centered design research reveals that the user is one of the most significant factors in design. The spatial characteristics, structured as a data collection tool in the research, can be used to collect user feedback to improve spatial performance of an existing coworking space or to design a new coworking space according to most important spatial characteristics for users.

As another contribution of the research, although there is no one design solution for all types of coworking spaces and for all types of users, the principles and design considerations put forward by synthesising the research findings can serve as a quick start guide for owners, managers and designers of coworking space, in the process of renovating an existing coworking space or establishing a new coworking space. According to the research findings, the high level of importance of all spatial characteristics of the ideal coworking space for the participants supports that the spatial characteristics questioned in this research are important issues to be considered. In this context, the technical, functional and behavioural variables in user-centered design research for coworking spaces are classified under 12 design principles that can be used for coworking space interior design (Figure 4):

Design principles based on **technical variables** include:

- Visual, acoustic and thermal comfort (daylighting, general lighting, local lighting, acoustic comfort, thermal comfort, individual control possibility),

DOI: 10.15320/ICONARP.2025.341

- Health and indoor air quality (natural ventilation, cleanliness and hygiene, social distance, indoor air quality),
- Sustainability (conservation of energy and resources) and
- Technology infrastructure (IT infrastructure and access to sockets).

Design principles based on **functional variables** include:

- Location and accessibility,
- Ergonomics of the space (space dimensions, circulation areas, ceiling height, flexibility),
- Ergonomics of the furniture (furniture dimensions, comfort of furniture, adjustability of furniture) and
- Architectural program and layout.

Design principles based on **behavioural variables** include:

- Collaboration and coworking (openness and transparency),
- Social interaction and communication (hospitality, encouraging serendipity, informality)
- Privacy and concentration (visual privacy, acoustic privacy and concentration) and
- Interior atmosphere (design aesthetics, brand identity, natural elements, visual connection with nature and interior style).

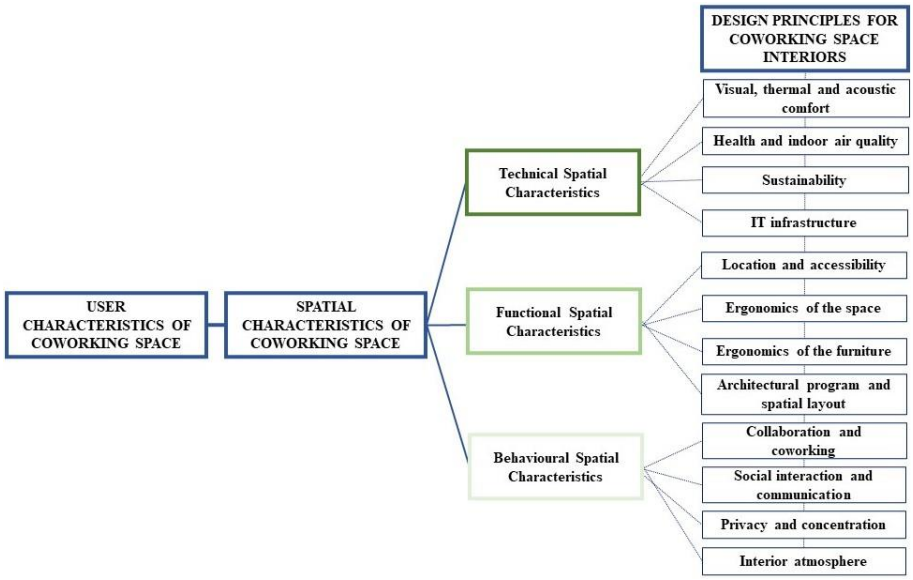


Figure 4. Design principles for coworking space interiors.

According to research findings coworking spaces are proposed to be designed with respect to different interaction and privacy levels that different users need (Figure 5). As privacy and interaction are considered as two sides of the same coin, “activity spaces”, “gathering spaces”, “collaboration spaces” and “private spaces” may be arranged at different levels between these two sides. Configuring the noisy and quiet spaces according to these levels and creating a cozy interior atmosphere with a strong technological infrastructure and individual control possibility over indoor comfort conditions can help the coworking space to be more preferred by the users. While organising spaces with different levels of privacy/interaction, the flexible, reconfigurable nature of the spaces (flexible space dividers, adjustable furniture, etc.) largely eliminates the

need for organising separate spaces for each level; spaces can be reshaped according to different requirements in a short time and ensure that users can easily switch between these spaces according to instant task changes.

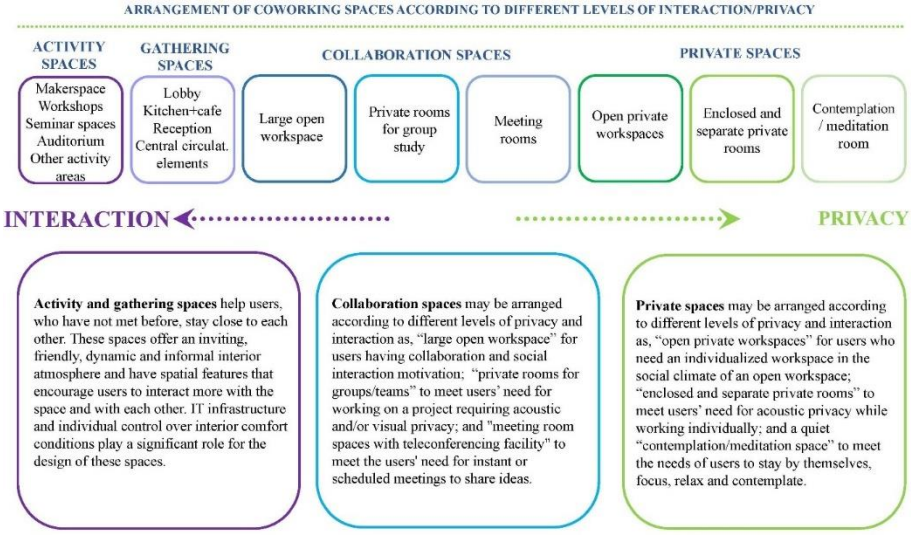


Figure 5. Proposal for organising coworking spaces according to different levels of interaction/privacy.

LIMITATIONS

The research is limited to using non-interactive methods (e-mail and online surveys) instead of interactive methods (on-site observation, face-to-face interviews and surveys) in coworking spaces. A total of 152 people participated in the online survey. Given the relatively small sample size, the research only provides information about the research participants. With a larger sample, the relational trends identified in the research may become more apparent and provide more information about characteristics that should be considered in future designs.

SUGGESTIONS FOR FURTHER RESEARCH

Coworking is a multifaceted fact and further research on coworking space design can be conducted through interdisciplinary collaboration. Interdisciplinary research can be conducted with teams of designers and social scientists to analyse the multidimensional nature of these spaces and to better understand user expectations and motivations.

CONCLUSION

The research revealed satisfaction and importance levels of spatial characteristics in coworking spaces; identified the spatial characteristics with low performance that need to be improved in users' coworking spaces; and confirmed the importance of spatial characteristics in users' preference for a coworking space by showing a significant relation between satisfaction levels with spatial characteristics and overall satisfaction levels. The findings also revealed that importance levels of spatial characteristics differ for users with different characteristics. In terms of practical use, the research makes two important contributions: "providing a quick multidimensional start guide for owners, managers

DOI: 10.15320/ICONARP.2025.341

and designers of coworking spaces" and "providing a research model base".

Representing a new way of work organisation and lifestyle today, coworking spaces are likely to remain popular in the coming years, but like all other workspaces, they will continue to evolve according to new information and collaboration technologies and changes in work organizations. The most important fact that will not change is that the most important source of inspiration and design data in the evolution of spaces is the users of the space. Although the data source will not change, it is obvious that user-centered design research models, strategies and tools will become more widespread and evolve with the support of technology.

NOTES

This article is based on the original research which is a part of Umut Tuğlu Karslı's PhD Dissertation Thesis supervised by Saadet Aytıs in Interior Architecture Program at Mimar Sinan University of Fine Arts in 2022.

REFERENCES

Aabø, S., Audunson, R. and Vårheim, A. (2010). How do public libraries function as meeting places?. *Library and Information Science Research*, 32(1), 16–26. https://doi.org/10.1016/j.lisr.2009.07.008

Augustin, S. (2014). Designing for collaboration and collaborating for design. *Journal of Interior Design*, 39(1), 9–18. https://doi.org/10.1111/joid.12020

Bilandzic, M. and Foth, M. (2013). Libraries as coworking spaces: Understanding user motivations and perceived barriers to social learning. *Library Hi Tech*, 31(2), 254–273. https://doi.org/10.1108/07378831311329040

Kojo, I. and Nenonen, S. (2016). Typologies for co-working spaces in Finland–what and how?. *Facilities*, 34(5/6), 302–313. https://doi.org/10.1108/F-08-2014-0066

Leclercq-Vandelannoitte A. and Isaac, H. (2016). The new office: how coworking changes the work concept. *Journal of Business Strategy*, 37(6), 3–9. https://doi.org/10.1108/JBS-10-2015-0105

Lee, S. S. (2018). *Third places to work in the digital age: implications from coworking space users' motivations and preferred environmental features*. MSc Thesis, Cornell University.

Lutzkendorf, T. and Speer, T. (2005). Alleviating asymmetric information in property markets: building performance and product quality as signals for consumers. *Building Research and Information*, 33(2), 182–195. https://doi.org/10.1080/0961321042000323815

Mariotti, I., Pacchi, C. and Di Vita, S. (2017). Coworking spaces in Milan: location patterns and urban effects. *Journal of Urban Technology*, 24(3), 47–66. https://doi.org/10.1080/10630732.2017.1311556

Meinel, M., Maier, L., Wagner, T., and Voigt, K. I. (2017). Designing creativity-enhancing workspaces: A critical look at empirical evidence. *Journal of Technology and Innovation Management*, 1 (1), 1–12.

Moriset, B. (2013). Building new places of the creative economy. The rise of coworking spaces. *Territoire en Mouvement*, 10.4000/tem.3868.

Oldenburg, R. (1999). *The Great Good Place: Cafés, Coffee Shops, Bookstores, Bars, Hair Salons, and Other Hangouts at the Heart of a Community*. Marlowe, USA.

Ondia, E. P., Hengrasmee S. and Chansomsak, S. (2019). Addressing the dilema between collaboration and privacy in coworking spaces. *International Journal of Architecture and Urban Development,* 9(3), 5–10.

Orel, M. and Almeida, M. D. M. A. (2019). The ambience of collaboration in coworking environments. *Journal of Corporate Real Estate*, 21(4), 273–289. https://doi.org/10.1108/JCRE-12-2018-0050

Preiser, W. F. E., Rabinowitz, H. Z. and White, E.T. (1988). *Post-Occupancy Evaluation*. Van Nostrand Reinhold, New York.

Preiser, W.F.E. and Vischer, J.C. (eds). (2005). *Assessing Building Performance*. Butterworth-Heinemann, Oxford.

Remøy, H. and Van der Voordt, T. J. M. (2014). Priorities in accommodating office user preferences: Impact on office users decision to stay or go. *Journal of Corporate Real Estate*, 16(2), 140–154. https://doi.org/10.1108/JCRE-09-2013-0029

Sanoff, H. (1977). *Methods of Architectural Programming*. Hutchinson and Ross Inc., Dowden.

Sayers, J.G. (2009). Flat whites: how and why people work in cafes. *New Zealand Journal of Employment Relations,* 34(2), 77–86.

Schmidt, S., Brinks, V. and Brinkhoff, S. (2014). Innovation and creativity labs in Berlin. *Zeitschrift für Wirtschaftsgeographie*, 58(1), 232–247. https://doi.org/10.1515/zfw.2014.0016

Schopfel, J., Roche, J. and Hubert, G. (2015). Co-working and innovation: new concepts for academic libraries and learning centres. *New Library World*, 116(1/2), 67–78. https://doi.org/10.1108/NLW-06-2014-0072

Stryker J. B. and Santoro M. D. (2012). Facilitating face-to-face communication in high-tech teams. *Research- Technology Management*, 55(1), 51–56. https://doi.org/10.5437/08956308X5501013

Tuğlu Karslı, U. (2020). Design for the future of work: a theoretical framework for coworking space design. In Y. Blount and M. Gloet (Eds.), *Anywhere working and the future of Work* (pp.163–189). IGI Global, Hershey, USA. https://dx.doi.org/10.4018/978-1-7998-4159-3.ch007

Van de Koevering, J. (2017). *The preferred characteristics of coworking spaces*. MSc Thesis, Eindhoven University of Technology.

Vischer, J. C. (2008a). Towards a user-centred theory of the built environment. *Building Research and Information*, 36(3), 231–240. https://doi.org/10.1080/09613210801936472

Vischer, J. C. (2008b). Towards an environmental psychology of workspace: how people are affected by environments for work. *Architectural Science Review*, 51(2), 97–108. https://doi.org/10.3763/asre.2008.5114

Waxman, L. (2006). The coffee shop: social and physical factors influencing place attachment. *Journal of Interior Design*, 31(3), 35–53. https://doi.org/10.1111/j.1939-1668.2006.tb00530.x

Weijs-Perrée, M., Van de Koevering, J., Appel-Meulenbroek, R., and Arentze, T. (2019). Analysing user preferences for co-working space characteristics. *Building Research and Information*, 47(5), 534–548. https://doi.org/10.1080/09613218.2018.1463750

DOI: 10.15320/ICONARP.2025.341

Resume

Umut Tuğlu Karslı is a Professor of Interior Architecture at Istanbul University. Dr. Karsli received her PhD and Proficiency in Art Degrees from Mimar Sinan Fine Arts University (Istanbul) in the field of Interior Architecture. She conducts interior architecture design studio courses and teaches spatial organization and interior design research for both undergraduate and graduate students. Dr. Karslı is widely published in her area of expertise including interior design research, sustainable design, user-centered design, spatial performance and adaptive reuse.

Saadet Aytıs is a Professor of Interior Architecture at Mimar Sinan Fine Arts University (Istanbul). Dr. Aytıs received her PhD from Mimar Sinan Fine Arts University (Istanbul) in the field of Architecture. She conducts interior architecture design studio courses and teaches interior construction and interior design research for both undergraduate and graduate students. Dr. Aytıs is widely published in her area of expertise including interior design research, adaptive reuse, interior construction and building elements.

ICONARP – Volume 13, Issue 2 / Published: 31.12.2025

ICONARP
International Journal of Architecture and Planning
Received: 30.06.2024 Accepted: 11.08.2025
Volume 13, Issue 2/ Published: 31.12.2025
Research Article *DOI: 10.15320/ICONARP.2025.342 E- ISSN:2147-9380*
ICONARP

Climatic Benefits of Urban Parks: Case Study in a Mediterranean Context

Sümeyra Elma*
Veli Ortaçeşme**

Abstract

Green spaces make a significant contribution to the climatic comfort of urban dwellers. These contributions can be in the form of cooling in hot summers and heating in cold winters compared to the surrounding built-up areas. These contributions are related to the landscape design of parks to a certain extent. The presence and extension of hard grounds and waters in parks as well as the type, texture and density of plants used determine the level of climatic comfort provided. The present research was conducted in Aydın Kanza Park in the Mediterranean City of Antalya, Türkiye, to determine the cooling and heating benefits of the park, located in a warm climate area. Temperature, humidity, and wind speed were measured once a week all year round at four different locations inside the park (tree-covered, lawn-covered, hard ground, pond-side) as well as at three locations at a distance of 50, 100 and 300 meters away from the park. The findings indicate that Aydın Kanza Park provides 2.4 ◦C warmer environment in the first four months of the year and 2 ◦C cooler environment in the following seven months in terms of mean values at midday compared to the built-up area surrounding the park. The findings also indicate that the heating and cooling effect provided by the park continues at a certain distance from the park. However, there is no significant difference between the temperature, humidity, and wind speed values of various locations with different land cover inside the park, which is most probably related to the size of the park.

Keywords: *Climatic comfort, Cooling, Heating, Green spaces, Parks*

*Department of Landscape Architecture, Institute of Natural and Applied Sciences, Akdeniz University, Antalya, Türkiye (*Corresponding author*)
Email: sumeyraelma@gmail.com

**Department of Landscape Architecture, Faculty of Architecture, Akdeniz University, Antalya, Türkiye
Email: veliortacesme@gmail.com

To cite this article: Elma, S., & Ortaçeşme, V. (2025). Climate benefits of urban parks: case study in a mediterranean context. *ICONARP International Journal of Architecture and Planning,* 13 (2), 709-730. DOI: 10.15320/ICONARP.2025.342

INTRODUCTION

Urban open spaces provide physical, environmental, social, and economic benefits to citizens (Woolley, 2003). Thermally comfortable urban open spaces offer high-quality locations to residents and attract them to the outdoors (Nikolopoulou & Lykoudis, 2007; Lin et al., 2012; Lai et al., 2014; Lai et al., 2019b; Lai et al., 2020). Thermal environmental parameters, such as air temperature, humidity, wind speed, and thermal radiation, affect the heat transfer between people and the surrounding Senvironment, and determine people's thermal comfort (Lai et al., 2019a; Zhang et al., 2023).

Urban green spaces such as parks can considerably mitigate the urban heat island effect. An increase in greenspace of 20% above the current level could eliminate between a third and a half of the city's expected UHI effect in 2050 (Emmanuel & Loconsole, 2015). The green vegetation can improve both indoor and outdoor thermal comfort, while at the same time providing multiple environmental services such as carbon storage and reduced air pollution, and act as urban biodiversity hot locations (Feyisa et al., 2014). With the presence of a vegetated surface, evapotranspiration can transform a large portion of incoming solar radiation to the surface, which otherwise would contribute to the underground heat storage and make the ground surface cooler (Ca et al., 1998).

Nonetheless, green spaces are not all the same. They can vary in their structural aspects, depending on their components in terms of trees, shrubs and/or herbaceous vegetation (Nowak et al., 2006). Due to the shading effect trees have on surfaces and/or the cooling effect of the water they transpire, they can also mitigate extreme air temperatures by changing microclimatic conditions on their surroundings (McDonald et al., 2016).

The World Health Organization has recommended that urban residents have access to at least 0.5-1 ha of public green space within 300 m of their home (World Health Organization, 2017). In addition, the Global United Nations Sustainable Development Goal (SDG) 11.7 focuses on the provision of green spaces in a universal, safe, inclusive, and accessible manner (United Nations, 2018; Venter et al., 2023).

The role of green areas in moderating urban climate has been explored all over the world and there is a vast literature on the benefits of green spaces to mitigate the effects of urban heat. However, few of them focus on the design aspect of parks by examining the climatic variables in different locations inside the parks. There are also few studies conducted in the Mediterranean Region, which is to be affected much more by the adverse effects of global warming. What makes different this study from related research is the fact that it focuses on the climatic comfort of the different sectors of the park and also that it deals not only with the cooling but also the heating effects of parks in a Mediterranean context.

DOI: 10.15320/ICONARP.2025.342

METHODOLOGY AND METHODS

The study area is Aydın Kanza Park and its near surroundings in Muratpaşa district of Antalya City, located in the Mediterranean Region of Türkiye. The park, which is located at the intersection of two main transportation axes of the city, namely Yüzüncü Yıl Boulevard and Anafartalar Street, has a size of 1 ha. It is surrounded by a dense urban fabric with 5-7 storey buildings (Figure 1). The reasons for selecting Aydın Kanza Park for this study include the presence of areas with various types of surface cover (wooded, grass, water, hard ground) and also the fact that it is surrounded by dense residential areas. These characteristics enable temperature, humidity, and wind speed measurements in the different parts of the park and in the residential area surrounding the park, and the data obtained can be compared to determine the microclimatic effects of the park.

Within the scope of study, temperature, humidity, and wind speed measurements were made all year round in 2019, once a week and three times a day (morning, 07:00-08:00 h; noon, 13:00-14:00 h; and night, 20:00-21:00 h), at a height of 2 m from the ground level. The measurements were made in four different locations of the park: 1). Tree-covered, 2). Lawn-covered, 3). Hard ground, and 4). Pond-side. In order to determine the extension of cooling and heating effects of the park, measurements were also done at the locations of 50, 100 and 300 m. away from the park (Figure 2). All measurements were done in a time-series basic trial approach with three replicated, split plots trial pattern (Ca et al., 1998; Yüksel 2005; Hamada & Ohta 2010; Xiao et al., 2018). Extech 45160 wind speed, temperature and humidity measurement device was used to record the data. The data obtained were analyzed using SPSS 22 software, and parameters that were statistically significant according to the analysis of variance results were compared using Duncan's multiple comparison test at a 5% significance level. The analysis results were interpreted in the context of the microclimatic contributions of parks throughout the year.

Figure 1. Location of Aydın Kanza Park in Antalya City, Türkiye.

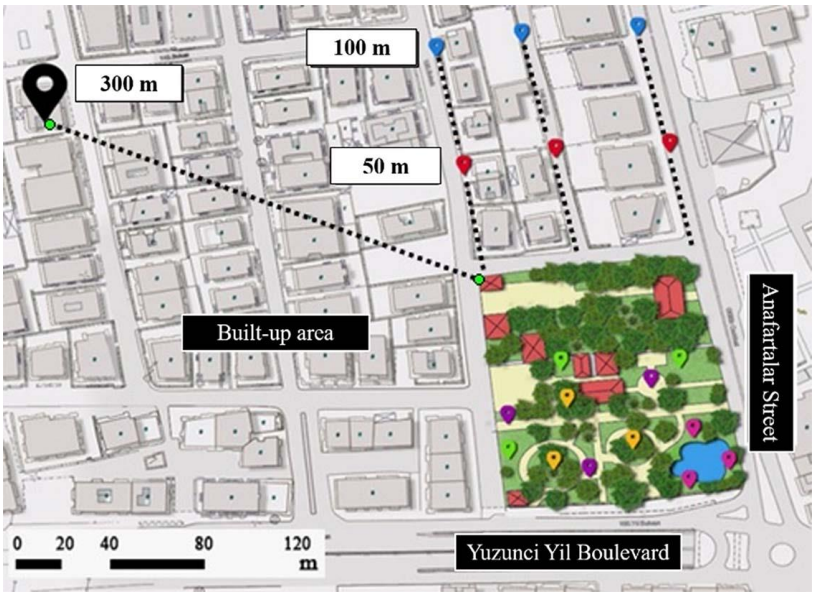


Figure 2. Measurement locations inside and outside of the park.

Table 1. Legend of measurement locations inside and outside of the park.

	Measurement locations in tree-covered part
	Measurement locations in lawn-covered parts
	Measurement locations at the pond-side
	Measurement locations on hard grounds
	Measurement locations at 50 m.
	Measurement locations at 100 m.
	Measurement location at 300 m

DOI: 10.15320/ICONARP.2025.342

DATA ANALYSIS

Antalya has a typical Mediterranean climate, with hot, dry summers and mild, rainy winters. The annual average temperature is 20.2 ° C. The month with the highest average temperature is August at 29.6 ° C, while the month with the lowest average temperature is January at 11.4 °C. The annual average humidity is 60.9%, and the annual average wind speed is 1.9 m/s. General climatic data of the city is given in the Figure 3.

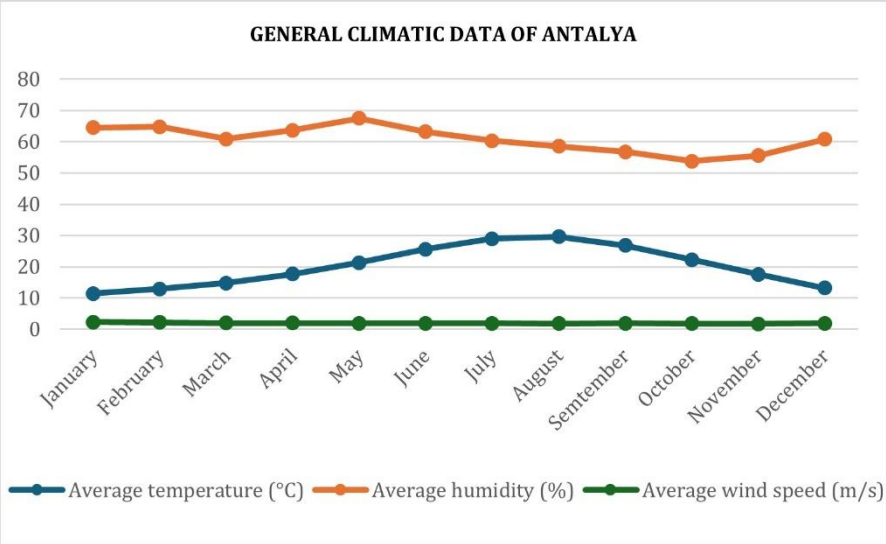


Figure 3. Average temperature, humidity and wind speed values of Antalya.

1. In-park Climatic Values

1.1. Temperatures

The average temperature values according to the month, location and measurement hours and the results of the statistical analysis of data are given in the Table 2.

Table 2. Average temperatures in the park according to the month, location, and hours.

Month	Measurement Hour	Measurement Location				Measurement Hour Average	Monthly Average
		Tree-covered	Grass-covered	Hard ground	Pond-side		
JANUARY	07.00-08.00	8.3 C a [y]	8.4 C a	8.2 C a	8.7 C a	8.4 c	**13 k [z]**
	13.00-14.00	19.3 A a	20 A a	19.5 A a	20 A a	19.7 a	
	20.00-21.00	11.4 B a	10.9 B a	10.9 B a	11 B a	11 b	
	Meas. Loc. Average	13 a	13 a	12.8 a	13.3 a		
FEBRUARY	07.00-08.00	10.2 C a	10.4 C a	10.5 C a	10.4 C a	10.3 c	**16.1 j**
	13.00-14.00	21.4 A a	21.5 A a	21.3 A a	22.1 A a	21.6 a	
	20.00-21.00	16.9 B a	16.5 B a	16.4 B a	16.7 B a	16.6 b	
	Meas. Loc. Average	16.2 a	16.1 a	15.9 a	16.4 a		
MARCH	07.00-08.00	14.1 C a	14.3 C a	14 C a	14.1 C a	14.1 c	**18.6 h**
	13.00-14.00	23.7 A a	24.2 A a	23.7 A a	24 A a	23.9 a	
	20.00-21.00	18 B a	17.7 B a	17.5 B a	17.7 B a	17.7 b	

	Meas. Loc. Average	18.6 a	18.7 a	18.4 a	18.6 a		
APRIL	07.00-08.00	17.4 C a	17.8 C a	17.4 B a	17.4 C a	17.5 c	**20.7 g**
	13.00-14.00	25.7 A a	26.4 A a	25.8 A a	26 A a	26 a	
	20.00-21.00	18.9 B a	18.9 B a	18.6 B a	18.6 B a	18.8 b	
	Meas. Loc. Average	20.7 a	21 a	20.6 a	20.7 a		
MAY	07.00-08.00	23.5 C ab	24.1 C a	23.4 C ab	23.3 C b	23.6 c	**26.5 d**
	13.00-14.00	30.3 A a	30.7 A a	30.2 A a	30.6 A a	30.4 a	
	20.00-21.00	25.6 B a	25.4 B a	25.2 B a	25.3 B a	25.4 b	
	Meas. Loc. Average	26.5 a	26.7 a	26.3 a	26.4 a		
JUNE	07.00-08.00	27.8 B ab	28.2 B a	27.8 B ab	27.5 C b	27.9 b	**29.3 b**
	13.00-14.00	32 A ab	32.9 A a	32.5 A ab	31.6 A b	32.3 a	
	20.00-21.00	27.9 B a	27.9 C a	28 B a	28 B a	27.9 b	
	Meas. Loc. Average	29.3 a	29.7 a	29.4 a	29 a		
JULY	07.00-08.00	29.8 C ab	30.3 B a	29.9 C ab	29.6 C b	29.9 c	**31.9 a**
	13.00-14.00	35 A a	34.8 A a	34.8 A a	34.8 A a	34.8 a	
	20.00-21.00	31.2 B a	31 B a	31.2 B a	31 B a	31 b	
	Meas. Loc. Average	32 a	32 a	32 a	31.8 a		
AUGUST	07.00-08.00	29.8 C bc	30.4 C a	30 C ab	29.5 C c	29.9 c	**32 a**
	13.00-14.00	35.5 A a	34.8 A a	35.4 A a	35.5 A a	35.3 a	
	20.00-21.00	31 B a	30.9 B a	31 B a	31 B a	31 b	
	Meas. Loc. Average	32 a	32 a	32.2 a	32 a		
SEPTEMBER	07.00-08.00	25.9 C ab	26.8 C a	26.2 C ab	25.5 C b	26.1 c	**29.1 c**
	13.00-14.00	31.8 A a	31 A b	31.3 A ab	32 A a	31.5 a	
	20.00-21.00	29.8 B a	29.4 B a	29.8 B a	29.8 B a	29.7 b	
	Meas. Loc. Average	29.2 a	29 a	29 a	29 a		
OCTOBER	07.00-08.00	23.2 C a	23.7 C a	23.5 C a	23.1 C a	23.4 c	**26 e**
	13.00-14.00	28.9 A a	29.2 A a	29.1 A a	28.9 A a	29 a	
	20.00-21.00	25.7 B a	25.6 B a	25.7 B a	25.5 B a	25.6 b	
	Meas. Loc. Average	26 a	26.2 a	26 a	25.9 a		
NOVEMBER	07.00-08.00	19 C ab	19.2 C a	19.2 C a	18.9 C b	19 c	**23.2 f**
	13.00-14.00	26.8 A a	27.5 A a	26.9 A a	27.9 A a	27.3 a	
	20.00-21.00	23.4 B a	23.2 B ab	23.4 B a	23 B b	23.2 b	
	Meas. Loc. Average	23 a	23.3 a	23.1 a	23.2 a		
DECEMBER	07.00-08.00	13.4 C a	13.3 C a	13.3 C a	12.9 C b	13.2 c	**16.7 ı**
	13.00-14.00	22 A a	21.2 A a	21.3 A a	21.7 A a	21.5 a	
	20.00-21.00	15.5 B a	15.6 B a	15.4 B a	15.3 B a	15.4 b	

DOI: 10.15320/ICONARP.2025.342

	Meas. Loc. Average	17 a	16.7 a	16.6 a	16.6 a		
Measurement Location Annual Aver.		**23.6 ab**	**<u>23.7 a</u>**	**<u>23.5 b</u>**	**23.6 b**		
Measurement Hour Annual Average							
07.00-08.00		**<u>20.3 c</u>**					
13.00-14.00		**<u>27.8 a</u>**					
20.00-21.00		**22.8 b**					
Significance *(p values)*							
Month (M):	<0.001*	[z] Different averages at 5% significance level according to Duncan test are shown by separate letters. [y]: In the sections written in italics (within each month), the uppercase letters show the comparison of the averages in the columns (each measurement hour), and the lowercase letters in the rows (at each measurement location). * It shows statistically significant p values. The underlined values in the table indicate the maximum and minimum values.					
Measurement Hour (MH):	<0.001*						
Measurement Location (ML):	0.027*						
M x MH:	<0.001*						
M x ML:	0.542*						
MH x ML:	<0.001*						
M x MH x ML:	0.654						

The monthly average temperatures vary between 13 ◦C and 32 ◦C. The highest monthly average value is in August (32 ◦C) whereas the lowest value is in January (13 ◦C). The differences between the morning, midday and evening temperature values in all months are statistically significant, being the midday values the highest and the morning values the lowest. Average annual temperature at midday was 27.8 ◦C whereas it was 20.3 ◦C in the morning. The lowest temperature recorded was in the morning of January (8.4 ◦C) and the highest temperature was at midday of August (35.3 ◦C).

Regarding the annual temperature averages of different measurement locations, no significant difference is seen with values varying between 23.5 ◦C and 23.7 ◦C. When the monthly average temperatures of different locations are compared, no statistically significant difference is seen either. The highest average temperature is in August (32.2 ◦C) and the lowest one is in January (12. 8 ◦C), both on the hardgrounds. These values show that the hardgrounds of the park have the highest temperatures in summers and the lowest temperatures in winters.

When the different locations in the park are compared in terms of temperature, it is seen that the differences between months ($p<0.001$), measurement hours in each month ($p<0.001$) and measurement locations ($p<0.027$) are statistically significant. In terms of binary interactions, it is seen that the values of month-to-measurement hour interaction ($p<0.001$), month-to-measurement location interaction ($p<0.542$), and measurement hour-to-measurement location interaction ($p<0.001$) are also statistically significant.

1.2. Humidity

The relative humidity varies between 42.3% and 54%, being the lowest in July and the highest in February. The differences between the morning, midday and evening values in January, March, April, May, June,

September, November, and December were found statistically significant, being the evening values the highest and the midday values the lowest. The lowest value was in January at midday (30.7%) and the highest value was in the evening of December (62.8%). No statistically significant difference was found between different measurement hours.

There was not much difference between the annual humidity averages of different locations. The lowest value (49.3%) was recorded in the grass-covered area whereas the highest value (50%) was recorded at pond-side. Regarding the monthly averages, the highest value was in February (54.4%) in the hardgrounds, and the lowest value was in July (41.5%) in the grass-covered area.

When the different locations are compared in terms of relative humidity, it is seen that the differences in the month ($p<0.001$), measurement hour ($p<0.001$) and measurement location ($p<0.001$) are statistically significant. When the values are evaluated in terms of binary interactions, it is seen that the pairwise interactions between month and measurement hour ($p<0.001$) and between measurement hour and measurement location ($p<0.004$) are statistically significant while the pairwise interaction between the month and measurement location ($p<0.787$) is insignificant. When the triple interactions between the months, locations and hours are examined in terms of humidity values, it is seen that the highest value (63%) is recorded at pond-side in the evening of January and at hardgrounds in the evening of December whereas the lowest value (29.3%) is recorded at the grass-covered area at midday in January.

1.3. Wind speed

Monthly averages of different locations and hours vary between 0.1 m/sec and 0.6 m/sec. The highest and lowest monthly averages are seen in June (0.6 m/sec) and December (0.1 m/sec), respectively. The difference between morning and evening values in the eleven months except September was not statistically significant and was lower than the midday values. In September, the difference between the morning, midday and evening was found to be statistically significant, being the highest value (0.8 m/sec) at midday and the lowest value (0 m/sec) in the morning. Looking at the measurement time averages, the lowest value (0 m/sec) was recorded in the evenings of January, April, May; mornings and evenings of February, March, October, November; and only mornings of September. The highest value was at midday (1.4 m/sec) in June.

There was not much difference between the annual wind speed averages of different locations. When the monthly averages are compared, no statistically significant difference is seen between the values of all months. The highest wind speed value (0.8 m/sec) was recorded at the pond-side in June, whereas the lowest values (0.1 m/sec) were recorded at the tree-covered area in October as well as in three-covered, grass-covered and hardgrounds in December.

When the different locations are compared in terms of wind speed, it is seen that the differences in the month ($p<0.001$) measurement hour

DOI: 10.15320/ICONARP.2025.342

($p<0.001$) and measurement location ($p<0.001$) are statistically significant. When the values are examined in terms of binary interactions, it is seen that the pairwise interaction between month and measurement hour ($p<0001$) is statistically significant, while the pairwise interactions between month and measurement location ($p<0.625$) and the measurement hour and measurement location ($p<0.294$) are not.

2. Analysis of In-park and Out-of-park Climatic Data

The differences between the temperature, humidity and wind speed values measured inside as well as outside of the park were examined to see the microclimatic effects of Aydın Kanza Park. For this purpose, the "whole park or in-park" data was created first by calculating the averages of all measurement values from different locations in the park. Then, the in-park values were compared with those of the three locations outside the park (50th m, 100th m and 300th m).

2.1. In-park and out-of-park temperatures

Measurements shows that the expected micro-climatic effects of Aydın Kanza Park are mostly achieved at midday. In the months of January, February, March and April, in-park temperatures are higher than those of out-of-park at midday.

According to both the general climatic data of Antalya and the data measured in this study, January is the coldest month of the year, and the midday temperatures is 3.2 ◦C higher in the whole park than the farthest location from the park at 300 m (Figure 4). In other words, Aydın Kanza Park provides a 3.2 ◦C warmer environment in the coldest month of the year. The park is still warmer than the farthest location in February, March, and April with 2.6 ° C, 2.0 °C and 1.9 ° C, respectively.

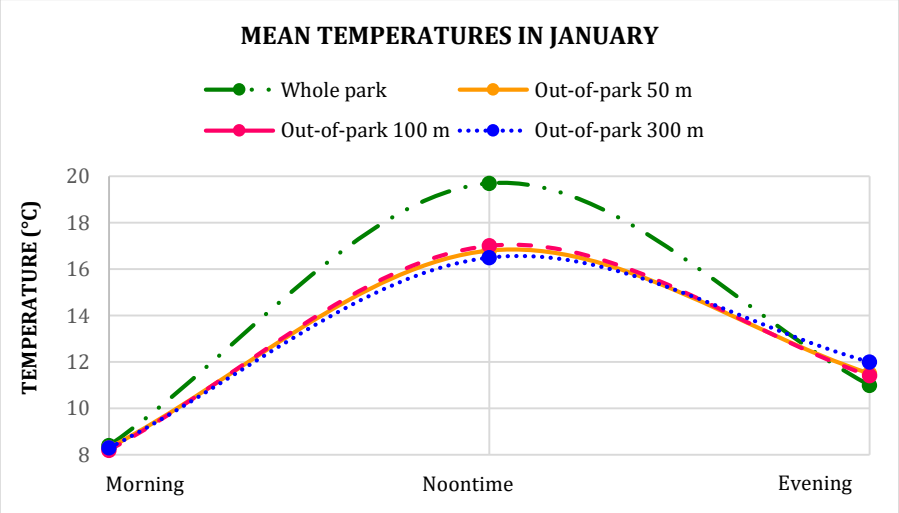


Figure 4. In-park and out-of-park mean temperatures (◦C) in January.

Starting from May, the park becomes cooler than the surrounding environment. From May to November, midday temperatures of the park are lower than those of out-of-park. According to both the general climatic data of Antalya and the data measured in this study, August is the

hottest month of the year, and the midday temperatures is 3.6 ◦C lower in the whole park than the farthest location from the park at 300 m (Figure 5). In other words, Aydın Kanza Park provides a 3.6 ◦C cooler environment in the hottest month of the year.

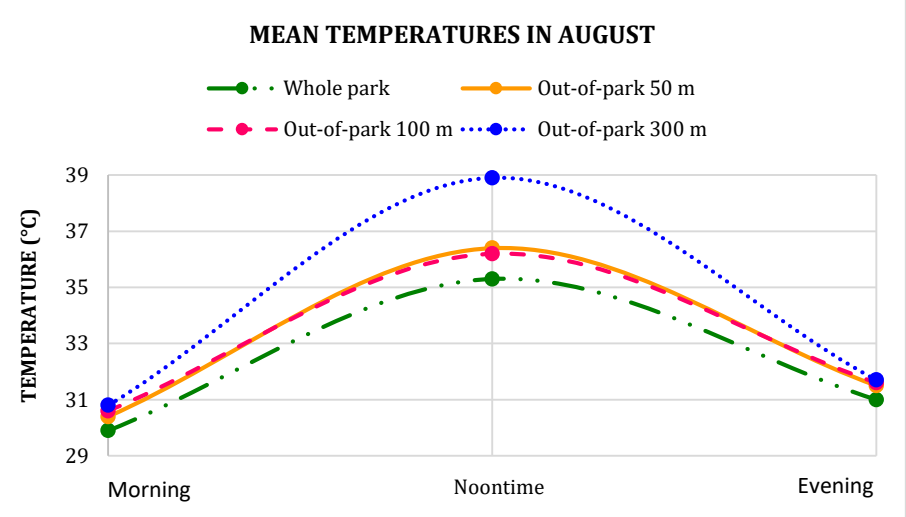


Figure 5. In-park and out-of-park mean temperatures (◦C) in August.

The temperatures values according to the month, location, and hours inside and outside of the park, and their statistical analysis results were given in the Table 3.

Table 3. Average temperatures inside and outside of the park according to the month, location, and hours.

Month	Measurement Hour	Measurement Location				Measurement Hour Average	Monthly Average
		In-park	Out-of-park 50 m.	Out-of-park 100 m.	Out-of-park 300 m.		
JANUARY	07.00-08.00	8.4 C a y	8.3 C a	8.2 C a	8.3 C a	8.3 c	**12.4 k z**
	13.00-14.00	19.7 A a	16.8 A b	17 A b	16.5 A b	17.5 a	
	20.00-21.00	11 B c	11.5 B b	11.4 B b	12 B a	11.5 b	
	Meas. Loc. Average	13 a	12.2 a	12.2 a	12.2 a		
FEBRUARY	07.00-08.00	10.3 C b	10.4 C b	10.3 C b	10.7 C a	10.4 c	**15.5 j**
	13.00-14.00	21.6 A a	18.9 A b	19.7 A b	19 A b	19.8 a	
	20.00-21.00	16.6 B a	16.2 B b	16.2 B b	15.7 B c	16.2 b	
	Meas. Loc. Average	16.1 a	15.2 a	15.4 a	15.1 a		
MARCH	07.00-08.00	14.1 C c	14.5 C b	14.4 C bc	14.9 C a	14.5 c	**18.3 h**
	13.00-14.00	23.9 A a	22.5 A ab	22.7 A ab	21.9 A b	22.8 a	
	20.00-21.00	17.7 B a	17.7 B a	17.8 B a	17.9 B a	17.8 b	
	Meas. Loc. Average	18.6 a	18.3 a	18.3 a	18.2 a		
APRIL	07.00-08.00	17.5 C a	17 C ab	16.7 C b	17.2 C ab	17.1 c	**20.5 g**
	13.00-14.00	26 A a	24.9 A a	25.5 A a	24.1 A a	25.1 a	

DOI: 10.15320/ICONARP.2025.342

	20.00-21.00	18.8 B b	19.3 B a	19.5 B a	19.4 B a	19.3 b	
	Meas. Loc. Average	20.7 a	20.4 a	20.6 a	20.2 a		
MAY	07.00-08.00	23.6 C c	24.2 C b	24.2 C b	25.2 C a	24.3 c	**27.1 d**
	13.00-14.00	30.4 A b	31.7 A ab	32 A a	31.5 A ab	31.4 a	
	20.00-21.00	25.4 B c	25.6 B b	25.8 B b	26 B a	25.7 b	
	Meas. Loc. Average	26.5 a	27.2 a	27.3 a	27.6 a		
JUNE	07.00-08.00	27.9 B b	28.6 B a	28.7 B a	29.1 B a	28.6 b	**30.3 b**
	13.00-14.00	32.2 A b	33.2 A b	33 A b	35.7 A a	33.6 a	
	20.00-21.00	27.9 B c	28.7 B b	28.7 B b	29.3 B a	28.6 b	
	Meas. Loc. Average	29.3 a	30.2 a	30.1 a	31.4 a		
JULY	07.00-08.00	29.9 C c	30.8 B b	30.9 B b	31.3 C a	30.7 c	**32.8 a**
	13.00-14.00	34.8 A b	37 A a	35.8 A ab	36.6 A ab	36.1 a	
	20.00-21.00	31 B c	31.6 B b	31.8 B a	31.7 B a	31.5 b	
	Meas. Loc. Average	31.9 a	33.2 a	32.8 a	33.2 a		
AUGUST	07.00-08.00	29.9 C c	30.4 C b	30.6 B ab	30.8 C a	30.4 c	**32.9 a**
	13.00-14.00	35.3 A b	36.4 A b	36.2 A b	38.9 A a	36.7 a	
	20.00-21.00	31 B c	31.5 B b	31.6 B a	31.7 B a	31.5 b	
	Meas. Loc. Average	32 a	32.7 a	32.8 a	33.8 a		
SEPTEMBER	07.00-08.00	26.1 C b	26.1 C b	26.2 C b	26.6 C a	26.2 c	**29.4 c**
	13.00-14.00	31.5 A b	31.9 A b	31.7 A b	32.5 A a	31.9 a	
	20.00-21.00	29.7 B c	30.3 B ab	30 B bc	30.5 B a	30.1 b	
	Meas. Loc. Average	29.1 a	29.4 a	29.3 a	29.9 a		
OCTOBER	07.00-08.00	23.4 C b	23.4 C b	23.3 C b	30.8 A a	25.2 b	**26.8 e**
	13.00-14.00	29 A b	29 A b	28.9 A b	30.9 A a	29.5 a	
	20.00-21.00	25.6 B a	25.9 B a	25.7 B a	25.8 B a	25.8 b	
	Meas. Loc. Average	26 b	26 b	26 b	29.2 a		
NOVEMBER	07.00-08.00	19 C c	20.2 C b	19.9 C b	21.8 C a	20.2 c	**23.7 f**
	13.00-14.00	27.3 A b	26.9 A b	27.1 A b	28.7 A a	27.5 a	
	20.00-21.00	23.2 B a	23.4 B a	23.4 B a	23.6 B a	23.4 b	
	Meas. Loc. Average	23.2 a	23.5 a	23.5 a	24.7 a		
DECEMBER	07.00-08.00	13.2 C ab	13.3 C ab	13.2 C b	13.7 C a	13.3 c	**16,8 ı**
	13.00-14.00	21.5 A a	20.6 A ab	20.4 A b	21.5 A ab	21 a	
	20.00-21.00	15.4 B c	15.6 B bc	15.8 B b	17 B a	15.9 b	

	Meas. Loc. Average	16.7 a	16.5 a	16.4 a	17.4 a		
Measurement Location Annual Aver.		**<u>23.6 b</u>**	**23.7 b**	**23.7 b**	**<u>24.4 a</u>**		
Measurement Hour Annual Average							
07.00-08.00		**<u>20.8 c</u>**					
13.00-14.00		**<u>27.7 a</u>**					
20.00-21.00		**23.1 b**					
Significance *(p values)*							
Month (M):	<0.001*	[z] Different averages at 5% significance level according to Duncan test are shown by separate letters. [y]: In the sections written in italics (within each month), the uppercase letters show the comparison of the averages in the columns (each measurement hour), and the lowercase letters in the rows (at each measurement location). * It shows statistically significant p values. The underlined values in the table indicate the maximum and minimum values.					
Measurement Hour (MH):	<0.001*						
Measurement Location (ML):	<0.001*						
M x MH:	<0.001*						
M x ML:	<0.001*						
MH x ML:	<0.001*						
M x MH x ML:	<0.001*						

Table 3 shows that the differences in month ($p < 0.001$), measurement time ($p < 0.001$) and measurement location ($p < 0.001$) values are statistically significant. In terms of binary interactions, the pairwise interactions between the month and measurement hour ($p < 0.001$), the measurement hour and measurement location ($p < 0.001$) and the month and measurement location ($p < 0.001$) were statistically significant. Month, hour and location triple interaction ($p < 0.001$) were also found to be statistically significant.

Monthly averages vary between 12.4 °C and 32.9 °C, being the highest value in August (32.9 °C) and the lowest value in January (12.4 °C). In terms of hourly averages, the lowest value occur in the morning hours of January (8.3 °C) and the highest value occur at midday of August (36.7 °C). Except June and October, the difference in temperature values of morning-noon-evening was statistically significant, being the midday values highest and the morning values the lowest. In June and October, the difference in the morning and evening temperatures was not statistically significant and was lower than the midday temperatures.

2.2. In-park and out-of-park humidity

In-park humidity values at midday were found to be lower than those of the out-of-park in the first four months of the year (January to April). According to both general climatic data of Antalya and the data measured in this study, January is the coldest month of the year and the midday relative humidity in this month is 4.1% lower than the farthest location from the park at 300 m (Figure 6). In other words, the park provides a 4.1% less humid environment in the coldest month of the year that softens the cold air felt.

DOI: 10.15320/ICONARP.2025.342

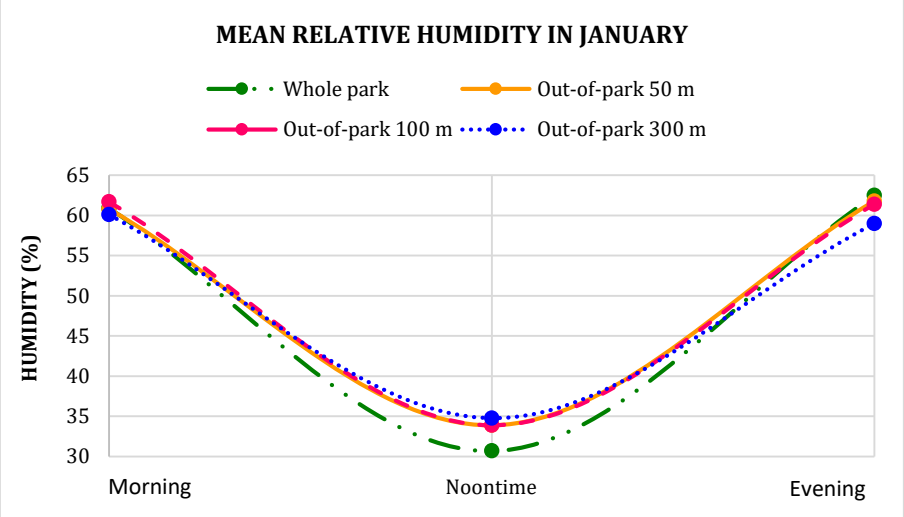


Figure 6. In-park and out-of-park mean relative humidity (%) in January.

In the following eight months from May to December, in-park humidity values are higher than the out-of-park values at all times of the day (Figure 7). In the hottest month of the year (August), the midday humidity in the park is 7.8% more than the farthest location from the park at 300 m. In other words, the park provides a more humid environment in the hottest month of the year, increasing the perceived temperature.

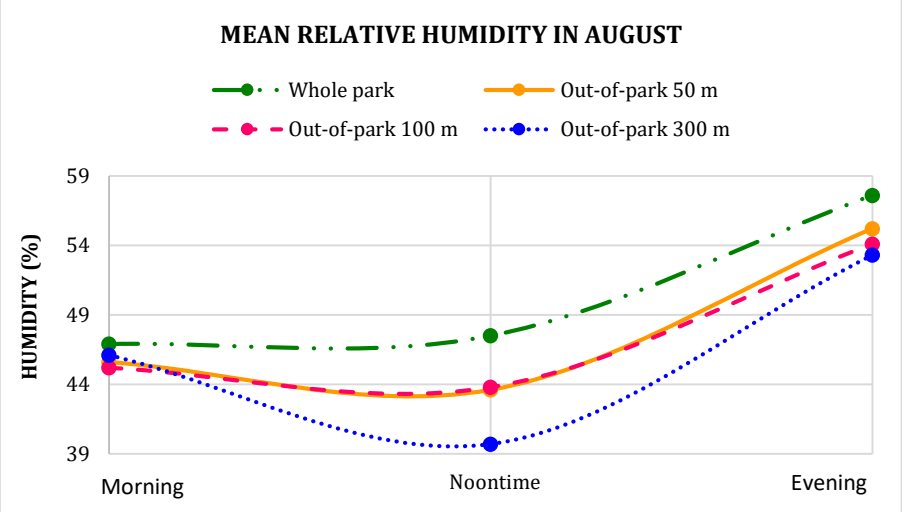


Figure 7. In-park and out-of-park mean relative humidity (%) in August.

When the in-park and out-of-park humidities are compared, it is seen that the differences in month ($p < 0.001$), measurement time ($p < 0.001$) and measurement location ($p < 0.001$) temperatures are statistically significant. In terms of binary interactions, the pairwise interactions between the month and measurement hour ($p < 0.001$), the measurement hour and measurement location ($p < 0.004$) and the month and measurement location ($p < 0.001$) were found to be statistically significant. Month, measurement hour and location triple interaction ($p < 0.001$) were also found to be statistically significant.

The monthly averages vary between 40.3% (July) and 54.4% (February). In terms of the hourly averages, it was observed that the

lowest value occurred at midday in January (33.3%) and the highest values occurred in the evenings of both October and December (61.4%).

The difference in humidity values of morning-noon-evening was statistically significant from February to June as well as in August, September, November, and December, being the evening values highest and the midday values the lowest. In July and October, the difference in the morning and midday humidity values was not statistically significant and found lower than the evening humidity. In January, the difference in the morning and evening humidity values was not statistically significant and found higher than the midday humidity.

2.3. In-park and out-of-park wind speed

In-park wind speeds were found higher at 100 m. than the park and other locations at midday and in the evening in the first three months of the year (January, February, and March). In January, the wind speed difference between the park and the 100 m location reaches to 0.5 m/s at midday (Figure 8).

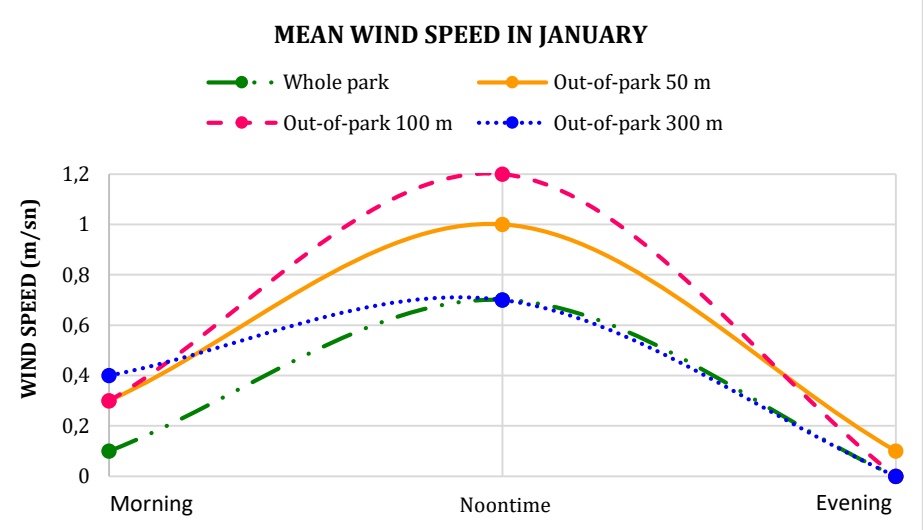


Figure 8. In-park and out-of-park mean wind speeds (m/s) in January.

The mean wind speeds measured at 100 m. are still higher than the park and other measurement locations from April to July and from September to December. The only exception is August in which the highest wind speeds were measured at 50 m location (Figure 9). In June, the wind speed difference between the park and the 100 m location reaches to 0.4 m/s at midday. In general, mean wind speeds are the lowest at 300 m. and the highest at 100 m. The results indicate that the out-of-park wind speeds are higher than the in-park wind speeds. The fact that the 100 m. location has the highest wind speeds measured is probably due to the wind corridor of a large street opening to this location.

DOI: 10.15320/ICONARP.2025.342

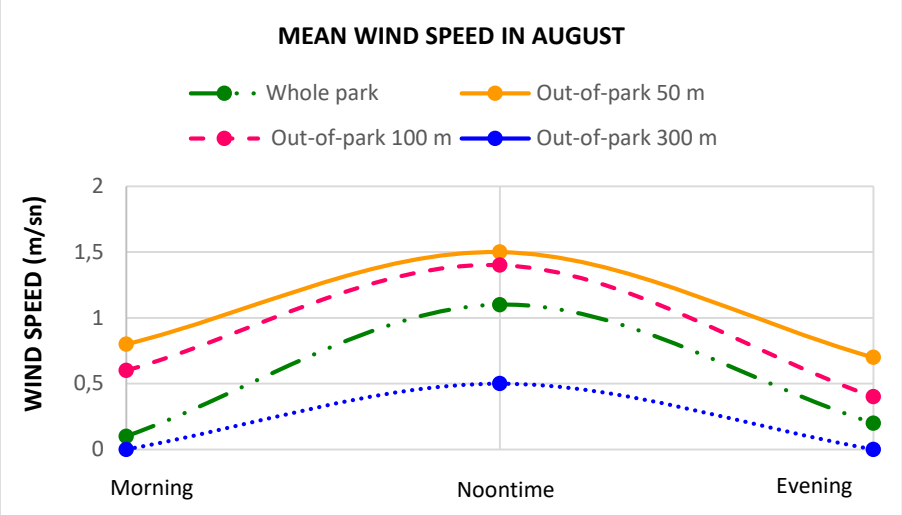


Figure 9. In-park and out-of-park mean wind speeds (m/s) in August.

When the in-park and out-of-park wind speeds are compared, it is seen that the differences in month ($p < 0.001$), measurement time ($p < 0.001$) and measurement location ($p < 0.001$) values are statistically significant. In terms of binary interactions, it was determined that the pairwise interactions between the month and measurement hour ($p < 0.001$) and the measurement hour and measurement location ($p < 0.004$ were statistically significant while the interaction between the month and measurement location ($p < 0.001$) was not. Month, measurement hour and measurement location triple interaction ($p < 0.001$) were also found not significant.

Monthly averages vary between 0.2 m/s and 0.6 m/s. The highest values occurred in June with 0.6 m/s while the lowest one occurred in December with 0.2 m/s. When the wind speed data are analyzed in terms of the hourly averages, it is seen that the lowest value occurred in the evening in January (0 m/s) and the highest values occurred in the evenings of both March and September (1.3 m/s).

DISCUSSION

Scientific research has demonstrated the microclimatic contribution of urban green spaces to the quality of life in urban areas. Studies conducted in India (Jha et al., 2024) and Sweden (Eliasson & Svensson, 2003) have shown that there are temperature differences of up to 8.3 ° C and 9 ° C, respectively, between green areas and their surroundings. A study conducted in France found that the cooling effect of parks was at its maximum during the night hours (16:00-00:00) in the summer months (June-August) and that the cooling effects varied between 1 and 5 ° C (Haeffelin et al., 2024). Some studies have suggested that having more open spaces in parks provides greater cooling during the summer nights, while the presence of dense vegetation provides greater cooling during the day. Based on these findings, the 'savannah approach,' which combines grassy areas and woody vegetation, has been proposed as the optimal solution for cooling (Kraemer & Kabisch, 2022; Arzberger et al., 2024).

The cooling effect of a park was found to exceed 300 m during daylight hours in a study conducted in Nagoya, Japan (Hamada & Ohta, 2010). In Hong Kong, Cheung and Jim (2019) found that 10% increase in tree cover causes a decrease of 0.052 °C in the buffer zone with a diameter of 20 m. Studies have also found that climatic benefits are associated with the size of green spaces (Upmanis et al., 1998, Yu & Hien, 2006). The study in Gothenburg, Sweden, showed that parks with a size of 2.4 ha, 3.6 ha and 156 ha had cooling effects of 1.7 ◦ C, 2.6 ◦ C and 5.9 ◦ C, respectively (Upmanis et al., 1998). The study in Singapore found that two parks of 12 and 36 hectares had a cooling effect between 2.0 °C and 2.3 °C (Yu & Hien, 2006).

In the context of landscape design parameters (grass, 10 m tree, 20 m tree, hard ground, water trunk and building), studies have been conducted to show that urban green spaces can help alleviate thermal comfort (Hwang et al., 2015, Yan & Dong, 2015, Sun et al., 2017) . It has been found that the most important factor affecting the moderation of thermal comfort is tall and large deciduous trees (Sun et al., 2017; Kaçmaz Akkurt & Şemsiyeci 2024) and the shade provided by these trees is effective in lowering temperatures (Hwang et al., 2015) in an urban context. It showed that all landscape parameters in three categories, including spatial and temporal variations in air temperature and their land cover characteristics, site geometry and spatial location, can effectively improve the urban thermal environment on an annual basis (Yan & Dong, 2015). Zhu et al. (2023) conducted a study in a historical region of China where the green space presence is 46.6% and the building density is 17.8%. Two case models were created in which the amount of green space was kept constant, and the building density was increased to 29.9% (Case I), and the amount of green space was kept constant and the amount of green space was reduced to 29.1% (Case II). A thermal comfort calendar was created for the base case and two case cases. When the thermal comfort calendars of the three cases were compared, it was determined that the thermal environment of the base case was the best and the thermal environment of Case II was the worst, especially at 12:00. Yücekaya and GünAydın (2022) stated that besides the cover characteristics of green areas, plant species and planting spacings are also important. In their study, they showed that the area created by planting coniferous plants at 4 m intervals had a higher cooling effect than the area consisting of only broad-leaved plants and both coniferous and broad-leaved plants**.** In a study conducted by Tülek et al. (2024) on the ecosystem services provided by woody plants in Çankırı Urban Park, it was revealed that the identified species contribute significantly to the ecosystem in terms of climatic benefits, pollination, erosion control, recreation and education, improvement of soil and air quality, and habitat provision.

The results obtained from this study support the findings of previous research. The results revealed that Aydın Kanza Park, which is a small Mediterranean park, provides a warmer environment in the first four

DOI: 10.15320/ICONARP.2025.342

months of the year (from January to April) and a cooler environment in the following seven months (from May to November). There is a balancing in

December. The park provides a 3.2 ◦C warmer environment at midday in January, the coldest month of Antalya, and a 3.6 ◦C cooler environment in August, the hottest month of the city.

The heating effect provided by the park in the first four months is between 1.9 ◦C and 3.2 ◦C while the cooling effect it provided in the following seven months was varying between 1 ◦ C and 3.6 ◦C. Average midday heating and cooling effects of the park according to the farthest location where no more climatic effect of the park is assumed were calculated as 2.4 ◦C and 2 ◦C, respectively. This indicates that the average heating effect of the park is higher than its

average cooling effect.

The results show that the heating and cooling effect provided by the park continues at a certain distance from the park. When the midday temperatures measured at 300 m are compared to those of 50 m and 100 m, it is seen that the temperatures at 50 m and 100 m are higher than those of 300 m in the first five months of the year (January to May). Five months' average warmer temperature provided by the park was calculated as 0.4 ◦C and 0.7 ◦C at 50th and 100th meters, respectively. In the meantime, the average cooling of the park in the seven months (June to December) of the year was calculated as 1.4 ◦C and 1.6 ◦C at 50th and 100th meters, respectively. These results indicate that the cooling effect of the park in its near surroundings is two to three times more than its heating effect.

The measurements in the different locations inside the park showed that there were not significant differences between the climatic values of different land covers. When we look at the average temperatures in August, which is the hottest month in Antalya, it is seen that the temperatures are equal, except for the hard grounds, which were found 0.2 ◦C warmer. The reason why the temperature values of locations with different land covers are so close to each other can be explained by the small size of the park (only 1 ha).

As stated before, the results obtained from this study support the findings of previous research on this subject. In their studies on some Israeli parks, Shashua-Bar and Hoffman (2000) found an average 2.8 ◦C cooling effect at midday in July-August. The average cooling effect of Aydın Kanza Park for the same two months was 2.7 ◦C, which is very close figure to that one obtained in Israel, a country in the Mediterranean region. Similarly, in a study on a Belgian city park, Toparlar et al. (2017) revealed that the park has a cooling effect of 3.05 ◦C in June. In Aydın Kanza Park, this value was found to be 3.5 ◦C in the same month. The results obtained from the Ca et al.'s (1998) study in and around a park in Tokyo are also quite similar to the results of this study, too. The temperature of the grass covered area in Tokyo Park was found to be 2 ◦ C lower than the asphalt and concrete covered surface around the park in

August, whereas the temperature of the grass covered part of Aydın Kanza Park was found 1.8 ◦ C lower than the location covered with the concrete surface at 300 m distance. As in this study, the highest air temperature in the grass area of a park in Tokyo was measured at midday and the lowest air temperature in the morning. Relative humidity was also found to be lower at midday than in the evening as in the park in Tokyo.

The heating and cooling provided by parks at different times of the day were also investigated. Xiao et al. (2018) studied daytime temperatures in the green areas of Suzhou, China, in July. They found that the temperatures reach to the highest level between 12:00 and 14:00; that they start decreasing from 14:00 onwards; and that the cooling effect in the hottest time slot of the day is between 5.2 ◦ C and 7.3 ◦ C. In addition, they revealed that the humidification effect of parks in the hottest time slot of the day is between 20.6% and 25%. The results of Aydın Kanza Park study also showed that the temperature values reach to the highest level between 12:00 and 14:00 and start to decrease after 14:00. The cooling effect of Aydın Kanza Park was found between 1 ◦ C and 2.2 ◦ C in the hottest time slot of the day in July. The humidification effect of Aydın Kanza Park was determined between 3.7% and 4.4% in the hottest time slot of the day in July. Xiao et al. (2018) also investigated the in-park temperature differences. In Wenxing Park, the tree-covered area inside the park provided the most cooling effect, followed by the grass-covered area, the green area near the water and the hard grounds. When the results of both studies are compared, it is seen that Aydın Kanza Park provides lesser cooling environment than the parks studied in China. This can be explained by the fact that the study conducted in China covers relatively large parks, the smallest of which is two times larger than Aydın Kanza Park and that there is strong relationship between the size of the park and the cooling effect provided.

The microclimatic effects provided by the parks can also been felt up to a certain distance. In his study, Şimşek Kuşçu (2016) investigated the microclimatic effects of some parks in İstanbul, Türkiye, and found a temperature difference of 5.08 ° C at 50th m, 7.11 °C at 100th m and 7.14 °C at 150th m. In this study, considering the mean values in August, which is the hottest month in Antalya, the temperature differences were found to be 0.7 ◦ C, 0.8 ◦ C and 1.8 ◦ C at 50th, 100th and 300th meters, respectively. The results from both studies are similar in terms of relative increase from the park, but quite different in terms of figures. This could be related by the fact that Şimşek's study is based on satellite data and represents the mean temperature values of many bigger parks and that this study is based on the actual measurements in a small park.

Most studies focus solely on the cooling effect of parks, and this effect is investigated during the summer months. The first distinguishing feature of this study apart from others is that it looks at not only the cooling effect of an urban park but also its heating effect. The second distinguishing feature is that the cooling and heating effects were studied

DOI: 10.15320/ICONARP.2025.342

not only during a specific period of the year but throughout the entire year.

CONCLUSION

The results of the present study show the importance of climatic benefits provided by urban green spaces. The climatic comfort provided by city parks and other green areas is even more important in warm climates like the Mediterranean. It was concluded that the park size is an important factor for a higher climatic benefit. Small parks like Aydın Kanza still provide climatic comfort to urban dwellers to a certain extent, but that would be much higher in bigger parks. Small, isolated green areas, which are not evenly distributed in the urban fabric, will not fulfil the functions expected from them, especially in terms of providing climatic comfort and mitigating the negative effects of urban heat islands. In order for the cooling effect of different design areas in the park to be clearly distinguished from each other in the hot climate character, these areas should be designed without breaking down too much. Considering the above-mentioned criteria, it is seen that wooded areas, grass area, pond edge and hard ground area come respectively in terms of cooling. In order for a park to provide the best climatic comfort, it is important to design the wooded area as maximum and the hard ground area as minimum, to protect perennial trees, and to use species with high leaf density. In order for parks and other green areas to fully fulfil the social, cultural, ecological and climatic functions expected from them, they must be planned within a system in urban planning, in accordance with certain standards and in sufficient size, and their regular distribution in the urban texture.

ACKNOWLEDGEMENTS/NOTES

This article is produced from the master's thesis ''Parkların Mikroiklimsel Etkilerinin Aydın Kanza Parkı (Antalya) Örneğinde İncelenmesi '' conducted at Akdeniz University.

REFERENCES

Arzberger, S., Egerer, M., Suda, M., & Annighöfer, P. (2024). Thermal regulation potential of urban green spaces in a changing climate: Winter insights. Urban Forestry & Urban Greening, 100, 128488. https://doi.org/10.1016/j.ufug.2024.128488

Ca, V. T., Asaeda, T. & Abu, E. M. (1998). Reductions in air conditioning energy caused by a nearby park. Energy and Buildings, 29, 83-92. https://doi.org/10.1016/S0378-7788(98)00032-2.

Cheung, P. K. & Jim, C. Y. (2019). Effects of urban and landscape elements on air temperature in a high-density subtropical city. Building and Environments, 164, 106-362. https://doi.org/10.1016/j.buildenv.2019.106362

Eliasson, I. & Svensson, M. K. (2003). Spatial air temperature variations and urban land use – a statistical approach. Meteorological Applications, 10, 135-149. 10.1017/S1350482703002056

Emmanuel, R. & Loconsole, A. (2015). Green infrastructure as an adaptation approach to tackling urban overheating in the Glasgow Clyde Valley Region, UK. Landscape and Urban Planning, 138, 71-86. https://doi.org/10.1016/j.landurbplan.2015.02.012

Feyisa, G. L., Dons, K. & Meilby, H. (2014). Efficiency of parks in mitigating urban heat island effect: An example from Addis Ababa. Landscape and Urban Planning, 123,87-95. https://doi.org/10.1016/j.landurbplan.2013.12.008

Haeffelin, M., Ribaud, J. F., Jonnathan, C., Dupont, J. C., Lemonsu, A., Masson, V., Nagel, T., & Kotthaus, S., (2024). Impact of boundary layer stability on urban park cooling effect intensity. Atmospheric Chemistry and Physics, 24(24), 14101–14122. https://doi.org/10.5194/acp-24-14101-2024

Hamada, S. & Ohta, T. (2010). Seasonal variations in the cooling effect of urban green areas on surrounding urban areas. Urban Forestry and Urban Greening, 9(1), 15-24. https://doi.org/10.1016/j.ufug.2009.10.002

Hwang, Y. H., Lum, Q. J. G. & Chan, Y. K. D. (2015). Micro-scale thermal performance of tropical urban parks in Singapore. Building and Environments, 94(2), 467-476. https://doi.org/10.1016/j.buildenv.2015.10.003

Jha, P., Joy, M. S., Yadav, P. K., Begam, S., & Bansal, T., (2024). Detecting the role of urban green parks in thermal comfort and public health for sustainable urban planning in Delhi. Discov Public Health, 21, 236. https://doi.org/10.1186/s12982-024-00368-7

Kaçmaz Akkurt, G., & Şemsiyeci, S. (2024). Evaluation of nature based solutions to improve the urban microclimate in Mediterranean climate conditions: A case study of Izmir Karşıyaka. Sustainability, 16(7), 2646. https://doi.org/10.3390/su16072646

Kraemer, R., & Kabisch, N. (2022). Parks under stress: Air temperature regulation of urban green spaces under conditions of drought and summer heat. Frontiers in Environmental Science, 10, 849965. https://doi.org/10.3389/fenvs.2022.849965

Lai, D., Zhou, C., Huang, J., Jiang, Y., Long, Z. & Chen, Q. (2014). Outdoor space quality: A field study in an urban residential community in central China. Energy and Buildings, 68, 713-720. https://doi.org/10.1016/j.enbuild.2013.02.051

Lai, D., Liu, W., Gan, T., Liu, K. & Chen, Q. (2019 a). A review of mitigating strategies to improve the thermal environment and thermal comfort in urban outdoor spaces. Science of The Total Environment, 661, 337-353. https://doi.org/10.1016/j.scitotenv.2019.01.062

Lai, D., Chen, B. & Liu, K. (2019 b). Quantification of the influence of thermal comfort and life patterns on outdoor space activities. Building Simulation, 13,113-125. 10.1007/s12273-019-0565-x

Lai, D., Lian, Z., Liu, W., Guo, C., Liu, W., Liu, K. & Chen, Q. (2020). A comprehensive review of thermal comfort studies in urban open spaces. Science of The Total Environment, 742, 140092. https://doi.org/10.1016/j.scitotenv.2020.140092

Lin, T. P., Tsai, K. T., Hwang, R. L. & Matzarakis, A. (2012). Quantification of the effect of thermal indices and sky view factor on park attendance. Landscape and Urban Planning, 107,137-146. https://doi.org/10.1016/j.landurbplan.2012.05.011

Nowak, D. J., Crane, D. E. & Stevens, J. C. (2006). Air pollution removal by urban trees and shrubs in the United States. Urban Forestry and Urban Greening, 4,115–123. https://doi.org/10.1016/j.ufug.2006.01.007

DOI: 10.15320/ICONARP.2025.342

Nikolopoulou, M. & Lykoudis, S. (2007). Use of outdoor spaces and microclimate in a Mediterranean urban area. Building and Environment, 42,3691-3707. https://doi.org/10.1016/j.buildenv.2006.09.008

Shashua-Bar, L. & Hoffman, M. E. (2000). Vegetation as a climatic component in the design of an urban street: An empirical model for predicting the cooling effect of urban green. Energy and Buildings, 3,221–235. https://doi.org/10.1016/S0378-7788(99)00018-3

Sun, S., Xu, X., Lao, Z., Liu, W., Li, Z., Garcia, E. H. & Zhu, J. (2017). Evaluating the impact of urban green space and landscape design parameters on thermal comfort in hot summer by numerical simulation. Building and Environments, 123, 277-288. https://doi.org/10.1016/j.buildenv.2017.07.010

Şimşek Kuşçu, C. (2016) Orta ölçekli parkların mikro iklimsel etki alanlarının araştırılması: gezi parkı, maçka parkı ve serencebey parkı örneği. METU Journal of the Faculty of Architecture, 33(2), 1-17. 10.4305/METU.JFA.2016.2.1

McDonald, R., Kroeger, T., Boucher, T., Longzhu, W., Salem, R., Adams, J., Basett, S., Edgecomb, M. & Garg, S. (2016). Planting healthy air. The Nature Conservancy. Retrieved from https://www.nature.org/content/dam/tnc/nature/en/documents/20160825_PHA_Report_Final.pdf

Toparlar, Y., Blocken, B., Maiheu, B. & van Heijst, G. J. F. (2017) The effect of an urban park on the microclimate in its vicinity: A case study for Antwerp, Belgium. International Journal of Climatology, 38, 303-322. 10.1002/joc.5371

Tülek, B., Sarı, D. & Şahin Körmeçli, P. (2024). Ecosystem services provided by urban woody plants in the context of spatial relations: Çankırı case area. Dendrobiology, 91, 100-112 https://doi.org/10.12657/denbio.091.008

United Nations (2018). World Urbanization Prospects: The 2018. Retrieved from https://population.un.org/wup/assets/WUP2018-Report.pdf

Upmanis, H., Eliasson, I. & Lindqvist, S. (1998). The influence of green areas on nocturnal temperatures in a high latitude city (Göteborg, Sweden). International Journal of Climatology, 18, 681-700. https://doi.org/10.1002/(SICI)1097-0088(199805)18:6<681::AID-JOC289>3.0.CO;2-L

Venter, Z. S., Figari, H., Krange, O. & Gundersen, V. (2023). Environmental justice in a very green city: Spatial inequality in exposure to urban nature, air pollution and heat in Oslo, Norway. Science of The Total Environment, 858, 160193. https://doi.org/10.1016/j.scitotenv.2022.160193

Woolley, H. (2003). Urban Open Spaces. London: Taylor & Francis.

World Health Organization, (2017). Urban green spaces: a brief for action. Retrieved from https://apps.who.int/iris/handle/10665/344116

Xiao, D. X., Dond, L., Yan, H., Yang, N. & Xiong, Y. (2018). The influence of the spatial characteristic of urban green space on the urban heat island effect in Suzhou Industrial Park. Sustainable Cities and Society, 40, 428-439. https://doi.org/10.1016/j.scs.2018.04.002

Yan, H. & Dong, L. (2015). The impacts of land cover types on urban outdoor thermal environment: the case of Beijing, China. Journal of Environmental Health Science and Engineering, 13, 43. 10.1186/s40201-015-0195-x

Yu, C. & Hien, N. W. (2006). Thermal benefits of city parks. Energy and Buildings, 38, 105–120. https://doi.org/10.1016/j.enbuild.2005.04.003

Yücekaya, M. & GünAydın, S. (2022). The Role of Different Planting Types in Mitigating Urban Heat Island Effects: A Case Study of Gaziantep, Türkiye.

Journal of Agricultural Sciences 28(3), 535-544. https://doi.org/10.15832/ankutbd.898103

Yüksel, Ü. (2005). Ankara kentinde kentsel ısı adası etkisinin yaz aylarında uzaktan algılama ve meteorolojik gözlemlere dayalı olarak saptanması ve değerlendirilmesi üzerinde bir araştırma. (Doctoral dissertation, Ankara University, Ankara). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/tezDetay.jsp?id=4NmRI7SwFTPUq4teYvDkXw&no=HsCjRp-E7SxUppnHhUAdnw

Zhang, Y., Rao, F., Xue, J. & Lai, D. (2023). Dependence of urban park visits on thermal environment and air quality. Urban Forestry & Urban Greening 79, 127813. https://doi.org/10.1016/j.ufug.2022.127813

Zhu, R., Liu, Y., Yan, B., Zhang, X., Yuan, L., Wang, Y. & Pan, Y. (2023). Effects of district parameters, green space and building density on thermal comfort- a case study of Badaguan District in Qingdao. Case Studies in Thermal Engineering 42, 102705. https://doi.org/10.1016/j.csite.2023.102705

Resume

Sümeyra Elma is a Landscape architect and researcher. She received her master's degree in landscape planning from the Department of Landscape Architecture, Faculty of Architecture, Akdeniz University in 2020. She is currently pursuing her doctoral studies in the same department. Her primary research areas include landscape planning, landscape economics, urban green spaces and their climatic impacts, and ecosystem services. She has published 1 book chapter, 2 articles, and 2 conference papers in these fields.

Veli Ortaçeşme has been trained as a landscape architect. His specialty and research interests include landscape planning, protected areas and urban green spaces. After having worked in private sector for two years, he moved to academia where he has been studying for more than 35 years. Currently, he has been teaching and conducting research at Akdeniz University, Faculty of Architecture, Department of Landscape Architecture in Antalya, Türkiye. Veli Ortaçeşme has published more than 200 articles, conference papers, research reports, book chapters and books.

DOI: 10.15320/ICONARP.2025.342

Research Article

ICONARP
International Journal of Architecture and Planning
Received: 04.04.2024 Accepted: 07.10.2025
Volume 13, Issue 2/ Published: 31.12.2025
DOI: 10.15320/ICONARP.2025.343 E- ISSN:2147-9380

ICONARP

Identification of Planning Region with Deductive Approach: The Case of Trabzon-Vakfıkebir

Sinem Dedeoğlu Özkan *
Dilek Beyazlı **

Abstract

The existing definitions of the region have become obsolete in the context of 21st-century understanding, and the concept of region alone has become inadequate for defining an area. This shift has precipitated the development of new perspectives on the region in theoretical and practical regional science. The scope of this study is to determine the boundaries of the planning region in the regional context of the Vakfıkebir district, which is one of the settlements located near the border of Trabzon providence, and which was determined as a sample area. The determination of boundaries was conducted through the prioritisation of spatial proximities and porosity principles within the region, which is regarded as a territorial entity. This approach entailed the juxtaposition of local units with a deductive approach. Similarity discussions/studies were carried out in the context of all districts of Trabzon and Giresun provinces. Within the scope of the data set compiled from relevant institutions/organizations in social, economic, political and spatial dimensions, the territorial/scale similar settlement classes of Vakfıkebir were determined through cluster analysis method. The results obtained were interpreted, and Vakfıkebir's primary and secondary "Identical Region" was defined. In this context, in order to contribute to the production of realistic and feasible regional development and development policies in regional planning practice, a context-oriented approach was envisaged in which the hierarchical, fixed structure of the region and the existence of vertical relations were revealed.

Keywords: *Boundary, Deductive Approach, Identical, Planning Region, Vakfıkebir-Trabzon*

*Department of Urban and Regional Planning, Karadeniz Technical University (KTU), Trabzon, Turkey. (*Corresponding author*)
E-mail: snmdedeoglu@gmail.com

** Department of Urban and Regional Planning, Karadeniz Technical University (KTU), Trabzon, Turkey.
E-mail: dilekbeyazli@gmail.com

To cite this article: Dedeoğlu Özkan & S., Beyazlı, D. (2025). Identification of Planning Region with Deductive Approach: The Case of Trabzon-Vakfıkebir. *ICONARP International Journal of Architecture and Planning,* 13 (2), 731-752. DOI: 10.15320/ICONARP.2025.343

INTRODUCTION

With the concept of borders becoming ambiguous due to globalisation, the definition of the region is undergoing a shift in meaning and today's definitions of the region refute the idea of the unitary city and contradict the understanding of the nation state (Duara, 1995; Scott, 2001). In the traditional approach, regional boundaries, which were drawn as isolated entities expressing only an absolute area with strict borders, are now ignored with the decrease in communication and transport costs (Erzi, 2005). Along with globalisation and regionalisation, economic, social, technological and political changes, such as the transition to post-Fordist production and the increasing value of information, have made the traditional concept of the region controversial (Garipağaoğlu, 2017).

When the concept of region is examined with its changing structure and dynamics from past to present, it is seen that it includes different definitions and concepts according to different academics. In this context; common to all definitions of a region is the idea that a geographical area constitutes an entity, so that meaningful statements can be made about the area as a whole (Hoover and Giarratani, 2020). The concept of region, which is generally defined as a homogeneous block (Agnew, 2018), is also expressed as socio-spatial processes defined in different areas of social action and social consciousness (Paasi, 1986), physical areas where human interaction takes place (Wirth 1942; Weitz, 1995), social structures created in cultural and administrative practices and discourses (Paasi, 2001), and places politically defined by governments and political movements (Patriarca, 1994; Amin,2004). The regional level has been seen as very blurred and fluid, always depending on many contextual circumstances (Glasson and Marshall, 2007). It is an open, discontinuous, relational, and internally diverse (Allen et al., 1998 and Massey, 1994) and multi-layered place (Paasi and Zimmerbauer, 2016) defined by changing relationships (Jones, 2009), as opposed to a limited area on the map (Allen et al., 1998). The concept of region, which has a dynamic structure, is not only based on geographical factors, but also on units that show functional and economic integrity with each other in a spatial sense (Friedman, 1956).

In parallel with these studies, the need to delineate PRs (planning region) in line with FRs (functional region) for the planning of growing metropolitan areas by taking into account the geographical extent to which the constituent parts of the respective cities are strongly connected to each other through daily interactions, such as commuting relationships, first emerged in regional planning (Wirth, 1942; Friedmann, 1956).

The concept of region, which in the period 1950-1970 was basically defined as a territorial, fixed, self-sufficient socio-spatial organisation, has changed, especially after 1980-1990, and taken on a new meaning in which geographical proximity and the relative size of places are less important than in the past (Batten, 1995). Thus, the phenomenon of the region, defined as globalised spaces in which local space gains in

DOI: 10.15320/ICONARP.2025.343

importance, has begun to be rethought within a complex geometry of socio-economic, cultural and political geographies that extend beyond borders (Agnew, 2002; Amin, 2002). According to Amin (2004), 'cities and regions do not come with the automatic promise of territorial or systemic integrity, as they are made through the spatiality of flow, juxtaposition, porosity and relational connectivity'. (Amin, 2004; Goodwin, 2013). Although it is very difficult to create a universal and standard definition of the concept of region, which is defined as a concept whose borders can hardly be drawn (Garipağaoğlu, 2017), the concept of region is now conceptualised as an open, fluid and unbounded territory (Castells, 1996; Amin, 2004; Massey, 2005; Allen and Cochrane, 2007; Jones, 2009; Harrison, 2013; Varró and Lagendijk, 2013; Agnew, 2013).

The concept of region has been reformulated as a development policy tool when examining the impact of globalisation on the settlement system (Genç et al., 2021). Until the 1980s of the 20th century, the dominant urban formation was the metropolitan city, defined as a large, dominant city in a region that influences other cities and rural settlements around it (Arkon, 2006). However, the existence of multiple centres with specialised economic, social and cultural functions and a high degree of interaction between them means that a monocentric model is no longer appropriate for describing contemporary urban configurations at the metropolitan level (Clark and Kuijpers-Linde, 1994; Kloosterman and Musterd, 2001). Developed in the last quarter of the twentieth century and now widely used, the concept of the metropolitan area is no longer sufficient to explain large urban formations on a global scale and the spatial relationships they contain. The European Spatial Development Perspective, prepared by the European Commission in 1999, advocates a sustainable approach to increasing the effectiveness of strategic spatial planning at the metropolitan scale, supporting the development of polycentric relationships between metropolitan regions and areas beyond their monocentric structure (METREX, 2003). In this context, it is also necessary to examine the relationship between the strength and extent of functional linkages between cities in a metropolitan area and its performance as a regional urban system (Meijers and Burger, 2010).

The increasing spatial mobility and flexibility of firms and households in a changing world order, as well as changes in local and regional policies, are transforming the concept of region (De Goei, et al., 2010). In this context, the main contribution of concepts such as metropolitan area, urban region, hinterland to spatial thinking is the shift away from the formality and physical structure of the city towards a focus on the dynamics of urban functions that transcend limited perceptions of space. As Harvey (2000) puts it, 'spatial scales are never fixed, they are constantly being redefined, debated and reconfigured'.

In summary, it is important to highlight how regions and regional change are best conceptualised and how they are a catalyst for new research. On the other hand, it is also important to explore and understand how regions are actually created for specific policy purposes

(Smith 1995; Cohcrane, 2018). This is because the creation of planning regions based on normative regions, i.e. administrative regions, which is the first and easiest thing to think of when creating planning region boundaries, fails to encompass the geographical scope of interacting communities and ultimately reduces the driving force of the people behind the planning process (Beyhan, 2019).

Today, the tendency to define planning regions according to normative regions continues (Ecemis Kılıç, 2009). This is due to the rigidity of normative regions, which "can continue to exist for reasons other than those that brought them into existence" (Wirth, 1937, p. 494). In this context, the production of successful regional plans is ensured by the precise definition of the boundaries of the planning region, which are not fixed in the face of a changing socio-economic structure, and which make the embeddedness of the region visible by questioning the relationships of the core unit.Regional plans based on normative regions, however, are actually unable to cover the geographical extent of the communities that interact with each other, which ultimately reduces the driving force of the people behind the planning process. This is due to the rigid nature of normative regions, which "may continue to exist for reasons other than those which brought them into existence" (Wirth, 1937, p. 494).

From this point of view, the main purpose of the study is to determine the planning region boundary that can respond to the need for change in spatial planning practice under the influence of globalisation, which represents the transformation of time and space, by introducing a new perspective at the local scale and in the territorial context of border settlements. While the functional determination of the planning region boundary, it is envisaged that border settlements should be considered in a holistic manner that ignores/transcends strict borders by going beyond being seen as administrative entities or atomistic structures. In this context, this study will provide a conceptual innovation to the planning discipline in terms of presenting a new planning region discussion as opposed to traditional regional boundaries. In line with the defined purpose, the hypothesis of the study has been defined as follows;

"H. Administrative boundaries cannot be the main limitation in zoning because regions cannot be defined in a fixed, closed, and static context".

The first part of the study includes a theoretical framework that summarises the concept of region and its changing content; the methodology section includes the study model, the method and the selection of variables. The results section is a process in which the methods established are applied in the selected study area in the context of the deductive approach to the boundaries of the planning region. The last section consists of discussions and conclusions, in which the similarities and differences of the planning region boundary drawn as a result of the field study with other planning region boundaries in the planning literature are evaluated.

DOI: 10.15320/ICONARP.2025.343

METHODOLOGY

The study process was designed according to the principle that no settlement should be considered in isolation, but rather within the context of its own administrative borders. In this context, the study emphasised the geographical characteristics, spatial structure, juxtaposition and proximity of settlements, as well as the porosity of the geography and spatial structure. It also defined the region within the scope of the "territorial structure" of the place in the process of determining the planning region, especially the border or near of the border settlements. The study adopted a top-down approach, utilising the principles of "contiguity/proximity" of settlements. The discussion on the planning region boundary was conducted using a deductive approach.

The aim of the deductive (theory testing) approach is to obtain evidence of the validity of a theory through hypotheses. In deductive logic, certain hypotheses are formulated and tested based on a general theory, and thus a general proposition is reduced to the specific through reasoning (Gürbüz and Şahin, 2018: 26). Settlement units (region, settlement, grid) are gradually divided into groups according to pre-selected criteria, taking into account the relative position of the unit to the threshold value on the criteria (Ballas et al., 2003). This top-down approach has traditionally referred to compact and highly contiguous settlements in the planning literature. When determining the cluster of settlements, a specific set of functions is selected on the basis of indicators such as population size, economic performance, accessibility, intensity of commercial services, etc. (Davoudi, 2008).

The district of Vakfıkebir, located within Trabzon province in Turkey, was selected as the primary study region for the delineation of the planning region boundary (see Figure 1). The selection of Vakfıkebir district as the study area was primarily influenced by its proximity to the provincial border. The district is situated in the western part of Trabzon province, at a distance of 40 kilometres from the city centre, and shares borders with Beşikdüzü in the west, Çarşıbaşı in the east, and the Düzköy and Tonya districts in the south. In accordance with the 1/50,000 Scale Provincial Spatial Development Plan (NUTS-4 level) (1/50,000 Provincial Spatial Development Plan Explanation Report, 2017), Vakfıkebir district is defined as the third planning sub-region, which encompasses Beşikdüzü, Çarşıbaşı, Şalpazarı and Tonya districts.

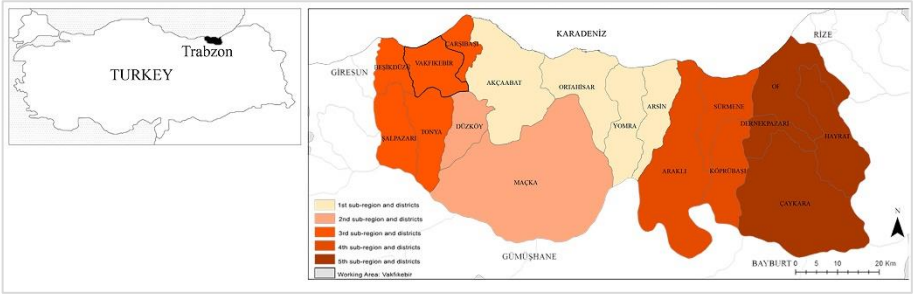


Figure 1. Trabzon province, its sub-regions and study area Vakfıkebir.

As a result of the clustering analysis of Vakfıkebir's territorial/scale similar settlement classes formed within the framework of social, economic, political and spatial dimensions, Vakfıkebir's "Identical Region" was determined in the context of settlements that are most similar to Vakfıkebir. Under the identical region, a cluster of "primary similar settlements" and a cluster of "secondary similar settlements" were identified in which Vakfıkebir district has a similar structure in every dimension.

Method and Dataset

The two-step clustering method is a multivariate analysis process that falls under the umbrella of cluster analysis methods. This two-step clustering method is a hybrid clustering technique that combines K-means, a non-hierarchical clustering technique, and Ward's least squares, a hierarchical clustering technique (Ceylan et al., 2017). This method was developed to address the limitations of the K-means algorithm. This approach involves a one-pass data approach that permits the concurrent utilisation of quantitative and qualitative variables. It determines pre-clusters in the initial step and subsequently performs hierarchical clustering (Wu et al., 2016; Michailidou et al., 2009). In the pre-clustering stage of the method, the data are scanned one by one and it is decided whether the current situation should be combined with previously formed clusters or not, and whether to start a new cluster according to the distance criterion (Michailidou et al., 2009). In the subsequent clustering step, the data are grouped into the desired number of clusters using the standard hierarchical clustering algorithm according to the subsets obtained from the pre-clustering step (Satish and Bharadhwaj, 2010).

The two-step clustering algorithm is notable for its ability to handle large data sets, its capacity to manage both categorical and continuous variables, its ability to automatically determine the optimal number of clusters, and its capability to remove observations that do not conform to the obtained clusters when necessary (Ceylan et al., 2017).Within the scope of the study, a two-step clustering analysis was conducted utilising the SPSS program. However, given that cluster analysis does not itself test the hypothesis, the onus falls on the researcher to verify the adequacy of the solution. At this juncture, the cluster quality bar signifies the silhouette coefficient, which is a metric of both cohesion (i.e. the similarity of items in a cluster) and dissimilarity (i.e. the difference of clusters), and ranges between -1 and 1 (Raggi et al., 2013; Bacher et al., 2004).

The study's objective is to determine the identical region of Vakfıkebir using a deductive approach through cluster analysis. To this end, a comprehensive data set encompassing social, economic, political, and spatial dimensions was required to define and classify similar settlement (district-NUTS-4) clusters in Trabzon and Giresun provinces. In this

DOI: 10.15320/ICONARP.2025.343

process, raw/undiected/stock data obtained from relevant institutions/organizations were utilised.

a) Social structure variables should be defined as the main component of the regional scale economic and social structure (Storper, 1995; 1997). Regional units are socio-spatial processes that emerge as part of the spatial structure of society and are defined in different social structure and social action areas (Paasi, 1986). In this context, the concept encompasses variables (i.e. stock data) that serve to measure the social structure, the spatial distribution and movement of the population, the continuity and quality of the basic education process and the continuity and quality of the subsequent education process in the context of equal opportunities, and the capacity and accessibility of health units.

b) It is imperative that economic structure variables are defined as the fundamental factors of economic growth in the formation process of regions (Hopkins, 2015). In order to ensure the effective economic structure of districts, it is essential that these variables encompass the workforce potential, financial resources, financial capacity, sectoral dynamics, and social and physical infrastructure facilities. This is to ensure consideration of the economic growth structure in the region and those who benefit from it as a whole (Agnew, 2000).

c) The necessity for self-realisation of the populace is emphasised by political structure variables, as posited by the statement of Seers in 1979 that "the realisation of human potential is the basic measure of development" (Dedeoğlu and Beyazlı, 2018). In this context, political variables consist of variables that measure the organisation, governance and participation of districts.

d) Spatial structure variables consist of variables that can be questioned within the scope of geographical pattern, natural structure and access in the spatial dimension of the spatial/administrative boundaries of settlements (Amin, 2004), which are regarded as a heterogeneous area placed side by side as a spatial organisation.

In order to prepare the data set, firstly, interviews were made with the relevant institutions/organisations and lists of data that could be provided were created. The process of determining the variables to be used within the scope of the study has been hindered by the limitation that data from relevant institutions/organisations at the district level could not be obtained. With the support of the relevant stakeholders mentioned below, the NUTS-4 level data set of the settlements of Trabzon and Giresun provinces for the most recent data year was prepared (Table 1).

The present study utilised a dataset consisting of a total of 42 variables, including 15 social, 19 economic, 2 political, and 6 spatial structure variables. This dataset was selected with a view to considering the socio-economic structure of rural areas, which were aggregated along four different dimensional axes (Table 1).

Table 1. Variables and Data Sources to be Used in the Deductive Approach Context.

	Variables	Year	Data Source
Social Structure	Population density	2021	Turkish Statistical Institute (TÜİK)
	The proportion of the population aged 15-24		
	The proportion of the population aged 65 and over		
	The average size of households		
	The rate of divorce		
	The rate of female literacy		
	The proportion of college and university graduates		
	The rate of in-migration	2020	TÜİK
	The rate of out-migration		
	The number of visits to health facilities	2019	Urban and Rural Settlement Systems Research Project in Turkey (YER-SİS)
	The proportion of the population living in rural areas in summert	2018	
	The proportion of the population living in rural areas in winter		
	The number of students enrolled at universities	2017	
	The number of specialist doctors	2021	Provincial Health Directorate
	The capacity of hospital beds		
Economic Structure	The proportion of the female workforce that is insured	2021	Social Security Institution
	The proportion of individuals whose premiums are paid by the state		
	The volume of trade sales	2018	YER-SİS
	The volume of trade purchases		
	The turnover		
	The export rate		
	The distribution of service activities in rural areas		
	The number of employees in manufacturing in rural areas		
	The per capita municipal income	2021	District Municipalities
	The per capita municipal expenditure		
	The residential electricity consumption	2021	Çoruh Electricity Distribution Co.
	The industrial electricity consumption		
	The quantity of animal production	2021	TÜİK
	The quantity of grain and other crops production		
	The employment rate in the organised industrial zone	2021	Ministry of Science, Industry, and Technology
	The number of beds in tourism establishments	2021	Provincial Directorate of Culture and Tourism
	The number of farmers	2021	Provincial Directorate of Agriculture
	The number of bank branches	2021	Turkish Banking Association
	The number of registered businesses	2021	Trade Provincial Directorate
Political Structure	The number of associations	2021	Ministry of Interior
	The number of cooperatives	2021	Provincial Directorate of Agriculture
Spatial Structure	The settlement area	2011	Ministry of Environment and Urbanization
	The areas at risk of disasters		
	The forest area		
	The watershed area		
	The agricultural area	2021	TÜİK
	The distance of settlements to city center (km)	2022	General Directorate of Highways

DOI: 10.15320/ICONARP.2025.343

FINDINGS

A deductive approach was adopted, with cluster analysis methods – a multivariate analysis process – being utilised to characterise the similar settlement regions of Trabzon and Giresun provinces, and to determine the identical region of Vakfıkebir district. The latter is one of the settlements located near the Trabzon-Giresun border, which was essentially determined as the study area. In the subsequent phase of the study, which aims to make multidimensional comparative evaluations of 34 districts (NUTS-4) of Trabzon and Giresun provinces with a total of 42 variables in the social, economic, political and spatial context, two-step cluster analysis was employed. The standardisation of the data was conducted utilising the SPSS 26.0 package programme, while the cluster analysis was performed with the standardised data. The clusters were defined through the evaluation of the "mean" values of the variables within the clusters, employing a holistic and comparative approach. Subsequent to this, the mapping and interpretation stages were undertaken.

Identical Region with Social Structure Dimension

A two-step clustering analysis was conducted with 15 selected and standardized variables to characterise the social structure of the districts belonging to Trabzon and Giresun provinces. The clusters were then categorised into five subgroups, and it was observed that the most influential variable in the formation of clusters was the "number of specialist doctors," while the least influential variable was the "average household size."

The results of the clustering analysis conducted in the context of social structure with a total of 33 districts belonging to Trabzon and Giresun provinces within the scope of the study area revealed that 38.2% of the districts were in Cluster-4, 29.4% in Cluster-5, 20.6% in Cluster-3, 5.9% in Cluster-1 and 5.9% in Cluster-2. The distribution of the variable values formed as a result of the analyses made with the current social structure variables according to the clusters was examined, and the cluster characteristics were determined by comparing the "mean" values of all variables between the clusters. Following a holistic and comparative evaluation of 15 variables and 5 clusters, clusters were defined according to their social structure characteristics (Table 2).

In terms of social structure, it has been observed that some districts in Clusters 3, 4 and 5 interact due to spatial proximity. Cluster 4, which is located in the middle-lower value range for almost all social structure variable values and hosts approximately half of the total number of districts and has the second-highest elderly dependency ratio after Cluster 5, is located in proximity to other districts. The districts situated on the western border of Trabzon (4 districts) and the coastal neighbouring district Eynesil demonstrate spatially homogeneous clustering in terms of social structure (Table 2 and Figure 2).

Table 2. Importance levels-mean values of variables influencing the formation of social structure clusters and the districts belonging to each cluster

Variables (Importance Level)	Cluster-1 (%5,9)		Cluster-2 (%5,9)		Cluster-3 (%20,6)		Cluster-4 (%38,2)		Cluster-5 (%29,4)	
	Mean	Rank*	Mean	Rank*	Mean	Rank*	Mean	Rank*	Mean	Rank*
Expert doctors (1)	75,17	1	13,65	2	1,70	3	0,63	4	0,21	5
Hospital bed count (0,97)	69,76	1	9,82	2	2,80	3	1,06	4	0,75	5
Population aged 15-24 (0,83)	40,73	1	14,99	2	5,97	3	2,54	4	1,30	5
University and college graduates (0,82)	45,95	1	15,28	2	5,02	3	2,31	4	1,23	5
Inward migration (0,74)	36,07	1	13,17	2	6,86	3	2,80	4	1,71	5
Number of students entering university (0,71)	39,33	1	15,46	2	5,80	3	2,76	4	1,29	5
Literacy rate among women (0,71)	37,04	1	15,61	2	6,06	3	2,74	4	1,55	5
Divorce rate (0,68)	42,21	1	13,71	2	5,72	3	2,41	4	1,58	5
Number of applications to health institutions (0,61)	52,37	1	11,49	2	5,30	3	2,11	4	0,89	5
Outward migration (0,53)	32,21	1	11,68	2	6,16	3	3,37	4	2,49	5
Population density (0,34)	32,00	1	7,82	2	5,20	3	5,17	4	1,68	5
Rural area winter population (0,28)	10,48	2	23,07	1	7,79	3	3,68	4	3,16	5
Rural area summer population (0,24)	9,00	3	15,34	1	9,93	2	2,96	5	4,43	4
Elderly dependency ratio (0,23)	2,83	5	3,56	4	4,82	3	5,54	2	8,49	1
Average household size (0,18)	6,51	2	6,59	1	6,18	3	6,08	4	4,90	5

* The ranking of the districts are defined as follows: 1: top, 2: upper-middle, 3: middle, 4: lower-middle, and 5: bottom.

Cluster-4, encompassing the study area (Arsin, Beşikdüzü, Çarşıbaşı, Sürmene, Tonya, Vakfıkebir, Çanakçı, Doğankent, Eynesil, Güce, Piraziz, Şeb inkarahisar, Yağlıdere), where the elderly dependency ratios are in the upper-middle range, rural summer population variable is in the lower

DOI: 10.15320/ICONARP.2025.343

range, and all other social structure variables are in the middle-lower range, is referred to as the "static elderly population cluster."According to the results of the two-step clustering analysis, it is observed that 38.2% of the districts in the province exhibit the characteristic of the "static elderly population cluster."

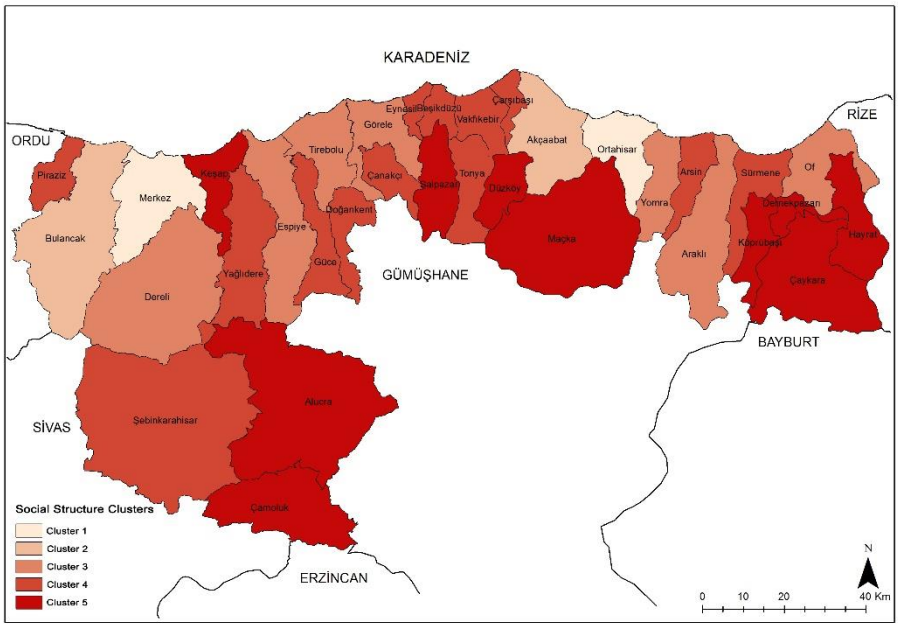


Figure 2. Spatial distributions of social structure clusters in Trabzon and Giresun.

Identical Region with Economic Structure Dimension

A two-step clustering analysis was applied with 19 standardised variables reflecting the economic structure of the districts. The most significant variable in the formation of clusters was determined as "insured female population", while the least effective variable was identified as "quantity of cereal and other plant production". The outcome of the two-step clustering analysis was that approximately half of the districts were found to be in Cluster-5 (27.8%), followed by Cluster-4 (23.5%), Cluster-3 (14.7%), Cluster-2 (5.9%), and Cluster-1 (5.9%) (Table 3). Following Cluster-5, Cluster-4, which generally has the lowest variable values, is composed of Beşikdüzü-Çarşıbaşı-Vakfıkebir in the western part and Araklı-Sürmene in the eastern part of Trabzon province (Figure 3).

In terms of economic structure, Cluster-4, which generally falls within the lower-middle group and includes the working areas (Araklı, Beşikdüzü, Çarşıbaşı, Sürmene, Vakfıkebir, Görele, Tirebolu), moderate levels of "number of bank branches," "number of farmers," and "animal production quantity" are exhibited, while variables related to "manufacturing industry and service activities in rural areas" and "municipal income and expenditures" are at lower levels. Considering these characteristics, this cluster is referred to as a "moderate production, weak service cluster." The two-step clustering analysis

reveals that 23.5% of districts in the province exhibit characteristics of a "moderate production, weak service cluster."

Table 3. Importance degrees-mean values of variables effective in the formation of economic structure clusters and districts belonging to clusters

Variables (Importance Level)	Cluster-1 (%5,9)		Cluster-2 (%5,9)		Cluster-3 (%14,7)		Cluster-4 (%23,5)		Cluster-5 (%50)	
	Mean	Rank*	Mean	Rank*	Mean	Mean	Rank*	Mean	Rank*	Mean
Insured female workforce population (1)	54,62	1	12,69	2	5,21	3	2,88	4	0,96	5
Number of registered businesses in the Chamber of Craftsmen (0,73)	38,75	1	15,50	2	4,37	3	4,20	4	2,11	5
Residential electricity consumption (0,72)	35,69	1	16,24	2	5,42	3	4,38	4	2,00	5
Revenue (0,64)	45,61	1	11,70	2	9,30	3	2,98	4	0,88	5
Trade purchase volumes (0,61)	42,44	1	11,90	2	10,47	3	2,71	4	1,02	5
Number of bank branches (0,43)	38,01	1	12,30	2	4,14	4	5,30	3	2,14	5
Number of individuals whose premiums are paid by the government (0,41)	27,33	1	16,89	2	6,12	3	5,07	4	2,38	5
Number of beds in tourism businesses with operating licenses (0,41)	47,45	1	6,74	2	4,97	3	3,07	4	2,48	5
Trade sales volumes (0,35)	37,65	1	8,71	3	11,54	2	3,75	4	1,15	5
Industrial electricity consumption (0,30)	38,74	1	5,85	3	7,64	2	3,87	4	2,45	5
Number of farmers (0,27)	13,14	2	14,17	1	6,73	4	7,94	3	2,84	5
Number of people employed in manufacturing industry in rural areas (0,25)	581	3	30,83	1	14,68	2	1,75	5	2,32	4
Export rate (0,20)	30,57	1	15,36	3	18,27	2	1,74	4	0,17	5
Animal production quantity (0,18)	12,04	2	18,89	1	4,99	4	5,76	3	3,95	5
Per capita municipal expenditure (0,11)	4,33	4	5,32	3	5,91	2	3,60	5	7,20	1
Per capita municipal revenue (0,09)	4,31	4	5,59	3	5,80	2	3,91	5	7,06	1
Employment rate in Organized Industrial Zones (0,06)	29,49	1	24,63	2	15,70	3	1,66	4	0,00	5
Distribution of service activities in rural areas (0,05)	6,62	3	15,21	1	9,59	2	3,59	5	4,69	4
Quantity of grain and other crop production (0,01)	7,14	2	14,13	1	1,64	5	3,67	4	7,05	3

* The ranking of the districts are defined as follows: 1: top, 2: upper-middle, 3: middle, 4: lower-middle, and 5: bottom.

DOI: 10.15320/ICONARP.2025.343

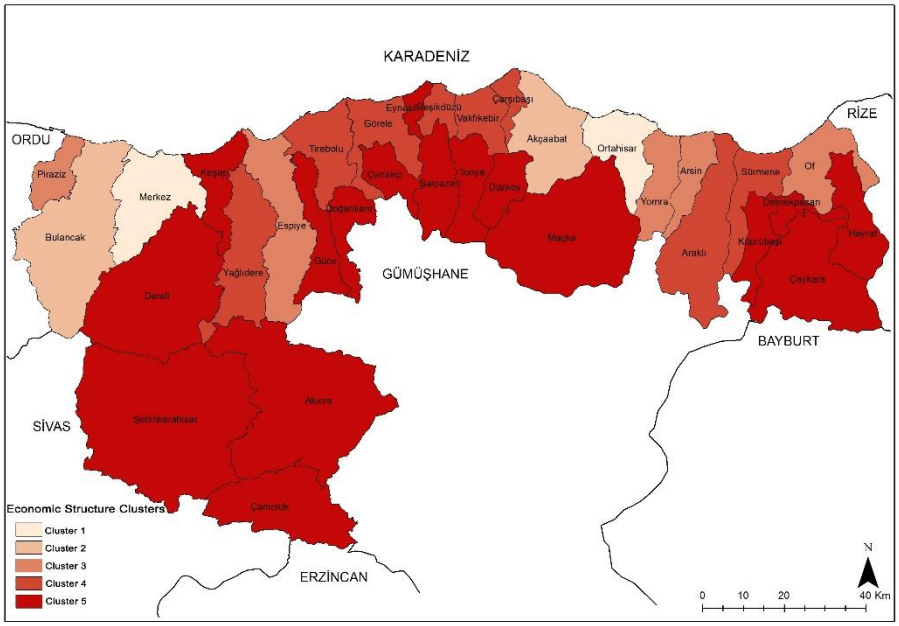


Figure 3. Spatial Distribution of Economic Structure Clusters of Trabzon and Giresun Districts

Identical Region with Political Structure Dimension

A two-step clustering analysis was conducted to describe the political structure of the districts in Trabzon and Giresun provinces. Standardised variables "number of associations" and "number of cooperatives" were used in the analysis. The obtained clusters were formed, and it was observed that the "number of cooperatives" was the more influential variable, while the "number of associations" was the less influential variable (Table 4).

From a political perspective, it is observed that 38.2% of the total 33 districts in Trabzon and Giresun provinces are in Cluster-4, 23.5% in Cluster-5, 20.6% in Cluster-3, 11.8% in Cluster-1, and 5.9% in Cluster-2. The cluster that includes the working area and where the variables "number of associations" and "number of cooperatives" are in the "lower" values is termed as Cluster-4, labeled as the "moderate to low organization cluster." According to the two-step clustering analysis, it is observed that 38.2% of the districts in the working area exhibit the characteristic of a "weak organization cluster." It is noted that, in terms of the variables "number of associations" and "number of cooperatives," the lowest level of organization is found in Cluster-5, followed by Cluster-4 districts (Table 4, Figure 4). From a political perspective, it is observed that 38.2% of the total 33 districts in Trabzon and Giresun provinces are in Cluster-4, 23.5% in Cluster-5, 20.6% in Cluster-3, 11.8% in Cluster-1, and 5.9% in Cluster-2. The cluster encompassing the working area and where the variables "number of associations" and "number of cooperatives" exhibit "lower" values is designated as Cluster-4, and is thus labelled as the "moderate to low organisation cluster."According to the two-step clustering analysis, it is observed that 38.2% of the districts in the working area manifest the characteristic of a "weak organisation cluster." It is further observed that, in terms of the variables "number of

associations" and "number of cooperatives," the lowest level of organisation is exhibited by Cluster-5, followed by Cluster-4 districts (Table 4, Figure 4).

Table 4. Importance degrees and mean values of variables influencing the formation of political structure clusters and districts belonging to clusters

Variables (Importance Level)	Cluster-1 (%11,8)		Cluster-2 (%5,9)		Cluster-3 (%20,6)		Cluster-4 (%38,2)		Cluster-5 (%23,5)	
	Mean	Rank*	Mean	Rank*	Mean	Mean	Rank*	Mean	Rank*	Mean
Number of Cooperatives (1)	17,61	1	9,64	2	7,98	3	3,46	4	1,40	5
Number of Associations (0,84)	8,37	2	3,95	3	42,53	1	3,18	4	1,93	5

* The ranking of the districts are defined as follows: 1: top, 2: upper-middle, 3: middle, 4: lower-middle, and 5: bottom.

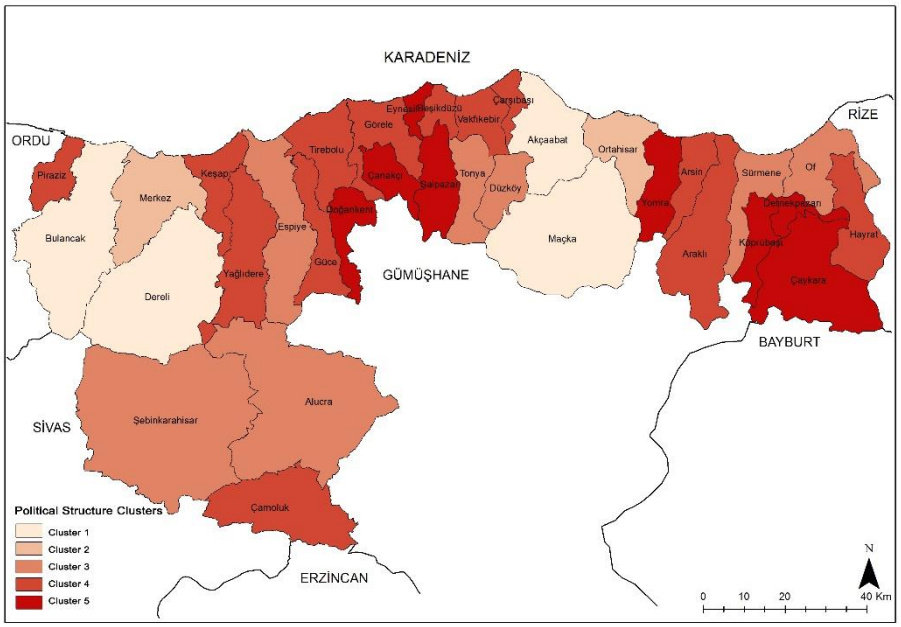


Figure 4. Spatial Distribution of Political Structure Clusters of Trabzon and Giresun Districts.

Identical Region with Spatial Structure Dimension

A two-step clustering analysis was conducted using six variables reflecting spatial structure characteristics based on land uses in the districts of Trabzon and Giresun provinces. The analysis revealed that the most significant variable in the formation of clusters is "settlement area", while "forest area" and "basin area" were found to be the least effective. The classification of the spatial structure of the 33 districts in the province revealed that 41.2% of the districts were in Cluster-5, 26.5% in Cluster-3, 14.7% in Cluster-1, 8.8% in Cluster-2, and 8.8% in Cluster-4 (Table 5).

A comparative evaluation of the mean values of the spatial structure variables reveals that Cluster-1 comprises districts with the highest values for spatial pattern variables such as "areas prone to disasters," "forest area," and "basin area," while Cluster-5 consists of districts with

DOI: 10.15320/ICONARP.2025.343

the lowest values for these variables. Cluster-5, encompassing approximately 41.2% of the total number of districts, is constituted by 13 districts neighbouring both provinces and exhibits a persistent similarity in terms of spatial structure (Table 5 and Figure 5).

Table 5. Importance degrees and mean values of variables influencing the formation of spatial structure clusters and districts belonging to clusters.

Variables (Importance Level)	Cluster-1 (%14,7)		Cluster-2 (%8,8)		Cluster-3 (%26,5)		Cluster-4 (%8,8)		Cluster-5 (%41,2)	
	Mean	Rank*	Mean	Rank*	Mean	Mean	Rank*	Mean	Rank*	Mean
Settlement area (1)	5,49	3	4,42	4	5,55	2	24,22	1	2,62	5
Distance of settlements to the city center (0,58)	5,22	3	14,48	1	3,97	4	0,57	5	6,64	2
Agricultural area (0,57)	8,95	2	1,24	5	7,70	3	12,95	1	3,10	4
Areas prone to disasters (0,56)	13,77	1	5,75	4	6,13	3	7,90	2	2,50	5
Forest area (0,54)	13,24	1	12,03	2	4,21	4	4,56	3	3,30	5
Basin area (0,54)	19,55	1	9,99	2	4,12	3	3,32	4	1,81	5

* The ranking of the districts are defined as follows: 1: top, 2: upper-middle, 3: middle, 4: lower-middle, and 5: bottom.

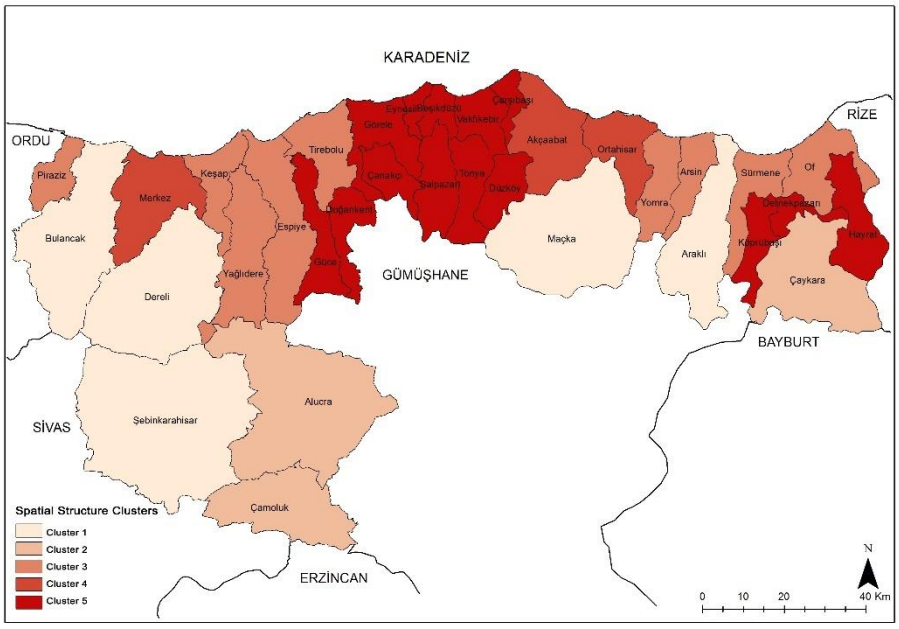


Figure 5. Distribution of Spatial Structure Clusters of Trabzon and Giresun Districts.

The Cluster-5 (Beşikdüzü, Çarşıbaşı, Dernekpazarı, Hayrat, Köprübaşı, Şalpazarı, Tonya, Vakfıkebir, Çanakçı, Doğankent, Eynesil, Görele, Güce), where the variable "distance of settlements to the city center" is in the middle-upper range, and the variables "agricultural area (grains/other

crops)," "settlement area," "areas prone to disasters," "forest area," and "basin area" are in the lower value range, is referred to as "periphery, middle sub-qualified area." Cluster-5, which includes the working area, reflects the spatial structure of 41.2% of the total districts (Figure 5).

DISCUSSION AND CONCLUSION

In the 1/50.000 Scale Provincial Spatial Development Plan of Trabzon Province, the 3rd Sub-region in which Vakfıkebir district is located covers the borders of Beşikdüzü, Çarşıbaşı, Şalpazarı, Tonya and Vakfıkebir districts. As a result of the clustering analysis, Vakfıkebir district shows identicalty with the following districts in different dimensions:

- Social Dimension: Arsin, Beşikdüzü, Çarşıbaşı, Sürmene, Tonya, Vakfıkebir, Çanakçı, Doğankent, Eynesil, Güce, Piraziz, Şebinkarahisar, Yağlıdere.
- Economic Dimension: Araklı, Beşikdüzü, Çarşıbaşı, Sürmene, Görele, Tirebolu, Yağlıdere.
- Political Dimension: Araklı, Arsin, Beşikdüzü, Çarşıbaşı, Hayrat, Çamoluk, Görele, Güce, Keşap, Piraziz, Tirebolu, Yağlıdere.
- Spatial Dimension: Beşikdüzü, Çarşıbaşı, Dernekpazarı, Hayrat, Köprübaşı, Şalpazarı, Tonya, Çanakçı, Doğankent, Eynesil, Görele, Güce.

The creation of clusters of similar settlements is predicated on the delineation of identical regions, a process not informed by a singular criterion. Rather, it is based on the establishment of a spatial entity comprising units that exhibit characteristics that are proximate in all social, economic, political and spatial dimensions. Within the context of Vakfıkebir, the districts that fall within the purview of the primary identical region are those that demonstrate a high degree of similarity to Vakfıkebir across the aforementioned dimensions. When a comparison is made according to the clusters obtained at this point, it is seen that the districts of Beşikdüzü and Çarşıbaşı form an integral whole of Vakfıkebir in all dimensions and have an integrated regional dynamism. In the 1/50,000 scale Provincial Spatial Development Plan, a social-spatial similarity is observed with Tonya, which is one of the other districts in the same sub-region, and a similarity with Şalpazarı district is found only in spatial dimensions. Conversely, Görele district, which is situated within the boundaries of Giresun province and exhibits spatial proximity with Vakfıkebir, demonstrates economic-political-spatial congruence with Eynesil district, and social and spatial congruence with Eynesil district. Consequently, the secondary identical region consists of the neighbouring settlement of Tonya and the closest neighbouring districts of Giresun, Görele and Eynesil, which are located beyond the provincial administrative boundaries (Figure 6). Thus, the research results support the fact that the concept of region, defined as globalized spaces where local space has gained importance today, as expressed in the relevant literature, is a multi-layered (Paasi and Zimmerbauer, 2016) phenomenon that extends beyond borders (Agnew, 2002; Amin, 2002),

DOI: 10.15320/ICONARP.2025.343

not only based on geographical factors but also showing functional and economic integrity with each other in the spatial sense (Friedman, 1956).

In consequence, the districts of Beşikdüzü, Çarşıbaşı, Tonya, Eynesil and Görele, which are defined as the identical region of Vakfıkebir, correspond to the metropolitan area boundary definition in the settlement system. In this country, the definition of the metropolitan area involves the planning of settlements as a part of the urban system in which they are located, and the development of administrative boundaries based on strategic/political planning regions.

In this context, the preparation of strategic spatial plans within the planning system in Turkey, within the scope of the metropolitan area defined beyond administrative boundaries as a result of social, economic, political and spatial dynamics, will ensure a polycentric and balanced development among areas beyond the monocentric structures advocated by the European Spatial Development Perspective (METREX, 2003). The study thus sought to address the fundamental question of the existence of similar settlement clusters in the Vakfıkebir district from the perspectives of social, economic, political and spatial dimensions. The study's findings support the hypothesis proposed.

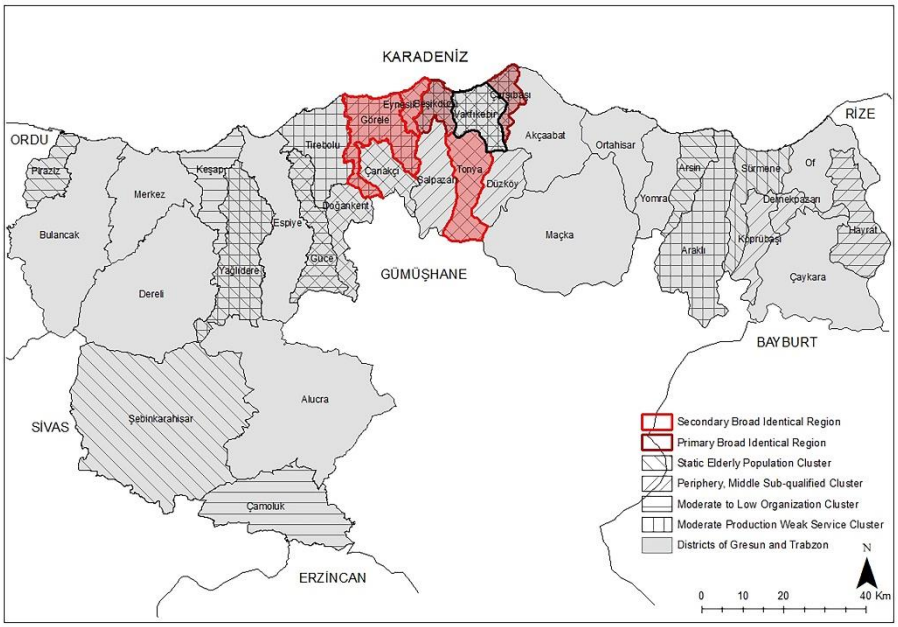


Figure 6. Identical region of Vakfıkebir district as a result of clustering analysis

Almost all regional plans in Turkey are based on either provincial boundaries (NUTS 3) or NUTS2 boundaries as planning regions. However, since the area in which the elements subject to spatial planning interact can extend beyond administrative boundaries, plans based on 'flat regions' (administrative boundaries) are unable to propose realistic and viable interventions. (Beyhan, 2010). However, regional plans based on normative territories are actually incapable of covering the geographical scope of interacting communities, which ultimately reduces the driving force of the people behind the planning process (Beyhan, 2019).

In this particular context, it would be advantageous to conduct further studies employing an inductive approach, utilising data sets encompassing the flow between settlements. In this context, it is recommended that a planning approach founded on administrative boundaries be accorded precedence over a planning approach predicated on porosity.

In the initial phase of defining the planning region within the study's scope, it was possible to ensure the visibility of the similarities and differences resulting from zoning separately in each dimension. Thus, an innovative model, different from the homogeneous and functional region types in the traditional approach, was tried and a multi-layered territorial boundary discussion was made to make the embeddedness of the zones visible in the context of the missing indicators. In this context, while creating the planning region boundary, both the generalisation made as a result of the loss of detailed data has been prevented and the production of location-specific, applicable and original policies has been enabled in the process of producing regional development/development policies.

In order to determine the planning region boundary of Vakfıkebir determined as a local study area, firstly, an attempt was made to understand the urban systems (sub-regions at NUTS 4 level) with the traditional regional approach. At this juncture, it was acknowledged that districts constitute territorial entities, and a spatial structure was delineated that transcends boundaries, albeit a vertical structure that connects local interaction scales, formed by the spatial integrity of local units that coexist.

NOTES

This work was prepared from the PhD thesis entitled “Territorial -and network- based region dialectics in regional planning practice: A model proposal for the determination of the relational regions within the scope of the plan region" at Karadeniz Technical University Graduate School of Natural and Applied Sciences in 2023.

This work was supported by Scientific Research Projects Unit of Karadeniz Technical University. Project number: FHD-2022-10346. “Territorial -and network- based region dialectics in regional planning practice: A model proposal for the determination of the relational regions within the scope of the plan region" (BAP02)

REFERENCES

Agnew, J.A. (2000), ‘From the political economy of regions to regional political economy’, *Progress in Human Geography*, 24 (1), 101–110.

Agnew J.A. (2002). *Place and politics in modern Italy*, University of Chicago Press, Chicago.

Agnew, J.A. (2013). Arguing with regions. *Regional Studies*, 47(1), 6-17.

Agnew, J. A. (2018). *Evolution of the regional concept*. In Handbook on the Geographies of Regions and Territories. Edward Elgar Publishing, 23-33.

DOI: 10.15320/ICONARP.2025.343

Allen, J. and Cochrane, A. (2007). Beyond the territorial fix: regional assemblages, politics and power. *Regional studies*, 41(9), 1161-1175.

Allen, J., Massey, D. and Cochrane, A. with Charlesworth, J., Court, G., Henry, N. and Sarre, P. (1998) *Rethinking the Region*. Routledge, London.

Amin, A. (2002): 'Spatialities of globalisation', *Environment and Planning A*, 34 (3): 385–99.

Amin, A. (2004). Regions unbound: towards a new politics of place. Geografiska Annaler: Series B, *Human Geography*, 86(1), 33-44.

Bacher J., Wenzig K. and Vogler M. (2004). SPSS TwoStep Clustering – A First Evaluation. In Dijkum C., Blasius J. and Durand C.(eds.). (2004). *Recent Developments and Applications in Social Research Methodology*. Proceedings of the RC33 Sixth International Conference on Social Science Methodology, Amsterdam.

Ballas, D., Kalogeresis, T. and Labrianidis, L. (2003). A Comparative Study of Typologies for Rural Areas in Europe, Bildiri, 43rd ERSA Congress. Finlandiya

Batten, D. F. (1995). Network cities: creative urban agglomerations for the 21st century. *Urban studies*, 32(2), 313-327.

Beyhan, B. (2010). Kamu yönetimi ve bölgesel planlamada düzgüsel bölgelerin açmazları ve işlevsel bölgelerin tanımlanmasında izlenebilecek yöntemler üzerine. *Çağdaş Yerel Yönetimler*, 19(4), 1-29.

Beyhan, B. (2019). The delimitation of planning regions on the basis of functional regions: An algorithm and its implementation in Turkey. *Moravian Geographical Reports*, *27*(1), 15-30.

Castells, M. (1996). *The rise of the network society*. Blackwell, Oxford 95–108.

Ceylan, Z., Gürsev, S. and Bulkan, S. (2017). İki Aşamalı Kümeleme Analizi ile Bireysel Emeklilik Sektöründe Müşteri Profilinin Değerlendirilmesi. *Bilişim Teknolojileri Dergisi*, 10(4), 475-485.

Clark, W. A. and Kuijpers-Linde, M. (1994). Commuting in restructuring urban regions. *Urban Studies*, 31(3), 465-483.

Cochrane, A. (2018). *Relational thinking and the region*. In Handbook on the Geographies of Regions and -Territories. Edward Elgar Publishing, 79-88.

Davoudi, S. (2008). Conceptions of the city-region: a critical review. *Proceedings of the Institution of Civil Engineers-Urban Design and Planning*, 161(2), 51-60.

Dedeoğlu Özkan, S. and Beyazlı, D. (2018). Bölgesel gelişmişlik düzeyinin belirlenmesine ilişkin veri seti sorunsalı: eleştiri ve öneriler. *Planlama Dergisi*, 28(1), 22-39.

De Goei, B., Burger, M. J., Van Oort, F. G. and Kitson, M. (2010). Functional polycentrism and urban network development in the Greater South East, United Kingdom: Evidence from commuting patterns, 1981–2001. *Regional Studies*, 44(9), 1149-1170.

Duara P. (1995). *Rescuing History from the Nation: Questioning Narratives of Modern China*. University of Chicago Press, Chicago, IL.

Ecemiş-Kılıç, S. (2009). Proposals for Regional Administrative Structure and Planning in Turkey. *European Planning Studies*, 17(9), 1283–1301.

Erzi, G. (2005). *Türkiye'nin Bölgesel Gelişim Süreci Ve Yeni Bölgecilik*, İstanbul Teknik Üniversitesi, Fen Bilimleri Enstitüsü, Yüksek Lisans Tezi.

Friedmann, J. (1956). "The Concept of a Planning Region". *Land Economics*, 32, 1-13.

Garipağaoğlu, N. (2017). *Bölge planlama ve Türkiye'de mekânsal planlama yaklaşımları*. Yeditepe Yayınevi.

Genç, F., Keyder, Ç., Keyman, E. F. and Badur, A. K. (2021). *Kentlerin Türkiyesi: İmkânlar, Sınırlar ve Çatışmalar* (Vol. 2990). İletişim Yayınları.

Glasson, J., & Marshall, T. (2007). *Regional Planning* (1st ed.). Routledge. https://spada.uns.ac.id/pluginfile.php/816700/mod_resource/content/1/Regional%20Planning-John%20Glasson%20and%20Tim%20Marshall.pdf

Goodwin, M. (2013). Regions, territories and relationality: exploring the regional dimensions of political practice. *Regional Studies*, 47(8), 1181-1190.

Gregory D. (2000). *Regions and regional geography*, in Johnston R., Gregory D., Pratt G. and Watts M. (Eds) The Dictionary of Human Geography, 4th Edn, pp. 687–690. Blackwell, Oxford.

Gürbüz, S. and Şahin, F. 2018. *Sosyal Bilimlerde Araştırma Yöntemleri*. Ankara, Seçkin Yayıncılık

Harrison, J. (2013). Configuring the new 'regional world': on being caught between territory and networks. *Regional Studies*, 47(1), 55-74.

Harvey, D. (2000), *Spaces of Hope*, Berkeley and Los Angeles, CA: University of California Press.

Hopkins, J. (2015). *Knowledge, Networks and Policy: Regional Studies in Postwar Britain and Beyond*, London: Routledge.

Hoover, Edgar M., & Giarratani, F. (1999). *An Introduction to Regional Economics*. (Reprint. Edited by Scott Loveridge and Randall Jackson. WVU Research Repository, 2020).

Jones, M. (2009). Phase space: geography, relational thinking, and beyond. *Progress in human geography,* 33(4), 487-506

Kloosterman, R. C. and Musterd, S. (2001). The polycentric urban region: towards a research agenda. *Urban studies*, 38(4), 623-633.

Macleod, G. and Jones, M. (2007). Territorial, scalar, networked, connected: In what sense a 'regional world'?. *Regional Studies*, 41(9), 1177-1191.

Massey, D. (1984). *Spatial Divisions of Labour*, London: Methuen.

Massey, D. (1994) *Space, place and gender*. Cambridge: Polity.

Massey, D. (2005). *For Space*, London: Sage.

Meijers, E. J. and Burger, M. J. (2010). Spatial structure and productivity in US metropolitan areas. *Environment and planning A*, 42(6), 1383-1402.

METREX, (2003). *The revised metrex practice Benchmark of Effective Metropolitan Spatial Planning*, The Network of European Metropolitan Regions and Areas, Glasgow.

Michailidou, C., Maheras, P., Arseni-Papadimititriou, A., Kolyva-Machera, F., and Anagnostopoulou, C. (2009). A study of weather types at Athens and Thessaloniki and their relationship to circulation types for the cold-wet period, part I: two-step cluster analysis. *Theoretical and applied climatology*, 97(1-2), 163-177.

Paasi A. (1986). The institutionalization of regions: a theoretical framework for understanding the emergence of regions and the constitution of regional identity. *Fennia*, 16, 105–46.

Paasi A. (2001). Europe as social process and discourse: considerations of place, boundaries and identity. *European Urban and Regional Studies*, 8, 7–28.

Paasi, A. and K. Zimmerbauer (2016). 'Penumbral borders and planning paradoxes: relational thinking and the question of borders in spatial planning', *Environment and Planning A*, 48 (1), 75–93.

Patriarca S. (1994). Statistical nation building and the consolidation of regions in Italy, *Social Science History* 18, 359–376.

DOI: 10.15320/ICONARP.2025.343

Plan Açıklama Raporu ve Planı, (2017). 1/50000 Ölçekli İl Çevre Düzeni Planı Açıklama Raporu, Trabzon Büyükşehir Belediyesi.

Raggi, M., Mary, S., Santini, F. and Paloma, S. G. Y. (2013). *A classification of European NUTS3 regions*. Publications Office of the European Union.

Satish, S. M. and Bharadhwaj, S. (2010). Information search behaviour among new car buyers: A two-step cluster analysis. *IIMB Management Review*, 22(1-2), 5-15.

Scott A. (ed.) (2001). *Global City-Regions: Trends, Theory, Policy*. Oxford University Press, Oxford.

Seers, D. (1979). The Meaning of Development, with a Postscript, In Seers, Nafziger, Cruise O'Brien, ve Bernstein, 9-30.

Smith, N. (1995). 'Remaking scale: competition and cooperation in prenational and postnational Europe', in H. Eskelinen and F. Snickars (eds), *Competitive European Peripheries*, Berlin: Springer, 59–74.

Storper, M. (1995). The resurgence of regional economies, ten years later: the region as a nexus of untraded interdependencies. *European Urban and Regional Studies* 2, 191–221.

Storper, M. (1997). *The regional world: territorial development in a global economy*. Guilford, New York.

Tekeli, İ. (2008). *Türkiye'de Bölgesel Eşitsizlik ve Bölge Planlama Yazıları*, Tarih Vakfı Yurt Yayınları, İstanbul

Varró, K. and Lagendijk, A. (2013). Conceptualizing the region–in what sense relational?. *Regional studies*, 47(1), 18-28.

Weitz E. D. (1995). The realms of identities: a comment on class and politics in Milan, *Social Science History* 19, 289–294.

Wirth, L. (1942). "*The Metropolitan Region as a Planning Unit*". In James H. (ed.) American Planning and Civic Annual, Union Trust Building, Washington, D.C., Mount Pleasant Press, J. Horace McFarland Company, Harrisburg, 174-184.

Wu, X., Zhan, F. B., Zhang, K. and Deng, Q. (2016). Application of a twostep cluster analysis and the Apriori algorithm to classify the deformation states of two typical colluvial landslides in the Three Gorges, China. *Environmental Earth Sciences*, 75(2), 146.

Resume

Sinem Dedeoğlu Özkan started his undergraduate education at Karadeniz Technical University Department of Urban and Regional Planning in 2008 and graduated in 2012. In the same year, she started her master's degree at KTU Institute of Science and Technology, Department of Urban and Regional Planning. She completed her master's thesis titled "A New Method for Determination of Regional Development Level" in 2015. In 2023, she completed her PhD thesis titled " Territorial- and Network- Based Region Dialectics in Regional Planning Practice: A Model Proposal for the Determination of "The Relational Regions" within the Scope of "The Plan Region". Her research interests include urban and regional planning, regional development, economic and social demography, networking. She continues her academic life as an assistant professor at the Department of Urban and Regional Planning, Faculty of Architecture, KTU.

Dilek Beyazlı was born in Istanbul in 1977. She graduated from Karadeniz Technical University, Department of Architecture in 1997. She completed his master's degree in 2000 and doctorate in 2005. In 2006, Dr. was appointed to the positions of Assistant Professor and in 2008 to Assistant Professors. She received

the title of Associate Professor in 2012 and Professor in 2017. She continues her academic life in KTÜ Faculty of Architecture, Department of City and Regional Planning. She has completed 3 doctorate and 12 graduate studies under her consultancy and teaches undergraduate and graduate programs. She has urban design projects, architectural implementation projects, master plan experiences for public institutions and organizations. She has been appointed as Environmental Problems Application and Research Center, KTÜ Zero Waste Coordinator and KTÜ Master Plan Academic Coordinator.

DOI: 10.15320/ICONARP.2025.343

ICONARP
International Journal of Architecture and Planning
Received: 19.03.2024 Accepted: 28.07.2025
Volume 13, Issue 2/ Published: 31.12.2025
DOI: 10.15320/ICONARP.2025.344 E- ISSN:2147-9380
Research Article

Urban Lost Spaces: A Landscape Design Studio Experience at The Scale of a Historical Site

Elif Sağlık*
Mahmut Can Ast**

Abstract

After the Industrial Revolution, the development of technology and rural-urban migration accelerated urbanization; this process led to the shaping of urban spaces based on the balance of occupancy and emptiness through planning and design. Urban spaces change over time according to the social, economic, technological, and other needs of city dwellers, and spaces that cannot adapt to this change lose their functions. These spaces, which are disconnected from the living texture of the city, lose their qualities by disrupting their communication with the city residents. Areas that do not fit the definition of space, do not contribute positively to the city and its inhabitants, and are open to redesign are considered lost spaces. In this context, Çanakkale city center is examined in terms of occupancy/vacancy and land use; the reasons why an urban space is lost are analyzed and design proposals are developed to reverse this loss. Çanakkale Old Central Hospital was chosen as a lot site due to negative impacts such as war, natural disasters, fire, disinvestment and lack of interest; its historical character, the surrounding military areas and its socio-demographic status were also influential in this choice. Landscape design projects were developed by 3rd year Landscape Architecture Department students in order to re-incorporate the area into the urban memory and urban agenda. The historic site has been handled by considering ecological, economic and social dimensions; plant species and structural materials suitable for the historical texture have been selected, different spatial arrangements have been designed and design proposals supported by sustainable design approaches have been presented. Thus, it is thought that the study plays a pioneering role in the evaluation of lost historical places in cities and supporting them with sustainable landscape design studies; from this perspective, it is thought to contribute in terms of academic and practical benefits.

Keywords: *Çanakkale Old Central Hospital, Historical lost space, Historical space, Lost space, Urban design*

*Assoc. Prof. Dr., Çanakkale Onsekiz Mart University, Faculty of Architecture and Design, Department of Landscape Architecture, Çanakkale – Türkiye (*Corresponding author*)
Email: elifysaglik@gmail.com

**Graduate Student, Çanakkale Onsekiz Mart University, Graduate Education Institute, Landscape Architecture Department, Çanakkale – Türkiye
Email: mahmutcanast@gmail.com

To cite this article: Sağlık E., & Ast, M.C. (2025). Urban Lost Spaces: A Landscape Design Studio Experience at The Scale of a Historical Site. *ICONARP International Journal of Architecture and Planning,* 13 (2), 753-777. DOI: 10.15320/ICONARP.2025.344

INTRODUCTION

Urbanization accelerated with the transition to a settled lifestyle and gained further momentum following the Industrial Revolution, driven by technological advancements and migration from rural areas to cities. Shaped by their physical and social dynamics, cities have become an integral part of daily life, expanding horizontally and vertically to accommodate human needs, thereby necessitating urban planning and design. The balance between solid and void spaces plays a critical role in maintaining urban integrity, with a harmonious relationship enhancing the success of urban life and spaces (Ünal & Topçu, 2022). However, spaces unable to adapt to changing needs lose their functionality and transform into "lost spaces" (Akaslan, 2006).

Trancik (1986) defines lost spaces as areas that fail to contribute positively to the city and its inhabitants, offering potential for redesign (Lak et al., 2019). Architects and planners argue that these spaces can be reintegrated into the city with new functions. Lost spaces, when incorporated into green infrastructure systems, can provide significant social and ecological benefits, addressing urban deficiencies in service areas (Hasan et al., 2018).

The rapid growth of modern cities has exacerbated environmental issues, including climate change, global warming, and rising energy demands. In this context, repurposing abandoned spaces presents opportunities to enhance urban belonging and ecology (Lee et al., 2015). Furthermore, historical environments carry the tangible and intangible values of past civilizations, enriching urban identity. Preserving and transferring these spaces to future generations is vital for sustaining urban identity (Tırnakçı & Aklıbaşında, 2018).

In this context, urban landscape planning and design comes to the forefront, while historical textures gain importance in terms of physical and socio-cultural relationships. Urban landscape design not only helps to shape the physical and social character of the city but also plays a critical role in the preservation and development of historical textures (Tırnakçı & Aklıbaşında, 2018). In this context, the study is shaped in line with two main objectives. The first objective is to identify the lost spaces that have emerged during the urban development process of Çanakkale, that can meet the needs of the city and its inhabitants, and that harbor important potentials for the city. Secondly, the first objective was to re-evaluate the potential of Çanakkale Old Central Hospital (ÇOCH), which stands out with its historical importance and features among the lost spaces obtained as a result of the analysis, through landscape design. ÇOCH, which is a historical lost space, was given to the 3rd year students of the Department of Landscape Architecture as a subject of study within the scope of the project course, and project design studies were carried out in accordance with the potential of the lost space within the framework of the professional discipline of landscape architecture.

DOI: 10.15320/ICONARP.2025.344

AN OVERVIEW OF URBAN SPACE AND LOST SPACE CONCEPTS

Urban spaces are areas where people interact in their daily lives and contain facilities that support these interactions. These spaces, which are shaped by the experiences of individuals and the meanings they attribute to space, are designed to adapt to the lives of city dwellers. Various elements such as space, time, social relations and activities contribute to the formation of a sense of belonging for city dwellers. This feeling leads individuals to see themselves as a part of space and to feel rights and responsibilities over that space (Solak, 2017). Urban spaces that fail to create a sense of belonging and cannot be integrated into the lives of city dwellers disrupt their communication with the city and its inhabitants, lose their functionality over time and lead to the emergence of lost spaces.

Theoretical research on urban lost spaces, in other words urban voids, started in Western countries about 30 years ago. Roger Trancik addressed the issue of lost spaces in his book *"Finding Lost Space"* (Lee et al., 2015). Lost spaces are areas that carry uncertainty for the city, that are not used or utilized in accordance with their function, and that have become temporarily or permanently unusable for various reasons. The potential of these spaces varies according to their condition. When abandoned industrial areas, parking lots, unused backyards, transition areas and other areas are considered as lost spaces, their important features and potential opportunities are often overlooked (Şimşek, 2022). The concept of lost space may vary according to the perspective of the person defining it (Simon & Mseddi, 2020). Accordingly, the concept of lost space can be evaluated with definitions such as empty spaces, dead zones, ambiguous areas, areas of uncertainty and marginal areas, despised landscapes, ambiguous landscape gaps, urban interstitial spaces, redundant landscapes negative space, gray space and residual space (Huihua et al., 2024). According to Trancik (1986), lost spaces are defined as non-structural landscapes, such as those that develop at the foundations of high-rise buildings or are inaccessible to pedestrians, parking lots that are remote in design and use, abandoned beaches, railway stations, military sites and dysfunctional industrial zones. These spaces are the unintentional remnants between various types of land use. Trancik emphasizes that lost spaces do not serve a specific purpose and need redesign. He states that these areas should be redesigned, that they do not make a positive contribution to the city and that they are unwanted urban spaces.

Formation of Lost Spaces

Each city has its own dynamics of change and transformation. Spaces that fail to adapt to these dynamics emerge over time as urban lost spaces. Trancik (1986), in his book "Finding Lost Space", identifies five main factors that contribute to the formation of lost spaces. These factors are increasing automobile dependency, attitudes of architects and planners towards open spaces, land use and zoning policies that

shape the city, public and private institutions' avoidance of taking responsibility for public spaces, and the abandonment of industrial, military and transportation areas in the city center. Furthermore, the classification of a space as lost can be explained by the lack of human participation and maintenance efforts in these spaces. A decline in people's interest in these places can lead to their disappearance. In short, the classification of a place as lost indicates a loss of a sense of belonging among people. As the place loses its functionality, it does not evoke any emotion in individuals (Haaster, 2015).

Problem, Potential and Solution in Lost Spaces

The New York State Department defines lost spaces as *"opportunities waiting to be realized"*; they are defined as dysfunctional, meaningless and empty spaces (De Girolamo, 2013). In short, this definition refers to the potential that resides in lost spaces and emphasizes the need for urban designers to identify this potential.

The concept of lost space can have a negative impact on individuals, often due to the various problems they contain. However, when these problems are addressed and the potential of these spaces is properly identified and utilized through effective planning and design, this negative impact can be turned into a positive one.

Lost spaces reveal various problems in the urban environment, including inactivity, neglect, pollution, insecurity and urban disconnection. When lost spaces fail to create a sense of belonging among city dwellers, they are avoided and eventually become derelict, leading to problems of vandalism and pollution. Pollution and dilapidation also contribute to problems during nighttime use and create a sense of insecurity among residents. On a larger scale, significant lost spaces impede pedestrian access, transcend the human-space scale, and lead to urban disconnection within an area due to a lack of functionality at the spatial boundaries (İnan, 2021).

Architects, landscape architects and urban planners see lost spaces as a problem that needs to be addressed in the city. They emphasize the potential to transform these spaces through design and planning into opportunities for ecological and social benefits. In identifying these potentials, attention should be paid to the social, physical and experiential characteristics of each space, and its location should also be taken into account (Şimşek, 2022). However, in contemporary cities, designer face challenges in creating holistic environments while creating collective and coherent boundaries for new development goals (Khalid et al., 2018).

Urban lost spaces or voids have long been discussed within the discipline of landscape architecture, encompassing the fields of planning and urban design. However, these lost urban spaces are often overlooked or underutilized. As the world's population continues to grow, the challenges of managing lost spaces in cities are also increasing. Lost spaces in cities need to be transformed into functional,

DOI: 10.15320/ICONARP.2025.344

attractive, healthy, vibrant, and safe areas for urban residents (Hamelin, 2016). In this context, it is possible to address lost spaces through different approaches and incorporate them into the urban fabric.

Trancik refers to the concept of reuse by examining lost spaces in three stages: addressing their historical processes, analyzing their evolution within the urban fabric, and developing design strategies that require the synthesis of obtained data and the implementation of concrete steps. Additionally, Nefs emphasizes the concept of temporary use in the re-functionalization of lost spaces (Simon & Mseddi, 2020).

Interventions in lost spaces can be addressed under two main categories: permanent and temporary use (Figure 1). Permanent use encompasses laws, regulations, and practices involving long-term decisions made at a larger scale (Şimşek, 2022). Temporary use, on the other hand, considers spaces from political, economic, ecological, and cultural dimensions (Simon & Mseddi, 2020; Köse & Arı, 2021) and can be examined under headings such as autonomous urbanism, small-scale interventions, tactical urbanism, DIY urbanism, and insurgent urbanism.

Figure 1. Strategies for addressing lost spaces (modified by Şimşek, 2022)

In reuse efforts, public participation is crucial for transforming lost spaces into physically existing spaces. Public involvement not only creates a positive impact on space but also enhances the quality of urban life. Therefore, designers must consider environmental factors and user expectations in redesigning lost spaces (Hasani et al., 2023). Permanent and temporary intervention efforts that reassess the social, ecological, and economic potentials of lost spaces with public participation are presented in Figure 2.

Figure 2. Examples of strategies for addressing lost spaces from around the world (Şimşek, 2022; Ünal, 2022; Wu, 2022; High Line, 2024; Url-1-6, 2024)

In this context, landscape architects, urban planners, and local governments should approach the phenomenon of lost spaces in cities from different perspectives and consider proactive solutions (Huihua et al., 2024).

HISTORICAL SITES FROM AN URBAN PERSPECTIVE

The loss of natural and cultural heritage can be observed in many cities around the world. According to UNESCO (1972), natural disasters and human activities are threats that contribute to the loss of this heritage. Such loss significantly impacts the destruction of ethnographic, historical, and natural values, and the resulting damage is often irreversible (Pérez-Hernández et al., 2020). In this section of the study, the cultural heritage of cities has been examined. In this context, the role of cultural heritage in the city's history, its relationship with citizens, its importance in the city's identity, and its sustainable transmission to future generations have been evaluated. Furthermore, the negative impacts leading to the loss of cultural heritage have also been discussed.

Historical heritage significantly contributes to the formation, development, and promotion of urban identity. It carries traces of the city's history and traditions while providing insights into the unknown. Historic environments that bridge the past and present foster a sense of continuity and attachment to place. These areas serve as valuable resources for understanding cultural diversity, social solidarity, and the sense of place, as well as for shaping urban identity (Akkar Ercan, 2016).

Understanding the dynamic emotional bond between people and place is crucial. Historical areas, in particular, face the risk of being forgotten, neglected, or abandoned. Research on the bond between individuals and places shows that the sense of place developed by individuals acts as a motivator for the "preservation of the place." Therefore, the sense of place holds even greater significance in historic areas. People's perceptions of their surroundings, combined with their conscious or unconscious feelings, form a sense of place. This relationship enables individuals to establish a sensory connection with their environment, allowing their understanding and emotions to fully integrate with the spiritual value of the place. Additionally, the sense of place supports socio-cultural relationships, helps individuals recall past experiences and cultural concepts, and contributes to the identity of spaces (Mohammad-Moradi et al., 2020).

Urban identity, like all entities, represents a concept unique to cities, characterized by their distinct features and individuality. Urban identity manifests itself in the perception city users develop towards the city they inhabit, present at every stage of daily life. For a city, its identity can be defined by its monumental value or distinctive characteristics. In terms of historical identity, a city reveals itself as a historical phenomenon shaped over time. It serves as both the stage and an active participant in the transformations experienced by societies throughout history. Therefore, the fabric created by cultural heritage in historical

DOI: 10.15320/ICONARP.2025.344

cities must be preserved and passed on to future generations (Sağlık, 2019).

In their study titled "Survey of Sustainable Regeneration of Historic and Cultural Cores of Cities", Chahardowli et al. (2020) emphasize that historical centers have evolved over time through various layers and represent the economic, social, and cultural assets of cities. The identity and existence of these areas play a critical role in urban development. Historical centers, which embody cultural heritage, offer significant opportunities and resources for strengthening urban tourism, marketing, and economic sectors.

In this context, the loss of historical sites not only affects urban identity but also negatively impacts the economic, social, and tourism sectors. Cities distinguished by their historical values and distinct urban identities should address the loss of historical areas comprehensively. Through research and studies, lost historical sites should be re-functionalized and integrated into the city's narrative and identity, maximizing the potential of these areas. At the same time, efforts to ensure the sustainability of cultural heritage are crucial for ensuring that this heritage is passed on to future generations.

MATERIAL AND METHOD

The study is structured around two main objectives. The first goal is to identify lost spaces that emerged during the urban development of Çanakkale, which hold significant potential for the city and can respond to the needs of urban residents. The study was conducted in the neighborhoods of Barbaros, İsmetpaşa, Namık Kemal, Fevzipaşa, Kemalpaşa, Cevatpaşa, and Esenler, located in the city center of Çanakkale (Figure 3). In exploring the study area, materials such as the 2021 zoning plan, satellite images, on-site observations, photographs, and both local and international literature sources were utilized.

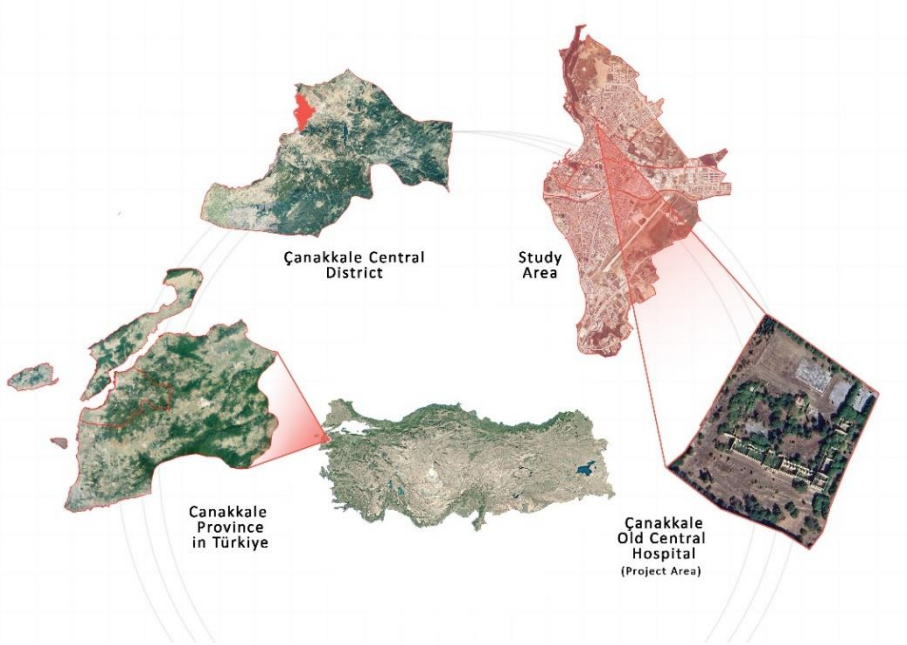


Figure 3. Location of the study area in the World (Edited by the author using Google Earth Pro, 2023)

The aim and methodology of the study are presented in Figure 4. Initially, density-void and land use analyses were conducted based on urban planning data, using criteria determined through literature reviews to identify lost spaces. The created analysis maps and current Google Earth images were used in the evaluation of the spaces. As a result of these assessments, lost spaces were identified. The identified lost spaces were classified as small and large-scale areas based on their spatial impact on the city of Çanakkale. These lost spaces were evaluated in terms of land use characteristics, the problems they cause, their presence in local newspapers, and user experiences within the city.

In this context, solutions through design were explored for three prominent lost spaces, with each area being addressed by two students, making a total of six students involved. For this study, a historical site was selected as a lost space for the project area. This decision aligns with Trancik's (1986) definition of "abandoned military sites" as lost spaces. The Çanakkale Old Central Hospital (ÇOCH), with its historical and architectural features, should be integrated into Çanakkale's cultural and tourism resources. Additionally, its location offers the potential to provide ecological, economic, and social benefits to its surroundings, making it an appropriate choice for the project area. Furthermore, selecting a historical site as the project area is expected to benefit students by enhancing their historical awareness and design approaches.

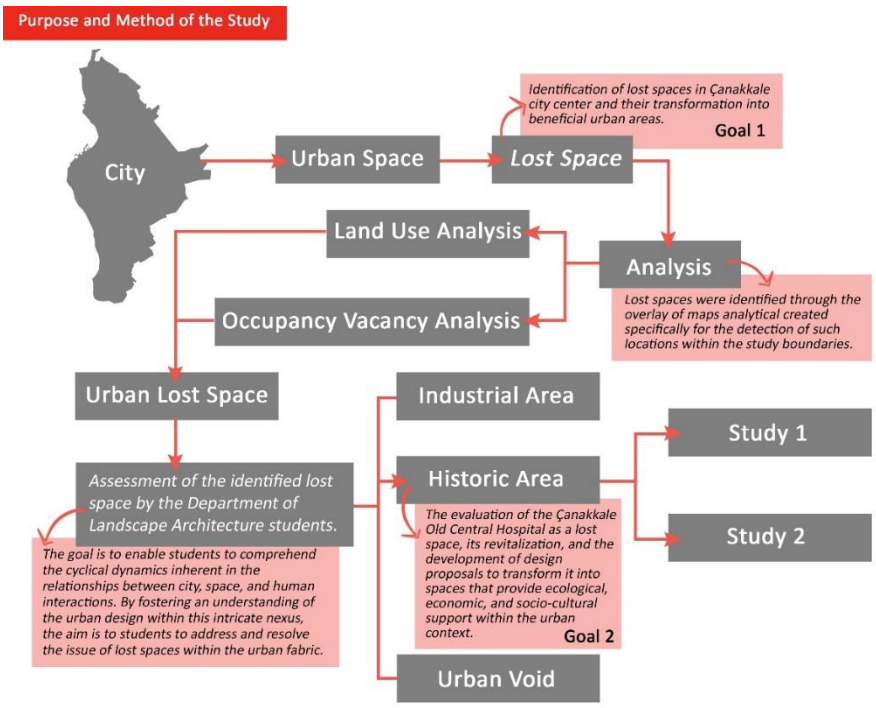


Figure 4. Purpose and method of the study

The second aim of the study is to assess lost historical sites, such as the ÇOCH, and to revitalize these areas, transforming them into significant spaces by providing ecological, economic, and socio-cultural support within the city. The focus of the study, the ÇOCH, involves landscape design project work carried out by third-year students of the

DOI: 10.15320/ICONARP.2025.344

Department of Landscape Architecture. This project process aims to help students understand the city-space-human relationship and to develop their urban design understanding and awareness within this network (Figure 5).

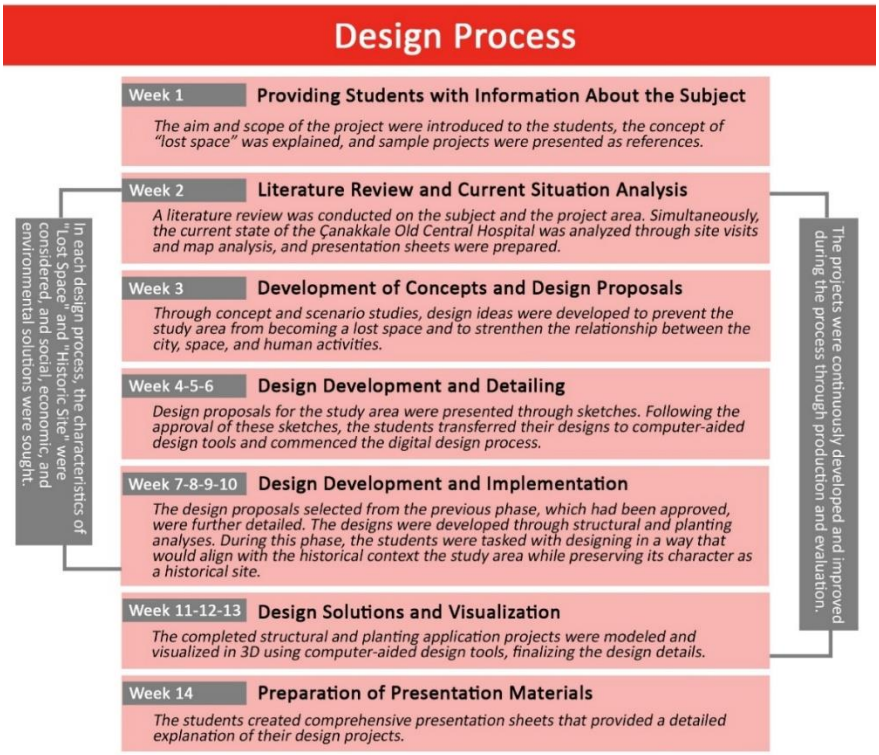


Figure 5. Design Process

THE CITY CENTER OF ÇANAKKALE WITHIN THE SCOPE OF LOST SPACES

Çanakkale holds significant economic and strategic importance for Turkey due to its location within the Bosphorus system. This characteristic has made it a historically prominent city, often mentioned and featured in epic tales. Throughout history, it has hosted numerous civilizations and boasts rich natural and cultural values. The industrial investments in the Çanakkale province, the fear of a potential earthquake in the Marmara region, the Covid-19 pandemic process, the 1915 Çanakkale Bridge, and developments in the logistics sector are all contributing to the increase in the city's population and accelerating urban development in Çanakkale.

Although the development direction of Çanakkale is generally towards the north, development in other directions is limited by a variety of factors. The Kepez neighborhood, located to the south of Çanakkale, is perceived as two intertwined cities due to its rapid development process. Factors such as the Çanakkale Airport in Barbaros neighborhood, the İzmir-Çanakkale Highway to the east, the Çanakkale Strait to the west, and the Sarıçay River passing through the city all influence the city's development direction. In this context, the urban development of Çanakkale is generally progressing towards the north and northeast. When looking at satellite images of Çanakkale taken in

different years, the changes in land colors, as shown in Figure 6, reflect the shifts in the city's development. The ongoing development in Çanakkale is leading to the expansion of the city, the emergence of new spatial usage areas, and the visibility of lost spaces.

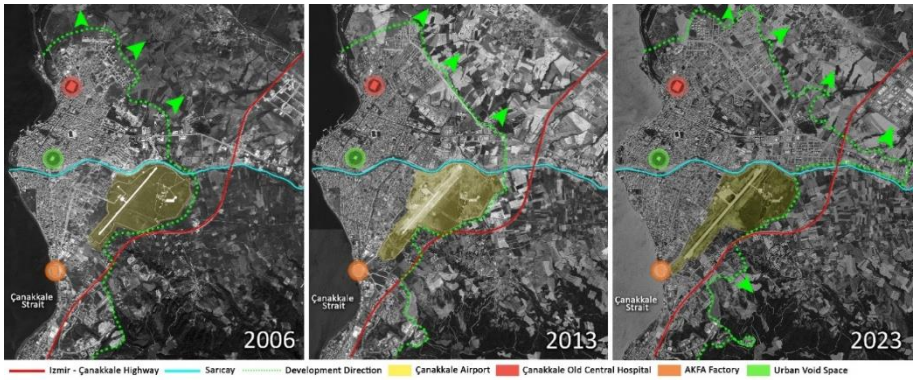


Figure 6. Satellite images regarding the development direction of Çanakkale Center (Edited by the author using Google Earth Pro, 2023)

In this section, efforts were made to identify the filled and vacant spaces emerging within the spatial development of Çanakkale and to create areas that could benefit the city by integrating lost spaces into urban life. In line with this goal, detailed analyses related to occupation, vacancies and land use in the central area of Çanakkale were conducted. The occupation/vacancy analysis for the city center of Çanakkale is presented in Figure 7.

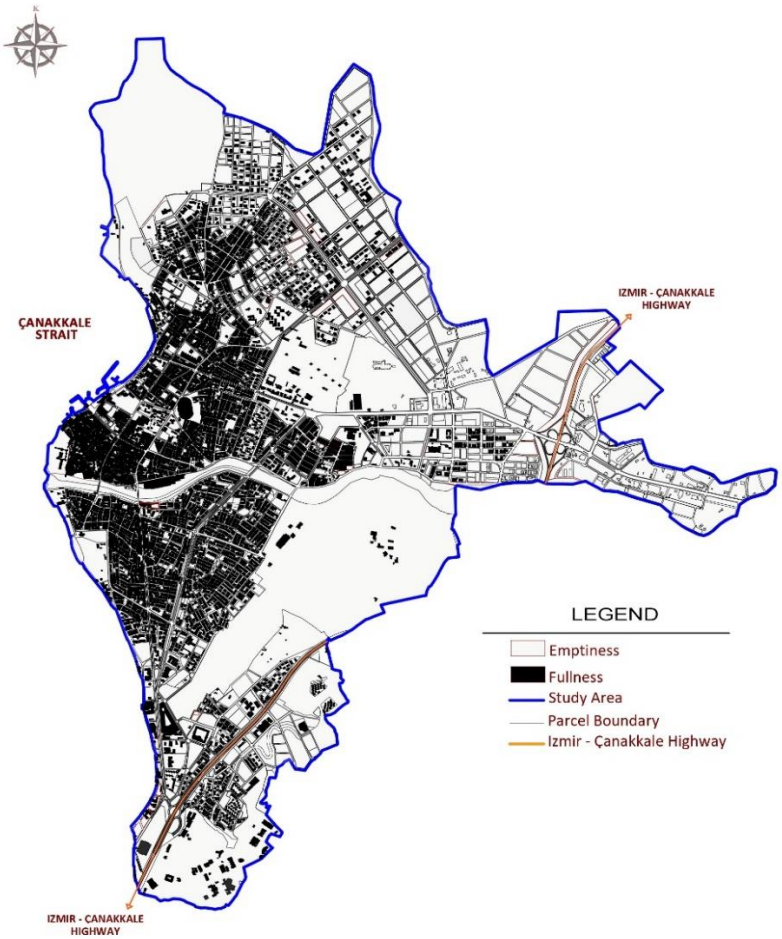


Figure 7. Çanakkale Center's Occupancy and Vacancy Analysis

DOI: 10.15320/ICONARP.2025.344

The analysis data was created using satellite images dated August 7, 2023, and the Google Earth Pro application. According to the analysis results, it was observed that there is a dense building stock along the coastal areas of Çanakkale. As the city progresses in its development direction, it was found that the building stock decreases and becomes more sparse. Additionally, in the northern and northeastern regions of Çanakkale, there are mostly vacant spaces due to ongoing urban development processes.

The land use analysis was prepared using the 2021 Çanakkale Zoning Plan and satellite images from 2023 (Figure 8). In the study area, various types of lands use, such as residential, educational, military, industrial, historical, public, and green spaces, were observed. A general evaluation of land use reveals that a significant portion of the land is designated and used for residential purposes.

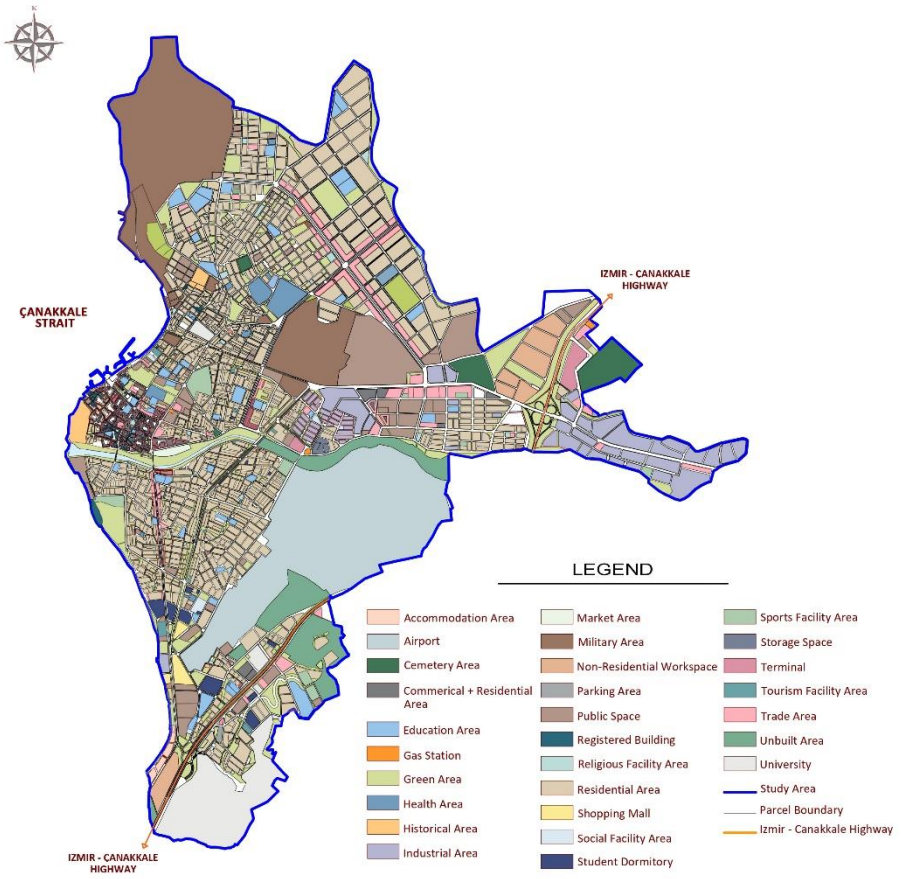


Figure 8. Çanakkale Land Use Analysis

In the identification of lost spaces, vacant land within residential areas was specifically evaluated to meet the growing population demand resulting from Çanakkale's urban and industrial development strategies. However, this issue has not been addressed from a planning perspective to meet the housing needs.

To identify lost spaces in Çanakkale city center, satellite images were analyzed by comparing occupation, vacancy, and land use. According to the analysis results, as shown in Figure 9, both large-scale and small-

scale areas were classified based on their potential impact on the city's economic, ecological, and social spaces.

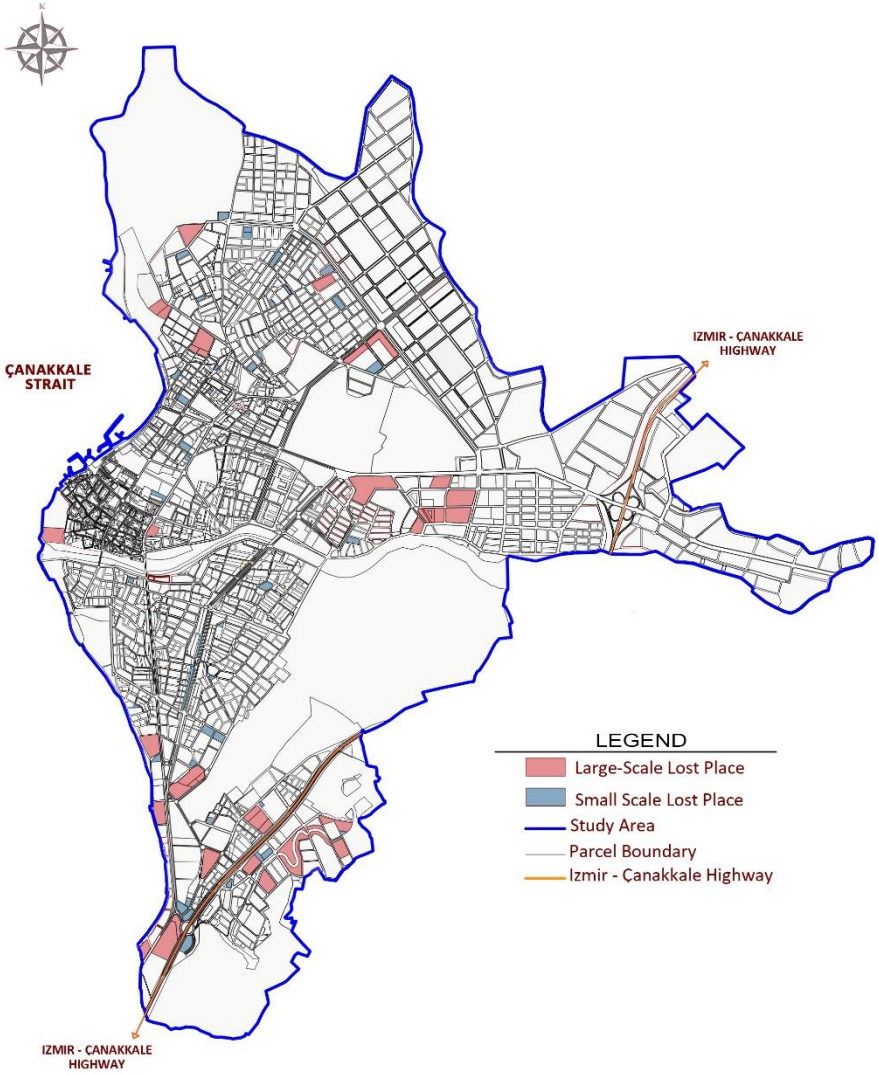


Figure 9. Detection of large and small-scale lost spaces

It was observed that large-scale lost spaces encompass a wide range, including public areas, industrial zones, commercial areas, educational facilities, factories, open green spaces, and historical sites. On the other hand, small-scale lost spaces consist of open green areas, areas planned as open green spaces but currently used as parking lots, as well as commercial and educational spaces.

As a result of examining the identified areas, three locations stand out (Figure 10). One of them is the AKFA Factory, located on Çanakkale's New Coastal Road (Figure 10a). This factory, which previously operated as a tomato canning factory, has turned into a lost space following the cessation of its commercial activities and the local political disputes surrounding it (Sakarya, 2016). The urban void is (Figure 10c) was considered as a solution to the parking shortage, a major issue in the central area of Çanakkale. However, after the transportation company's activities ceased, it became an empty and unused space within the city (Anonymous, 2021). This urban void has remained an empty area in the

DOI: 10.15320/ICONARP.2025.344

city for years, but it is currently being used as a parking lot with temporary arrangements.

Figure 10. Examples of lost spaces in Çanakkale

Another important location is the ÇOCH in the Esenler district of Çanakkale. This historical site holds significant value both locally and nationally. However, due to its location, the hospital has been subjected to urban pressures and has been destroyed by both natural and human factors, leaving it in a state of ruin. This has led to the creation of a historical lost space (Figure 10b).

Çanakkale, today stands out as a historical city with its rich cultural and historical heritage. The historical and cultural inventory map of the city center of Çanakkale (Figure 11) has been created by considering the locations of cultural and historical sites mentioned in Tombul's (2015) study titled "Çanakkale Cultural Inventory: Archaeological Settlement Areas and Art Historical Structures."

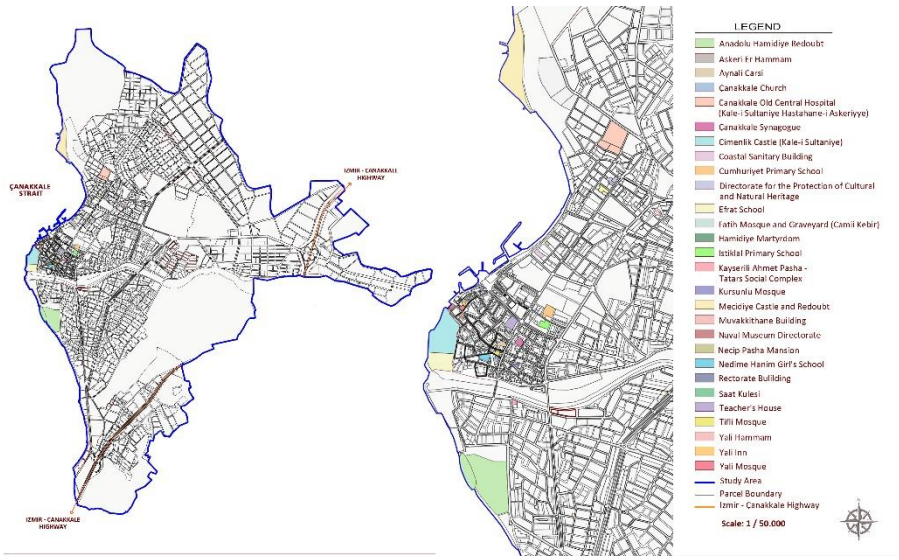


Figure 11. Historical and cultural values of Çanakkale Center

The created map shows the presence of 24 historical and cultural structures. The identification of important cultural and historical values of Çanakkale, such as the ÇOCH and the Efrat School, which are among the lost spaces revealed through the analysis, has determined the focal points of this study.

As a result of the evaluations, the ÇOCH, one of the historical lost spaces, has been selected as the project area. The chosen project area

has been designed by third-year students of the Department of Landscape Architecture. The goal is to integrate the historical lost space into the city, creating an area that contributes to Çanakkale's daily urban life and its history.

DESIGN PROCESS IN LOST SPACE

Historical sites are valuable cultural assets for countries and cities. They are areas that require a sensitive approach within the urban ecosystem. While carrying the traces of the past and illuminating the future, they shape the identity of the city in which they are located. Historical sites, with their potential, nourish the city both economically and socially. In this context, design works should develop products that are appropriate to the characteristics of the historical site. The importance of historical sites for the city, as well as the key point to consider in conservation and design approaches, are discussed in the second part of the study.

In Yiğit's (2010) study on the survey, restitution, and restoration of the Çanakkale Old Central Hospital (ÇOCH), he proposed transforming the area into an open-air museum. Additionally, the announcement published by the Çanakkale Governorship in 2019, titled "Türkiye's First Military Health Museum in Çanakkale," presented the idea of redesigning and opening this area as a museum. However, no concrete activities have been encountered up to the date of this study. The literature review conducted in this study revealed that academic works specific to this area are limited in number. Therefore, this selection of the study develops redesign proposals aimed at preserving the historical site and preventing its loss. To redesign the lost historical space, site visits, analysis of natural and environmental features, and socio-demographic conditions have been conducted to assess the current situation and initiate the design process.

The historical site's cultural fabric has been preserved through a collection of historical data derived from literature, written, and visual sources. In this context, the Kale-i Sultaniye Military Hospital, also known as the Çanakkale Old Central Hospital (Figure 12), is located in Çanakkale's Cevatpaşa District, near the Liman Bayırı area. The hospital is situated in the northern part of Çanakkale. The building's facade was designed for military use and faces south, offering a commanding view of the strait and the harbor (Yiğit Kahraman, 2011).

Figure 12. Çanakkale Old Central Hospital (Kale-i Sultaniye Hastanesi-i Military) (Yiğit, 2010)

DOI: 10.15320/ICONARP.2025.344

The historical hospital served as the central hospital during World War I and the Gallipoli Campaign. It was closed in 1918, and in 1923, it was transferred to the gendarmerie forces and reopened. The hospital suffered significant damage due to wars, fires, and other factors (Yiğit Kahraman, 2011).

The ÇOCH is located in the Esenler neighborhood, one of the developing areas of Çanakkale. The urban areas around the ÇOCH are shown in Figure 13. The surrounding area of the study site includes residential areas, accommodation facilities, sports complexes, educational institutions, religious structures, military areas, and urban green spaces. When viewed from the access point to the study site, it is situated among the main transportation axes of the city, with secondary streets providing additional support for access. This indicates that the study area is in an accessible location. However, the ÇOCH is positioned as a negative space within the pedestrian and urban circulation axis. Particularly, its distance of 12-15 minutes from the city center supports its reconsideration for redevelopment in terms of new functions.

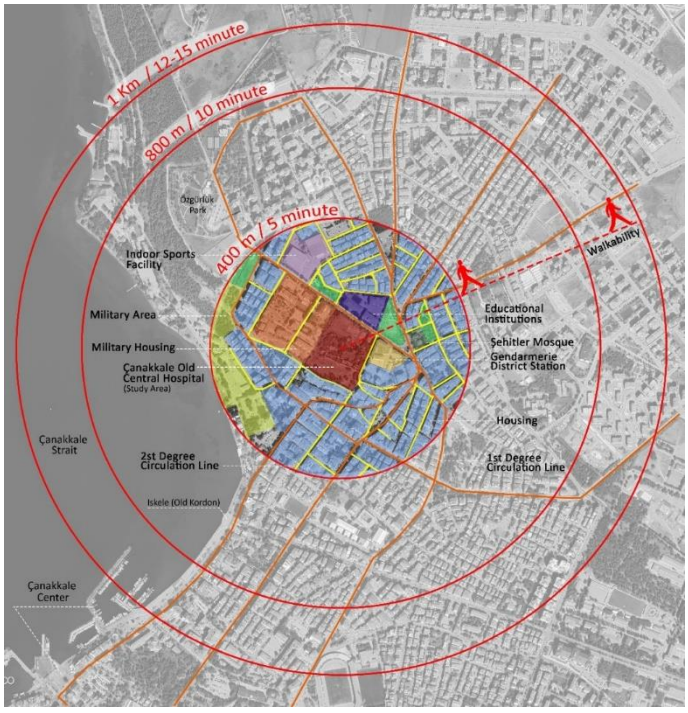


Figure 13. Çanakkale Old Central Hospital environment analysis (Edited by the author using Google Earth Pro, 2023)

The Military Hospital, an important structure in Çanakkale's historical and cultural fabric, is currently in a state of ruin due to the lack of necessary precautions (Figure 14). Surrounded by barbed wire, this structure has been isolated from the daily life of the city, squeezed between other buildings during the urban development process, and has raised security concerns. While the development area serves as a central hub for various political and economic investments, the presence of military housing, military and gendarmerie facilities near the project site could limit the activities and development of this lost space.

ICONARP – Volume 13, Issue 2 / Published: 31.12.2025

Figure 14. Visuals from the studying area of Çanakkale Old Central Hospital (Kale-i Sultaniye Hastahane-i Askerriye)

Within the scope of this study, two student projects were examined and are presented in Figure 15. The students emphasized the need for the preservation of the historical structure in the study area and highlighted the importance of transferring its cultural value to the future. In the project, students were asked to focus on the preservation of the structure. The requested design approach emphasizes that, as seen in ancient cities, the preservation of an architectural structure built in recent centuries should not be limited to the work done on the building itself. It should also address historical spaces through environmental arrangements. Additionally, the design approach applied to the ÇOCH, which displays a different design philosophy, can contribute to creating a symbol and point of interest for Çanakkale. In their projects, both students have completed concept and scenario studies specific to the area.

In the Study 1 project, the concept was designed as a space where people from different cultures and age groups can safely come together and engage in social interactions. In the Study 2 project, the concept focused on aligning the building's historical and touristic impact with the concept of time texture, envisioning it as a space where tourism activities could take place. In this context, both project design processes began with sketches.

Figure 15. Landscape studies of lost historical place

In "Study 1" (Figure 16), during the sketch phase, a grid system was applied with different scales and angles. This system was used to detail

DOI: 10.15320/ICONARP.2025.344

the spaces according to their characteristics. It was observed that the overall area was dominated by geometric and radial, inorganic lines. The selected structural materials were suggested to be made from sustainable and durable structural elements. Additionally, the colors and textures of different materials used in spatial transitions were chosen to encourage dynamic interaction within space. Mulching was applied to provide support for plant materials. The first detail presented in Figure 16 shows a decorative fountain and walking paths with different paving materials. The second detail is related to the café area that encourages social interaction in the project, where both open and closed spaces were created to facilitate user interaction. Furthermore, the soothing effect of water was incorporated through the decorative fountain.

Figure 16. Landscape design project details for Study 1

One of the design approaches is the preservation of the historical building and cultural fabric for future generations. In this context, a space has been proposed where a miniature model of the historical building will be presented to help users perceive and understand the historical structure more clearly (Figure 17a). Additionally, the creation of stairs at different levels provides users with an observation experience (Figure 17c). Accessibility for people with disabilities, the elderly, and mothers with children has been considered, ensuring that the historical area is designed as an accessible space. Within the area, multiple seating areas, a café, and a Souvenir Market have been created where users can relax, spend time, and engage in social interactions.

ICONARP – Volume 13, Issue 2 / Published: 31.12.2025

Figure 17. 3D render images of landscape design for Study 1

Within the scope of the project, plant design has been created with a sustainable approach. In the plant design areas, mulching has been predominantly applied to support plant growth (Figure 15b). Additionally, this mulching application has been designed to integrate with the area in a way that does not detract from its aesthetic appeal.

In the "Study 2" project (Figure 18), the design is characterized by informal, circular, and radial lines. This design has created a space that facilitates high spatial accessibility and communication. The chosen structural materials consist of sustainable and durable elements. Furthermore, the colors and textures of the materials used in spatial transitions have been selected to encourage dynamic interaction with space. The first detail shown in Figure 18 is taken from one of the entrance areas of the project, the promotional area. The monument stones in this area aim to serve as an open-air museum, offering users the opportunity to trace the traces of the past. The narrative on the monument stones aims to create historical awareness among citizens, thereby ensuring the cultural continuity of the lost space.

Figure 18. Landscape design project Details for Study 2

The second detail is derived from the project's square area. Considering the historical context of the space as an old military

DOI: 10.15320/ICONARP.2025.344

hospital, a sculpture focused on the field of healthcare has been used (Figure 19a). The sculpture, depicting the healing aspect of the demigod Asclepius from Greek mythology, stands out as a symbol of health, representing the field of healthcare from ancient times to the present, with a snake wrapped around it (Akdoğan, 2022). Various design approaches have been applied in the area to ensure accessibility for all, with attention given to this aspect (Figure 19b).

Figure 19. 3D render images of landscape design for Study 2

In the project, an approach focused on environmental sustainability and ecology has been adopted, emphasizing the use of natural elements that consume fewer resources in plant design. In line with this approach, the selection of local plant species with low water requirements, which support sustainability and protect local biodiversity, has been prioritized. Plant arrangements have been made in the plant design to define spaces and support circulation (Figure 19c). The plants used in the design were selected based on their color, form, texture, scale, and other characteristics to create a composition.

CONCLUSION AND SUGGESTIONS

Lost spaces, which create negative impacts between cities, emerge during the two- and three – dimensional development of urban areas. Unused, undefined, and functionless spaces stand out as disconnected from urban life, not participating in daily activities, undesired, and forgotten areas. These spaces, under urban pressures, often turn into dormant areas. Such spaces pose a threat to cities. However, depending on their location and characteristics, these spaces can be transformed into beneficial areas for cities. The concept of lost spaces addresses the transformation of these spaces in the city center of Çanakkale into useful areas for the urban environment.

As a result of the analysis conducted in the city center Çanakkale, lost spaces have been identified. Upon examining the lost spaces, which are classified into large and small scales, three spaces have emerged as significant: the AKFA Factory, Çanakkale Old Central Hospital (ÇOCH), and an urban vacant area. The reasons for considering these spaces as lost have been thoroughly examined. Among these three spaces, the ÇOCH, with its historical significance, has been the focal point of the study. Çanakkale has a strong historical identity on both the global and Türkiye stages. In this context, the ÇOCH, with its significant historical background and heritage, has the potential to be a part of the city's

identity. Considering these characteristics, the hospital should be regarded as one of the important historical sites.

Redesign in the Context of Space

In cities with rich historical heritage, the presence of historical and cultural assets is widespread. Due to their structural characteristics, historical sites in cities may struggle to adapt to modern urban development. While trying to integrate into the city's development, they may risk losing their historical fabric. Over time, neglect, damage, disuse, and the creation of unsafe environments can lead to these sites being considered as lost historical spaces. These areas, which once played a significant role nationally and internationally and hold cultural, historical, and architectural value at both local and national levels, may have been disconnected from the city-space-human relationship, overlooked, or forgotten. This necessitates maintenance and the adoption of necessary protective measures. Lost historical spaces can be re-evaluated with the necessary conservation measures to contribute to carrying cultural heritage into the future, and can serve as important areas supporting ecological, economic, and socio-cultural aspects within the city.

The city of Çanakkale has hosted many civilizations throughout history, witnessed significant wars, and been a place where the fate of a nation was altered. In this context, the research conducted within the study area has revealed that the ÇOCH, which has been subjected to urban development pressures, remains a dilapidated historical space due to natural and human influences from the past to the present. Today, this site, in its ruinous state, is enclosed by barbed wire, causing security concerns, disconnected from urban life, lacking a sense of belonging, and disrupting the continuity of the city due to its size. With these negative effects, the historical area has been classified as a lost space. Despite being located in a high and active socio-demographic living area; several factors contribute to the classification of the historical spaces as a lost space. These factors include the damage caused to the structure due to negative effects such as war, natural factors, and fire, leading to the loss of its functionality; the location of the site within a development area, which results in political and economic investments being directed elsewhere; the lack of attention from relevant institutions and organizations; its status as a special area with historical significance; the presence of military, gendarmerie, and military housing areas in the surrounding area, which restricts the possibility of proposed interventions and regeneration.

The second objective of this study, which focuses on the ÇOCH, was assessed by Landscape Architecture undergraduate students within the scope of Project III – Landscape Design Studio course. The processes that led the historical space to become a lost space were evaluated throughout the 14 – week design period. In this context, two design projects aimed at reducing negative impacts and developing proposals

DOI: 10.15320/ICONARP.2025.344

to use the area's natural and cultural potential for the benefit of the city. The proposed designs deviated from traditional urban design approaches, presenting user-focused, accessible, and secure thematic areas with a modern and aesthetic character. The redesigned space was organized to be easily accessible for individuals with different user profiles. Various spatial arrangements were adopted to create social spaces where different user profiles could interact together. In the design, aesthetic and visual quality was sought by selectin the most appropriate structural and plant materials in terms of color, texture, and form, along with artworks that complement the historical fabric. The historical texture was preserved, and supporting elements were carefully integrated into the design. When evaluating the accessibility within the area, uninterrupted access was provided to all users. The use of the space was considered both during the day and night, and lighting studies extended the users' time spent in the area. At the same time, a sustainable and ecological approach was designed with minimal resource consumption and renewable principles. An ecological approach was supported through appropriate plant species selection while maintaining a balance between green space and hard surfaces. The projects provided both active and passive recreational activities for urban residents with large green areas, offering users opportunities to interact with cultural and natural values.

Redesign in the Urban Context

In both project studies, the landscape design has redefined the spatial identity of the ÇOCH, a lost historical space, and presented design proposals to integrate it into urban use. Accessibility to the project area (pedestrian, vehicle, public transport, etc.) is supported by the surrounding urban system. The ÇOCH, which had drifted away from the urban context, now provides a transition between urban spaces through its redesign, while offering a new social space. Additionally, the green areas addressed in the designs not only support the city's green fabric but also create a new habitat. In this context, designs have been developed within the area to create a sense of belonging for the city's residents through the presence of the historical fabric, the benefits it provides to the city, and the services it offers to the citizens. The redesigned environment of the historical building has been linked to the city in ecological, economic, and socio-cultural terms, preventing it from becoming a lost space.

Since lost spaces are a broad topic, there are no definitive principles for design projects in these areas. However, each space should be evaluated individually within its own context. Factors such as user profile, urban system, and land use can be cited as examples of influences. When examining the proposed design suggestions and concrete interventions in lost areas (Figure 2), the absence of public participation reveals an aspect that could be developed in the projects.

Conclusion and Recommendations on Lost Spaces and Historical Spaces

In this study, the concept of lost spaces has been addressed through landscape design using a historically significant example. However, the evaluation of lost spaces is not limited to landscape design alone; it can also be explored through the contributions of all disciplines within urban design. Lost spaces need to be assessed in two stages within the context of city and space. In the context of the city, lost spaces should be designed as areas that respond to the needs of cities and urban dwellers, providing social, economic, and ecological benefits. When evaluated in the context of space, the specific characteristics of the area should be taken into consideration, and the expectations of the city's residents from this space should be questioned and assessed. In this direction, concrete steps must be taken by determining the functions that will help integrate the lost space into the city's daily life. Design approaches supporting decisions at a larger scale must be developed, factors leading to the lost status should be identified, and solutions to address these issues should be proposed. In this context, it is crucial to create a multidisciplinary working environment for discovering and re-integrating lost spaces into urban life.

Lost historical spaces should be preserved and reassessed to be passed on to future generations. Planning and design work should be carried out according to the characteristics of historical spaces. Cultural heritage should be addressed not only structurally but also in connection with their surroundings. Landscape design efforts should support the reuse of lost historical spaces. Through planning and design works, lost historical spaces should be transformed from a threatening situation for the city and its history into valuable spaces. Quality and aesthetic spaces should be created that support the city's social life and meet its needs. Social focal points and communication areas should be created within the city, ensuring they are always accessible. This way, the reuse of lost historical spaces is encouraged, and the recurrence of lost space situations is prevented. Lost historical spaces should be valuable places that contain natural values, support sustainability, preserve ecological balance, ensure cultural continuity, and undergo maintenance and restoration efforts. In addition, it is of great importance to gather the views of the local community and adopt participatory design processes. Although these aspects were not addressed in the scope of this project, it is recommended that public participation be considered in future work carried out in the project area. It is anticipated that this study will play a pioneering role in the evaluation of historical spaces in cities and their support through sustainable landscape design practices, providing both academic and practical benefits from this perspective.

DOI: 10.15320/ICONARP.2025.344

ACKNOWLEDGEMENTS

We would like to thank Şahnaz Akgöz and Sıla Sönmez for their contributions through the projects that formed the basis of the analyses presented in this study. Their support played an important role in the completion of this research.

REFERENCES

Akaslan, P. (2006). Etkinliğini Yitirmiş Kentsel Mekânların Kent Yaşamına Katılması [Yüksek Lisans Tezi]. İstanbul Teknik Üniversitesi, İstanbul.

Akdoğan, I. (2022). Tıp Sembolünün Tarihçesi Üzerine Bir Değerlendirme. *Mersin Üniversitesi Tıp Fakültesi Lokman Hekim Tıp Tarihi ve Folklorik Tıp Dergisi*, 12(3), 456 – 463.

Akkar Ercan, M. (2016). 'Evolving' or 'lost' identity of a historic public space? The tale of Gençlik Park in Ankara. *Journal of Urban Design*, 22(4), 520–543. https://doi.org/10.1080/13574809.2016.1256192

Anonymous (2021). Cennet Olacaktı…Yazık Oldu…Çanakkale Aynalı Pazar Gazetesi. Accessed address (20 November 2023): https://www.canakkaleaynalipazar.com/cennet-olacakti-yazik-oldu/20449/

Çanakkale Valiliği (2019). Çanakkale'ye Türkiye'nin İlk Askeri Sağlık Müzesi. Accessed address http://www.canakkale.gov.tr/canakkaleye-turkiyenin-ilk-askeri-saglik-muzesi

Chahardowli, M., Sajadzadeh, H., Aram, F. & Mosavi, A. (2020). Survey of Sustainable Regeneration of Historic and Cultural Cores of Cities. *Energies.* 13, 2708. http://dx.doi.org/10.3390/en13112708

De Girolamo, F. (2013). Time and Regeneration: Temporary Reuse in Lost Spaces. *Planum. The Journal of Urbanism*. 2(27), 68-101.

Haaster, J.V. (2015). Lost space: Exploring Copenhagen Hidden Potential [Master Thesis]. University of Copenhagen, Copenhagen.

Hamelin, C. (2016). The Potential of Lost Space: A New Model for Identifying, Classifying and Transforming Urban Void Space [Master Thesis]. The University of Guelph, Canada.

Hasan, M.T., Rahman, Md. M., Islam, S. & Siddika, T. (2018). Using the Lost Space – As an Urban Regeneration Strategy: A Case of Study Sylhet, Bangladesh. *Journal of Civil and Construction Engineering*, 4 (2), 1 – 9.

Hasani, E., Naghshineh, R. & Touranposhti, A. D. (2023). Identification and Design of Abandoned Urban Land. *Space Ontology International Journal, 12*(1), 39-45. Doi: 10.22094/SOIJ.2023.1951960.1480

High Line (2024, December 13). Erişim Adresi: https://www.thehighline.org/photos-videos/

Huihua, Y., Hussein, A. K. B., Ibrahim, R. B., Zhuang, Q. (2024). Opportunity in Lost Spaces: Exploring the Potential of Edible Landscapes in Viaduct Underpasses. *Environment and Social Psychology*, *9*(9), 2983. Doi: 10.59429/esp.v9i9.2980

İnan, S. (2021). Kayıp Mekanların Taktiksel Şehircilik Yaklaşımı ile Yeniden Düşünülmesi: Kadıköy Örneği [Yüksek Lisans Tezi]. Yıldız Teknik Üniversitesi, İstanbul.

Khalid, N. S., Hilal, S. Nasrudin, N. & Marzuhi, M. A. (2018). Lost Space in Urban Core Areas of Kuala Lumpur in Relations to Physical Urban Environment. *Planning Malaysia: Journal of the Malaysian Institute of Planners*, 16(3), 156 – 170.

Kösa, B. & Arı, D. (2021). Kentlerdeki Kayıp Mekânların Kentsel Tarım ile Geri Kazandırılması: İstanbul-Ayvansaray Mahallesi Örneği. Ö. Karakayacı et al.

(Ed.), *8. Kentsel ve Bölgesel Araştırmalar Sempozyumu, Yeni Gelecekte Yeni Bir Tasarım Anlayışı* – 1 (s.375-400) içinde. Konya, Türkiye: Kentsel ve Bölgesel Araştırmalar Ağı.

Lak, A., Ramezani, M. & Aghamolaei, R. (2019). Reviving the Lost Spaces Under Urban Highways and Bridges: An Empirical Study. *Journal of Place Management and Development*, 12 (4), 469 – 484, http://dx.doi.org/10.1108/JPMD-12-2018-0101.

Lee, S. J., Hwang, S., & Lee, D. (2015, June). Urban Voids: as a Chance for Sustainable Urban Design. In *Proceedings of the 8th Conference International Forum Urbanism,* https://doi.org/10.3390/ifou-D007.

Mohammad-Moradi, A., Yazdanfar, S-A., Norouzian-Maleki, S., (2020). Exploring the Sense of Place Components in Historic Districts: A Strategy for Urban Designers and Architects. *Int. J. Architect. Eng. Urban Plan*, 30(1): 30-43, https://doi.org/10.22068/ijaup.30.1.30.

Pérez-Hernández, E., Peña-Alonso, C. & Hernández-Calvento, L. (2020). Assessing lost cultural heritage. A case study of the eastern coast of Las Palmas de Gran Canaria city (Spain). *Land Use Policy*, 96, 104697, https://doi.org/10.1016/j.landusepol.2020.104697

Sağlık, E. (2019). Kentsel Tasarım Kalitesi ile Kentsel Kimlik İlişkisi: Çanakkale Kenti Örneği. [Doktora Tezi]. Çanakkale Onsekiz Mart Üniversitesi, Çanakkale.

Sakarya, İ. (2016). Katılımcı Demokrasi ve Kent Hakkı Çerçevesinde Çanakkale'de Yerel Siyaset. [Doktora Tezi]. İstanbul Üniversitesi, İstanbul.

Simon, M. & Mseddi, A. (2020). The Vacant Urban Space: Problems, Possibilities, Processes. *Periodica Polytechnica Architecture, 51*(2), 101-107. https://doi.org/10.3311/PPar.15749

Şimşek, D. (2022). Kentsel Kayıp Mekânların Oluşmasında Raylı Sistem Hattının Etkileri: Bakırköy – Kazlıçeşme Hattı Üzerinden Bir Değerlendirme [Yüksek Lisans Tezi]. İstanbul Teknik Üniversitesi, İstanbul.

Solak, S. G. (2017). Mekân-Kimlik Etkileşimi: Kavramsal ve Kuramsal Bir Bakış. *Manas Sosyal Araştırmalar Dergisi*. 6 (1), 13 – 37.

Tırnakçı, A. & Aklıbaşında, M. (2018). Tarihi Çevrelerde Kentsel Peyzaj Tasarımın Kayseri Mimar Sinan Parkı Örneğinde İncelenmesi. *Erciyes Üniversitesi Fen Bilimleri Enstitüsü Dergisi*, 34 (3).

Tombul, M. (2015). Çanakkale Kültür Envanteri: Arkeolojik Yerleşim Alanları ve Sanat Tarihi Yapıları. Musa Tombul, İstanbul.

Trancik, R. (1986). *Finding Lost Space: Theories of Urban Design*. New York. Van Nostrand Reinghold Company.

Ünal B. & Topçu K.D. (2022). Exploring Lost Spaces Towards Regaining Them for Urban Life: The case of Konya Historical City Center. *Journal of Design for Resilience in Architecture and Planning,* 3, 348 – 375.

Ünal, B. (2022). Kentsel Tasarım Bağlamında Kayıp Mekânların İrdelenmesi ve Kent Yaşamına Yeniden Kazandırılması, Konya Kenti Örneği. [Yüksek Lisans Tezi]. Konya Teknik Üniversitesi, Konya.

Url-1 (2024, December 13). https://www.archpaper.com/2024/04/phase-two-the-underline-opens-miami/

Url-2 (2024, December 13). https://nextcity.org/urbanist-news/who-will-benefit-from-miamis-new-rails-to-trails-park

Url-3 (2024, December 13). https://www.publicspace.org/works/-/project/g027-square-for-a-change

Url-4 (2024, December 13). https://www.architectsjournal.co.uk/practice/culture/the-union-street-urban-orchard

DOI: 10.15320/ICONARP.2025.344

Url-5 (2024, December 13). https://www.google.com/url?sa=i&url=http%3A%2F%2Fwww.collectifetc.com%2Frealisation%2Fplace-au-changement-opus2%2F&psig=AOvVaw0ZUQakHYWu3SeSesCVHzj7&ust=1734207813971000&source=images&cd=vfe&opi=89978449&ved=0CBQQjRxqFwoTCNCR1dfJpYoDFQAAAAAdAAAAABAJ

Url-6 (2024, December 13). https://www.thehighline.org/photos-videos/

Wu, M. (2022). Research on the Activation of Urban Leftover Space Based on Spatial Narrative. [Doctoral Thesis]. University of Pécs, Hungary.

Yiğit Kahraman, S. (2011). Çanakkale Eski Merkez Hastanesi (Kale-i Sultaniye Hastahane-i Askeriyye). *Çanakkale Araştırmaları Türk Yıllığı.* 10-11, 3-24.

Yiğit, S. (2010). Çanakkale Eski Merkez Hastanesi Kale-i Sultaniye Hastahane-i Askeriyye Rölöve – Restitüsyon ve Restorasyon Projesi. [Yüksek Lisans Tezi]. İstanbul Teknik Üniversitesi, İstanbul.

Resume

Assoc. Prof. Dr. Elif SAĞLIK is a faculty member at the Department of Landscape Architecture, Faculty of Architecture and Design, Çanakkale Onsekiz Mart University. She completed her undergraduate studies in Landscape Architecture at Karadeniz Technical University in 2006, and went on to earn both her M.Sc. and Ph.D. degrees at Çanakkale Onsekiz Mart University. Her master's research focused on the adequacy and improvement possibilities of urban outdoor space designs for wheelchair users, using Ordu city center as a case study. In her doctoral research, she explored the relationship between urban design and urban design quality, with an emphasis on the city center of Çanakkale. Her academic interests primarily include urban design, design quality, and design techniques.

Mahmut Can AST is currently pursuing a master's degree in the Department of Landscape Architecture at Çanakkale Onsekiz Mart University. He completed his undergraduate studies in Landscape Architecture at Çanakkale Onsekiz Mart University in 2023. His academic interests include landscape design, as well as the evaluation of landscape design and techniques. In his graduate studies, he focuses particularly on the functionality and sustainability of landscape design, emphasizing spatial data-based evaluation methods. He aims to contribute to interdisciplinary research centered on design and analysis and to further deepen his expertise in the field.

ICONARP
International Journal of Architecture and Planning
Received: 05.02.2024 Accepted: 24.11.2025
Volume 13, Issue 2/ Published: 31.12.2025
DOI: 10.15320/ICONARP.2025.345 E- ISSN:2147-9380

Research Article

ICONARP

Beyond Campus Walls: Studentification in Ankara's İşçi Blokları Neighborhood – Housing, Affordability, and Community Dynamics

Samaneh Sohrabi Akkoç*
Funda Yirmibeşoğlu**

Abstract

This article examines the dynamics of studentification in İşçi Blokları, Ankara—a 1970s cooperative-housing district adjacent to Middle East Technical University (METU). Originally constructed in 1973 as a workers' cooperative housing estate, İşçi Blokları today functions as a major student-housing cluster, with many dwellings rented to students. Using a mixed-methods design (survey and in-depth interviews, 2022–2023), the study analyses how student demand reshapes housing affordability, dwelling quality, and neighborhood cohesion. Studentification emerges as a multifaceted urban issue. Residents depict students as a "guaranteed market," linking their presence to higher property values but also to reduced maintenance and social frictions; yet many support a more balanced citywide distribution and acknowledge students' economic and cultural contributions. Empirically, we find rent inflation and physical decline in older cooperative stock alongside growth in cafés, study-friendly venues, and youth-oriented services that enhance cultural vibrancy. In response, the paper proposes a new housing model that brings together the municipality, housing cooperatives, and universities. The model sets affordable rent limits (30–35% of household income), creates a revolving renovation fund to repair old buildings, and includes university agreements to guarantee stable student occupancy. Together, these measures aim to keep rents stable, improve living standards, and prevent resident displacement. Overall, studentification in İşçi Blokları is a transformative socio-spatial process requiring inclusive housing policy, multi-scalar governance, and the revitalization of cooperative institutions to balance affordability, diversity, and urban sustainability.

Keywords: *Housing affordability, Studentification, University–city relations*

*First Author's Affiliation:
Department of Urban and Regional Planning, Istanbul Technical University, Istanbul, Türkiye (*Corresponding author*)

Email: sohrabi18@itu.edu.tr

**Second Author's Affiliation:
Department of Urban and Regional Planning, Istanbul Technical University, Istanbul, Türkiye

Email: funday@itu.edu.tr

To cite this article: Sohrabi Akkoç, S., & Yirmibeşoğlu, F. (2025). Beyond Campus Walls: Studentification in Ankara's İşçi Blokları Neighborhood – Housing, Affordability, and Community Dynamics. *ICONARP International Journal of Architecture and Planning,* 13 (2), 778-804.DOI: 10.15320/ICONARP.2025.345

INTRODUCTION

Studentification refers to the process by which specific urban areas experience a significant influx of student populations, often leading to noticeable changes in the housing market, local economy, and community dynamics. This phenomenon has been a prominent feature of urban development since the late 1990s, highlighting the growing impact of student populations on urban dynamics and social structures (Allinson, 2006; Munro et al., 2009; Sage et al., 2013; Smith, 2005). Studentification is often viewed through the theoretical lens of gentrification (Atkinson & Bridge, 2004; Lees, Shin, & López-Morales, 2015; Smith, 2005). Both studentification and gentrification reshape urban areas, though in different ways (Smith, 2005). While both processes are linked to rising rents, displacement pressures, and shifts in neighborhood identity, their drivers differ. Gentrification is typically associated with middle-class professionals, whereas studentification is propelled by a transient student population whose collective presence reshapes urban space (Moos, Revington, Wilkin, & Andrey, 2018). Both processes contribute to increased housing costs and can result in the marginalization or displacement of long-term residents (Moos et al., 2018). Nevertheless, these transformations significantly alter the social, economic, and cultural character of neighborhoods (Boersma, 2013; Fabula & Kovács, 2017).

Universities exert a profound influence on urban development, extending beyond education and research to encompass demographic, spatial, and economic effects (Felsenstein, 1996; Russo, Van den Berg, & Lavanga, 2007). Concentrations of students in proximate neighborhoods often accelerate urban change, from the subdivision of family homes into shared rentals to shifts in community cohesion and local business ecologies (Chatterton, 1999; Brookfield, 2019). While such transformations can revitalize areas, they also create tensions around affordability, service provision, and neighborhood identity (Hubbard, 2008).

Heterotopia & Theoretical Lens

Heterotopia, as introduced by Foucault (1986), refers to “spaces of otherness” where multiple and often contradictory social practices coexist within a single place. Such spaces operate outside or alongside dominant spatial norms, simultaneously reflecting and challenging them (Foucault, 1998; Johnson, 2006). In urban contexts, heterotopias illustrate how neighborhoods can host diverse populations and competing uses, generating tensions but also new cultural meanings. In the case of İşçi Blokları, originally designed as cooperative housing for workers, the coexistence of long-term families and transient student households has produced a hybrid social environment. This overlap demonstrates how studentification reshapes not only the physical fabric but also the symbolic meaning of place, aligning with Harvey’s (2000) observation that heterotopias disrupt prevailing spatial orders.

DOI: 10.15320/ICONARP.2025.345

Significance of Studentification

Despite its challenges, studentification can generate important opportunities for urban neighborhoods. It may revitalize housing stock, stimulate local employment, and diversify cultural and social life (Ley, 2003). Universities and their students often bring vibrancy and cultural diversity to communities, while institutional investment in infrastructure such as public transportation and recreational facilities can benefit residents more broadly. Students also contribute to local labor markets by providing a flexible workforce.

At the same time, these benefits coexist with significant challenges. Studentification is frequently associated with overcrowding, rising rents, and tensions between permanent and temporary residents (Kinton, Smith, & Harrison, 2016). In the case of the 100. Yıl İşçi Blokları neighborhood in Ankara, regions traditionally dominated by family residences have been transformed into houses in multiple occupation (HMOs), undermining community cohesion and producing unbalanced demographics. Recognizing this dual-edged nature is crucial for urban planners, policymakers, and community leaders seeking balanced and sustainable development. This study highlights the importance of addressing housing affordability, ensuring quality of life for both students and long-term residents, and implementing comprehensive strategic planning for student accommodation. By examining studentification in Ankara, the research underscores the broader policy challenge: how to utilize the vibrancy students bring while mitigating displacement and housing precarity, ensuring that urban growth benefits all members of the community.

Turkish Context & Research Gap

Over the past two decades, the Turkish government has mobilized universities to support regional development and economic growth (Demirdag & Nirwansyah, 2025). At the same time, national studies report that dormitory bed capacity does not meet student demand (Sarıipek, Peker, & Cerev, 2024). In Ankara, a citywide inventory of 21 higher-education institutions (2018–2019) shows institutional bed capacity far below enrolment, with documented spillover into nearby neighborhoods around Middle East Technical University (Yalçınkaya, 2020; Hansu, 2023). Given the limited stock of purpose-built student accommodation (PBSA), students rely heavily on private and shared rentals, a pattern closely associated with localized studentification dynamics (Sage, Smith, & Hubbard, 2013; Smith, 2005). Despite the rapid expansion of higher education and its urban imprint, Turkish case studies on these dynamics remain comparatively scarce, indicating a gap in national and international scholarship (Yalçınkaya, 2020; Sarıipek et al., 2024).

Building on this conceptual frame and the Turkish context, the study is guided by the following research questions:

RQ1: How does studentification affect housing affordability, dwelling quality, and neighborhood sustainability in İşçi Blokları?

RQ2: How do long-term residents and students negotiate coexistence, belonging, and conflict in everyday spaces?

RQ3: Which policy instruments—regulatory, financial, and organisational—can align cooperative-stock renewal with affordability and social cohesion?

LITERATURE REVIEW

Definition and Conceptual Framework

Studentification is defined as the socio-spatial restructuring of urban areas driven by the increasing presence of students (Hubbard, 2008). It involves demographic, cultural, and economic shifts that reshape neighborhood identity and everyday life. While often discussed in relation to gentrification, studentification differs because it is propelled by a transient, young population rather than middle-class professionals (Smith, 2005). As Smith argues, students can be considered "apprentice gentrifiers," whose temporary residence, limited financial capacity, and distinctive lifestyle practices create unique forms of urban change.

Historical Evolution and Global Spread

The concept of studentification was first observed in British cities, where large student populations transformed inner-city neighborhoods (Chatterton, 1999; Smith, 2005). Over time, the phenomenon expanded beyond the UK, becoming a global issue affecting university towns and metropolitan regions worldwide (Kenna, 2011; He, 2015; Daneri et al., 2015). This global spread demonstrates that studentification cannot be understood solely as a UK-based model but requires comparative attention to different housing systems and socio-political contexts. In England, local authorities use a combination of house in multiple occupation (HMO) licensing and Article 4 Directions to regulate the concentration and quality of student housing. HMO licensing establishes minimum standards for space, safety, waste, and noise management, while Article 4 Directions— a UK planning tool—remove permitted development rights in designated areas, so that converting family dwellings (Use Class C3: single-household dwellinghouses) into small HMOs (Use Class C4: 3–6 unrelated occupants) requires full planning permission and can be refused where local HMO thresholds are exceeded. Applications are evaluated against local HMO thresholds (commonly around 10–20% within a defined area) to prevent excessive clustering (Revington, 2018). In parallel, planning policies promote purpose-built student accommodation (PBSA) through Section 106 obligations — legally binding agreements under the UK Town and Country Planning Act 1990 used to mitigate site-specific impacts (e.g., management plans, travel plans, public-realm/transport contributions, and, in some cases, affordability or university nomination agreements) (UK Government, n.d.; Town and Country Planning Act 1990, s.106; Nottingham City Council, 2024)— and Supplementary Planning Documents (SPDs) —

DOI: 10.15320/ICONARP.2025.345

guidance that adds detail to adopted development plan policies and is a material consideration in decision-making, prepared under the Planning and Compulsory Purchase Act 2004 and the Town and Country Planning (Local Planning) (England) Regulations 2012 (UK Government, n.d.; Planning and Compulsory Purchase Act 2004; Town and Country Planning (Local Planning) (England) Regulations 2012). These mechanisms aim to control over-concentration, improve standards in the private rented sector, and steer demand toward better-managed PBSA developments. City-level experiences, such as Leeds and Nottingham, show how combined regulatory tools (licensing + thresholds + PBSA requirements) can balance housing demand and mitigate neighborhood externalities, providing useful insights for contexts like Ankara, where dormitory capacity is limited and informal HMOs dominate.

Impacts of Studentification

The literature identifies a wide range of economic, social, and cultural impacts of studentification—both positive and negative.

Negative impacts: Neighborhood change is often perceived negatively by long-term residents. Common concerns include noise, littering, antisocial behaviour, crime, parking problems, and the deterioration of local environments (Munro & Livingston, 2011; Kinton et al., 2016; Revington, 2022). Studentification has also been linked to segregation, where students cluster together and become socially distant from other groups, weakening community cohesion (Chatterton, 2010; Sage et al., 2012a, 2012b). The growth of shared rentals (HMOs) can reduce housing quality, displace families, and lead to unbalanced neighborhoods (Hubbard, 2009; Mulhearn & Franco, 2018). Moreover, neighborhoods dominated by students may suffer from seasonal decline during non-term periods, with empty streets and closed businesses (He, 2014).

Positive impacts: Students also bring significant benefits. They contribute to local economies as reliable consumers of housing, food, retail, and leisure services (Chatterton, 2010; Hubbard, 2008; Knight Frank, 2019). Their presence supports local businesses, creates employment, and stimulates investment in services such as property management, maintenance, and real estate markets (Smith, 2005). At a cultural level, students can enhance vibrancy, diversity, and cosmopolitan identity, turning university neighborhoods into lively urban quarters (Munro et al., 2009; Ruiu, 2017). As Chatterton (1999) and Smith (2005) note, students and young professionals often cluster in areas that reflect their shared lifestyles, influencing local retail adaptation and shaping culturally distinct urban quarters. However, as Hubbard (2009) note, positive contributions are often overlooked in public debates and the

media, which tend to highlight negative effects. Table 1 presents an overview of studentification and its neighborhood consequences.

Table 1. Neighborhood Transformations under Studentification

Economical	Sociocultural	Physical
Students create a demand for rental housing- Limited availability of affordable housing for non-student residents.	Changes in the composition of the population and the rising density of the population.	The conversion of building forms and functions to cater to student services.
Local businesses cater to the requirements of students by offering a wide range of products and services.	The absence of social cohesion leads to the occurrence of segregation and social conflict.	Urban and regional land use undergoes transformations.
The increase in land and rent prices, inflation, and economic segregation.	Transient residency, seasonal depopulation, and floating population.	Urban aesthetic shifts (graffiti, noise barriers, cycle storage).

Overall, studentification produces a dual-edged urban experience: it can energize cities while also creating social tensions and spatial inequalities.

Strategies for Managing Studentification

Urban responses to studentification typically focus on housing regulation and community integration. Two dominant forms of student housing provision are houses in multiple occupation (HMOs) and purpose-built student accommodation (PBSA).

HMOs provide flexible and relatively low-cost housing but often suffer from poor quality, overcrowding, and weak regulation. When highly concentrated, they are frequently linked to neighborhood decline (Hubbard, 2009; Kenna, 2011). In İşçi Blokları, the expansion of HMOs has transformed family housing into shared student rentals, reshaping both the built environment and the neighborhood's social composition.

PBSA has been promoted in many cities as a way to relieve pressure on private rental markets. While it can reduce competition for local housing, critics argue that PBSA creates homogeneous, isolated student enclaves that reinforce segregation and commodify student life (Sage et al., 2013; Smith & Hubbard, 2014). In contrast to Western European contexts where PBSA has expanded rapidly, Ankara has limited PBSA provision, which intensifies reliance on informal HMOs.

Effective management of studentification therefore requires more than simply increasing housing supply. It involves balancing integration and diversity, regulating rental practices, and ensuring that planning frameworks address both the risks of informal HMOs and the exclusionary potential of PBSA.

METHODOLOGY

Research Design

This study investigates studentification in the İşçi Blokları neighborhood adjacent to Middle East Technical University (METU) in

DOI: 10.15320/ICONARP.2025.345

Ankara. The area's proximity to the campus, varied housing stock, and evolving socio-spatial dynamics make it a particularly illustrative case for examining the interplay between student populations and long-term residents. The research aims to provide deeper insights into the multifaceted effects of studentification on community relations, neighborhood identity, and housing conditions, while also identifying implications for policy and planning. The central guiding question is: How does studentification affect housing affordability, community cohesion, and neighborhood sustainability in İşçi Blokları, and what policy instruments could address these challenges?

To address this question, the study employs a mixed-methods approach, combining qualitative and quantitative strategies. In-depth interviews were conducted with students, long-term residents, local business owners, real estate agents, and the neighborhood mukhtar, while a large-scale questionnaire survey was used to capture broader patterns and perceptions. Together, these methods provide a comprehensive understanding of how studentification is negotiated at the everyday level and how it reshapes urban space.

Data Collection and Procedures

Survey. A structured questionnaire was distributed electronically and in person to 200 respondents, comprising 100 students and 100 non-students living in or around İşçi Blokları. Participants were recruited through purposive and snowball sampling to reach both student and long-term resident populations. Efforts were made to include respondents of different ages, genders, and housing arrangements to enhance diversity. While the sampling method does not allow full statistical generalization, it provides a sufficiently diverse pool to capture varied perspectives. The survey included both closed questions (e.g., Likert-scale items on housing affordability, neighborhood change, and safety) and open-ended questions that allowed respondents to elaborate on their experiences (see Appendix A for the survey structure and sample items).

Interviews. In addition to the survey, 30 semi-structured interviews were conducted between April 2022 and February 2023. Interviewees included students (n=10), long-term residents (n=8), landlords and real estate agents (n=6), local business owners (n=4), the neighborhood mukhtar, and two METU sociology professors (see Appendix A for the interview guide and discussion themes). Interviews lasted between 30 and 60 minutes and were conducted face-to-face in homes and workplaces or online, depending on participant preference. Informed verbal consent was obtained from all participants, and anonymity was preserved through the use of pseudonyms. We present survey results in section 4.5 and interview themes in section 4.6.

ICONARP – Volume 13, Issue 2 / Published: 31.12.2025

Data Analysis

Survey results were analyzed using descriptive statistics (frequency counts and cross-tabulations) to identify general patterns. Open-ended survey responses and interview transcripts were examined through content analysis (Weber, 1990). Data were organized into thematic categories to enable systematic comparison across respondent groups, including affordability, neighborhood identity, noise and safety, and perceived benefits of students. Table 2 illustrates the areas explored in the interviews and survey, covering social relations, housing dynamics, cultural contributions, neighborhood identity, and economic impacts.

Table 2. Analytical Framework for Content Analysis

Analytical Dimension	Categories	Sample Codes
Economic Impacts	Housing pressures and displacement,	Rent inflation; Resident displacement, Landlord profit motive
	Local economic contributions	Business growth; Consumer demand, Student workforce
Social Relations	Student–resident interactions	Coexistence; Lifestyle conflicts, Temporary presence
	Belonging and identity	Student belonging; Identity shift, Resident resistance
Cultural & Spatial Change	Amenities and lifestyle transformation,	Cafés; Nightlife, Study spaces; Youth cultures
Residential Satisfaction	Spatial assets and deficiencies	Accessibility; Public services, Housing inadequacy

Case Selection: Why Ankara and İşçi Blokları?

Ankara was selected for its dual role as Türkiye's capital and a major educational hub. According to national higher-education statistics, the city hosts 21 universities with roughly 350,000 students. METU enrolls about 26,251 students; based on METU's official statistics (dormitory capacity ≈7,300), approximately 70% live off campus, generating sustained pressure on nearby rental markets (Middle East Technical University, 2023a, 2023b). Survey and interview evidence indicate that students prefer İşçi Blokları for walkability to campus, dense everyday amenities, and time/cost savings on transport—factors that reinforce the spread of shared rentals (HMOs) and demand for centrally located dwellings.

İşçi Blokları, adjacent to METU, was chosen for three reasons. (1) It originated as a workers' cooperative estate, making it socio-economically distinct from nearby middle-class districts. (2) Over the last two decades it has undergone a marked shift toward student occupancy, including widespread conversion of family flats into shared rentals. (3) Compared with other student areas in Ankara, İşçi Blokları exhibits a sharper juxtaposition of long-term residents and transient students, offering a rich context to examine how adaptation and conflict co-exist—and how policy can balance affordability, quality, and social cohesion.

DOI: 10.15320/ICONARP.2025.345

CASE STUDY: İşçi Blokları Neighborhood

This study investigates the multidimensional dynamics of studentification in İşçi Blokları, focusing on social, economic, and spatial transformations. Located east of the Middle East Technical University (METU) campus in Ankara's Çankaya district, İşçi Blokları has become a key student-rental zone where housing pressures, shared living, and evolving community relations illustrate broader urban change.

Historical Background of İşçi Blokları

İşçi Blokları, located in Ankara's Çankaya district east of the METU campus, was developed as a cooperative housing project by the Confederation of Turkish Trade Unions between 1973 and 1988. Initially planned for 3,500 units, it expanded to 4,906 due to rising demand. Constructed with reinforced concrete and brick infill, the neighborhood reflected the principles of social housing, integrating schools, parks, service buildings, and a marketplace to foster community life.

Over time, İşçi Blokları attracted university students seeking affordable rentals near METU. Shared living arrangements became common, gradually reshaping its social and spatial character and embedding the neighborhood into Ankara's wider studentification process.

Social and Cultural Impacts

The influx of students has transformed İşçi Blokları into a youth-oriented hub characterized by cafés, study-friendly venues, and affordable eateries. While many long-term residents appreciate the vibrancy and convenience, others perceive the neighborhood's growing "student identity" as a sign of transience and disruption.

Positive and Negative Impacts

Positive impacts

Economic vitality: Rising student demand for rentals and everyday services increases local footfall and stabilizes off-season demand, which, in turn, supports new business formation (e.g., cafés, copy shops, repair services) and extends opening hours. Landlords and small firms hire additional staff, while supplier linkages (laundry, printing, food wholesalers) create secondary spending locally, strengthening the neighborhood's micro-economy (Baron & Kaplan, 2010).

Cultural diversity: Students introduce new cultural practices—languages, cuisines, arts, and sociability patterns—through clubs, festivals, and informal events, expanding the urban social landscape and enriching everyday public life. These interactions foster "bridging" ties between long-term residents and newcomers, broadening tastes and amenities (e.g., international eateries, cultural venues) and enhancing the area's symbolic attractiveness (He, 2015).

Negative Impacts

Housing market pressures: Student-driven demand enables room-by-room pricing, short-term tenancies, and high turnover, lifting asking rents and weakening tenure security for non-student households. In İşçi Blokları, aging cooperative flats are subdivided for flat-sharing; owners prefer students because frequent re-letting allows regular rent increases and lower upkeep. The result is reduced affordability and "quiet displacement" of longer-term residents. (Smith, 2004).

Social tensions: Different daily routines and norms, plus short-term tenancies, weaken neighborly trust. In İşçi Blokları, thin walls and shared stairwells amplify disturbances, while high turnover disrupts building committees and informal support. Result: more complaints about noise, litter, and wear—and a loss of place attachment and belonging (Hubbard, 2008).

Current Status of İşçi Blokları

Demographic structure: According to Endeksa, a real estate data and analytics platform in Turkey, the total population of the İşçi Blokları neighborhood is approximately 16,650. Recent demographic and housing data underline the dual nature of the area: a youthful, mobile population coexisting with an aging, rooted community. Approximately 35% of residents are under 30, predominantly METU students, while the remainder includes retirees and long-term households. This coexistence reinforces İşçi Blokları's hybrid identity as both a "student enclave" and a remnant of Ankara's cooperative-housing legacy.

Middle-aged households and families with children are underrepresented. Household distribution is estimated at 55% student households, 25% elderly households, and 20% nuclear families. According to Figure 1**,** the neighborhood demonstrates a balanced mix of younger and middle-aged residents.

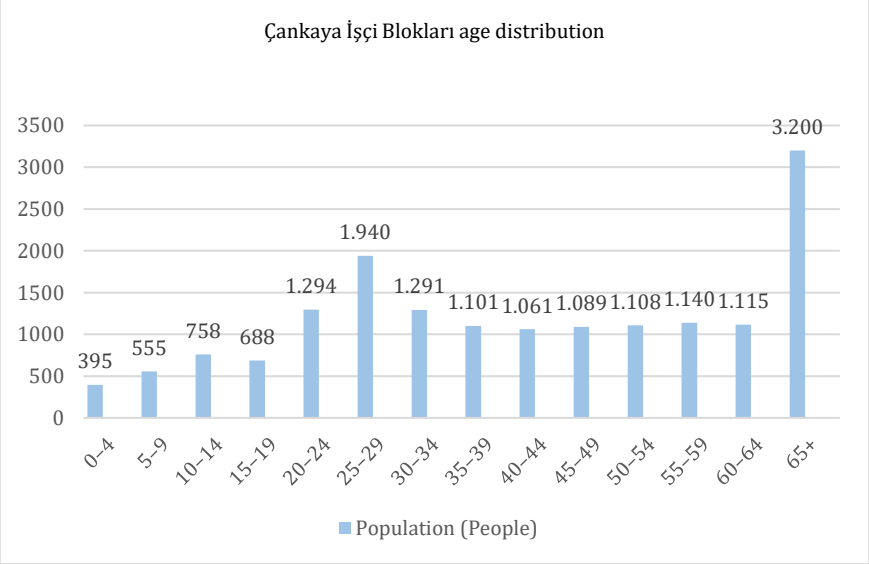


Figure 1. Age distribution of İşçi Blokları neighborhood. Source: Endeksa (2024), demographic data. Figure prepared by the author.

DOI: 10.15320/ICONARP.2025.345

Economic pressures and housing dynamics: As Sage (2010) argues, landlords in England often view student areas as a guaranteed rental market, which contributes to continuously increasing rents. A similar pattern is evident in İşçi Blokları, where the neighborhood's growing popularity among students has driven sharp rises in both rents and property values. Tenants report that residential blocks have deteriorated over time, as landlords, confident their properties will be rented regardless, refrain from investing in maintenance. This neglect has resulted in widespread physical decline.

Median listing prices (TL/m^2) and asking rents indicate that location advantages (centrality, walkability to METU, low transport costs) sustain demand even as the cooperative housing stock ages. In İşçi Blokları, median listing prices rose from ~5,000 TL/m^2 (2021) to ~30,000 TL/m^2 (2023) —consistent with platform analytics for the neighborhood (Hepsiemlak). Within the cooperative stock, renovated units show faster rent growth and higher TL/m^2 than non-renovated units, reflecting depreciation after ~10 years and penalties from poor insulation/heating, lack of elevators, and deferred maintenance. Although flat-sharing can lower per-person outlays for students—creating a perception of affordability—average rents continue to rise, intensifying pressures on working-class and retired households and risking "quiet displacement." (Figure 2).

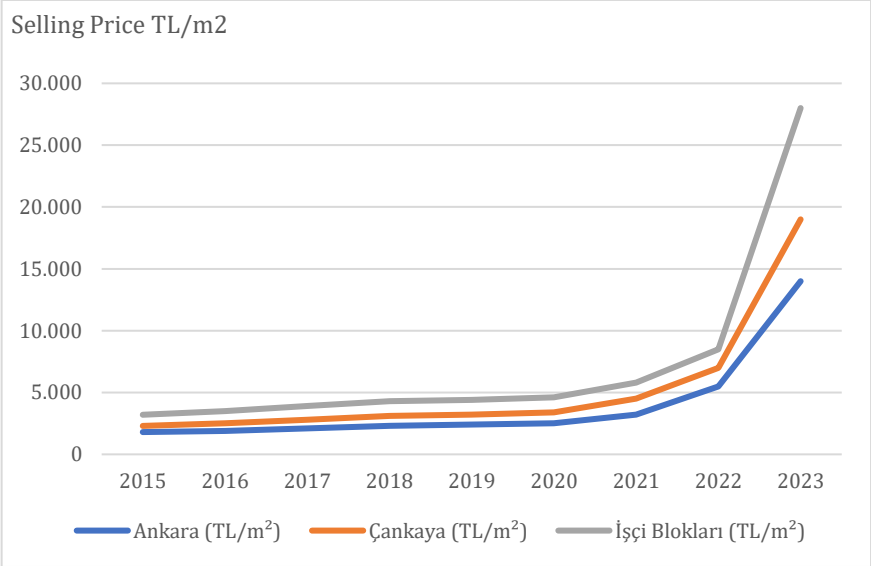


Figure 2. Change in housing sales prices (TL/m^2) in Ankara, Çankaya, and İşçi Blokları (2015–2023). Source: Figure adapted from Endeksa (2023); prepared by the author. Values approximated from visual data.

İşçi Blokları – Change in Sales Prices

18.63% ↑	**617%** ↑	**574.9%** ↑
1 Month Change	3-Year Change	5 Year Change

Educational Status: According to the Turkish Statistical Institute (TÜİK, 2023), Ankara recorded the highest average years of schooling in Türkiye for the population aged 25 and over, with 10.7 years, followed by Istanbul, Eskişehir, Kocaeli, and İzmir as illustrated in Figure 3.

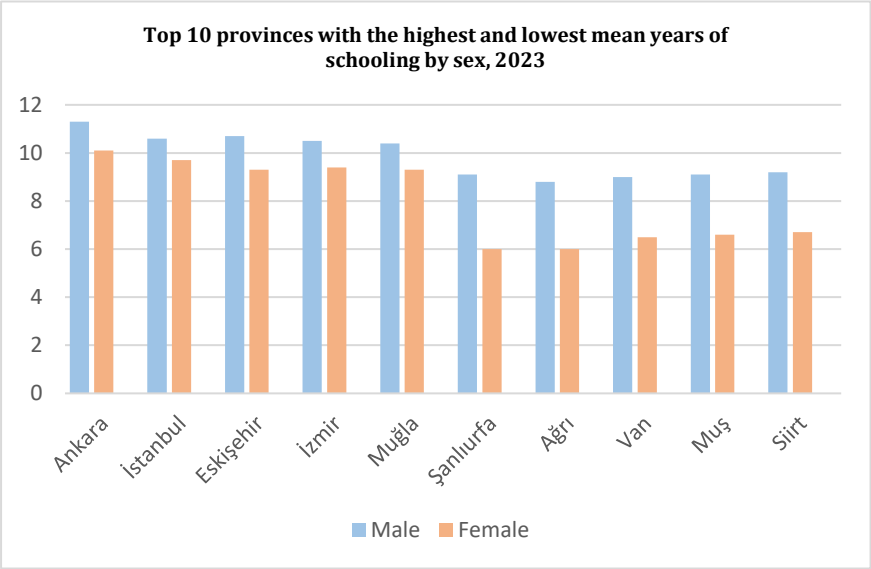


Figure 3. Educational status of Ankara. Data source (Turkish Statistical Institute [TÜİK] (2023). Figure prepared by the author.

Reflecting this broader trend, the İşçi Blokları neighborhood also demonstrates a diverse educational profile among its residents. As shown in Figure 4, 52% of the population have completed tertiary education or hold higher qualifications, representing a substantial share of highly educated individuals. A further 42% of residents have attained formal education at the primary or secondary levels but have not graduated, while the remaining 6% fall into other categories, including those with minimal or no formal schooling (Endeksa).

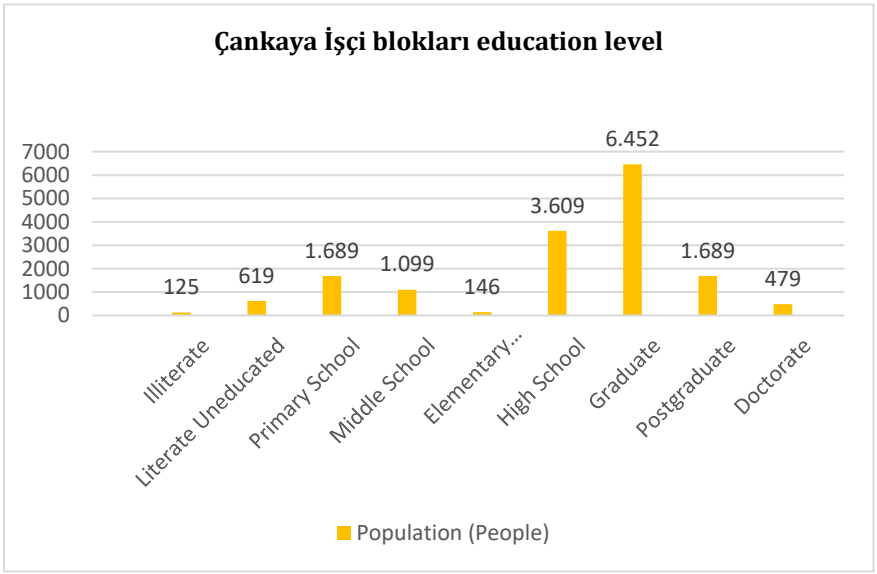


Figure 4. Educational level of İşçi Blokları neighborhood. Source: Endeksa (2024), demographic data. Figure prepared by the author.

Survey findings (Quantitative)

Sample: A structured questionnaire (n = 200; students = 100, non-students = 100) was administered in 2022–2023 to residents living in or around İşçi Blokları.

DOI: 10.15320/ICONARP.2025.345

The survey aimed to capture how residents perceive social integration, housing conditions, and neighborhood satisfaction amid ongoing change.

Identity, distribution, and social relations

Students were commonly viewed as a distinct demographic: 32% described students as a separate group with different lifestyles. A majority (65%) preferred dispersing student households across the city rather than concentrating them. Despite this, 80% of student respondents reported a sense of belonging to the neighborhood. Overall, 90% agreed that students contribute meaningfully to the city's development (e.g., cultural diversity, innovation), and 77% characterized İşçi Blokları as having strong cultural/educational attributes relative to other Ankara neighborhoods. Figure 5 illustrates key survey perceptions among residents and students in İşçi Blokları.

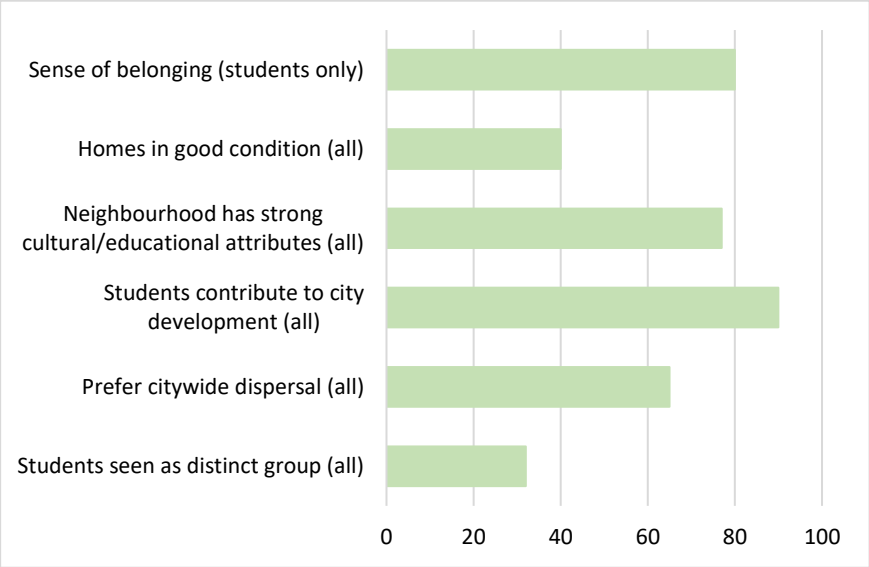


Figure 5. Key survey perceptions in İşçi Blokları (2022–2023 survey). Prepared by the author.

Economic Pressures and Housing Dynamics

Respondents widely perceived rising rents and maintenance shortcomings in the housing stock. Many reported deteriorating building conditions and linked these to limited landlord investment. While flat-sharing was seen to reduce per-person costs for students, respondents noted that total rents per dwelling remain high, intensifying affordability pressures for working-class and retired households and raising perceived displacement risk.

Social and Spatial Satisfaction in the Neighborhood

Survey responses indicate high satisfaction at the neighborhood scale and low satisfaction at the dwelling scale. A majority reported that accessibility to the city center and services (healthcare, markets) is good, and many accept higher neighborhood rents as consistent with this centrality. By contrast, respondents expressed low satisfaction with housing quality, citing small unit size, poor insulation/heating, lack of

elevators in five-story buildings, and deferred maintenance. Overall, residents value public spaces and everyday amenities and wish to preserve the neighborhood's social environment, even as they call for upgrades to dwelling standards.

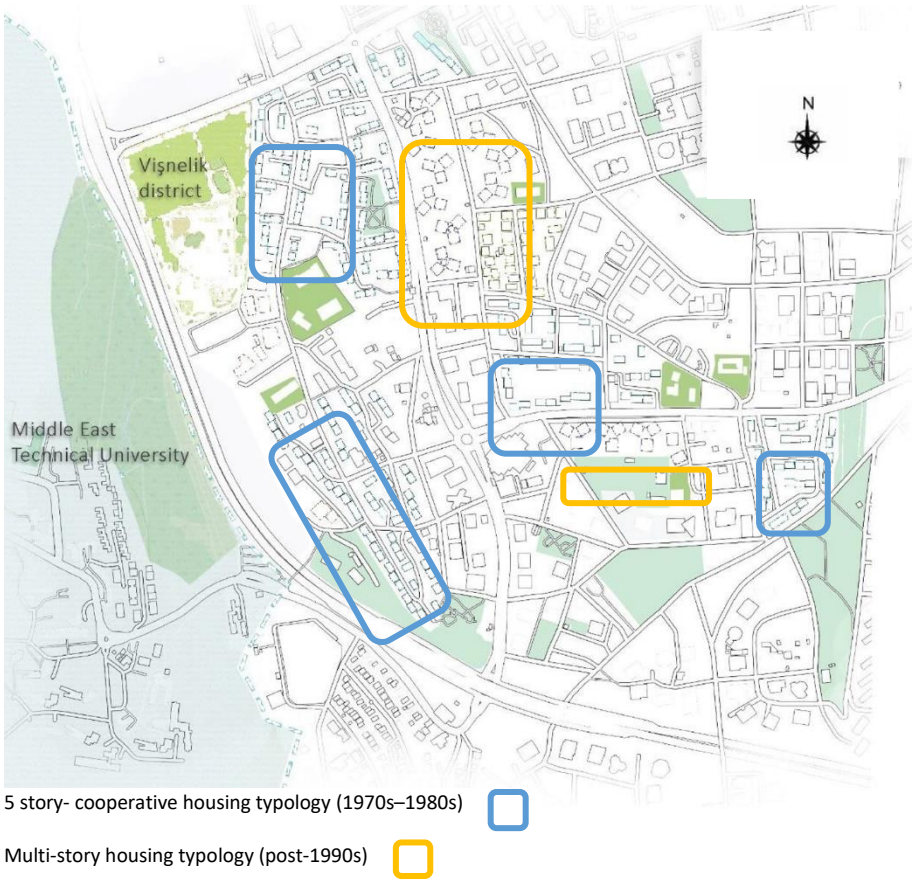


Figure 6. Spatial context of 100. Yıl İşçi Blokları, showing its proximity to Middle East Technical University (METU) and surrounding green areas. Adapted from Çağla Hansu (2023)

Figure 7. Morphological diversity in 100. Yıl İşçi Blokları, combining low-rise cooperative housing with later high-rise developments. This coexistence of forms reflects the district's evolution from worker housing to a mixed-income urban neighborhood. Photo adapted from (a). "16 Adımda ODTÜ Kampüsü," by ODTÜ Ar-Ge Topluluğu (2018), Onedio.

DOI: 10.15320/ICONARP.2025.345

Figure 8. Typical cooperative housing typology — small flats, poor insulation, no elevators, but strong neighborhood identity (Photo by author, 2024).

Figure 9. Multi-story buildings constructed as part of later development phases, these high-rise buildings represent the neighborhood's transition from mid-rise cooperative housing to denser residential forms. (Photo by the author, 2024.)

Interview Findings (Qualitative)

Thirty semi-structured interviews (students n=10; long-term residents n=8; landlords/estate agents n=6; local business owners n=4; the *Muhtar*; two METU academics) were conducted April 2022–February 2023.

Theme 1– Affordability trade-offs and sharing

Participants described sharing HMOs to manage rising rents, often accepting maintenance problems and reduced privacy.

"Four of us share; insulation is poor and heating fails, and maintenance is slow" (Student)

Theme 2– Landlord practices and housing quality

Under strong demand, some landlords were perceived to under-invest in upkeep.

"Landlords don't repair anything because they know students will rent regardless." (Long-term resident).

"Several landlords said students are a 'guaranteed market,' so flats can be re-let often and owners feel less pressure to do maintenance."

Theme 3– Neighborhood identity, seasonality, and safety

The café/nightlife economy and study-friendly venues foster a youth-oriented atmosphere, but interviewees noted quieter streets during university breaks.

"It is the students who keep the cafés open and the shops running—without them, this neighborhood would lose its heartbeat." (Shop owner)

Theme 4– Belonging, coexistence, and tension

Accounts reflected both attachment and friction: students described belonging despite temporariness; some long-term residents reported social fatigue due to turnover.

"This neighborhood feels like home to me, even if I will only be here for a few years." (Student)

"We used to know everyone in the building; now faces change every year." (Resident)

Theme 5– Renewal, place attachment, and value

Views on redevelopment diverged: investors expected higher values; older cooperative members emphasised social ties and the everyday use-value of shared spaces.

"These buildings are old, but they carry our memories. We don't want them demolished just for profit." (Elderly resident)

Together, these narratives reveal a complex coexistence of transience and attachment, economic rationality and emotional value. While students express belonging despite temporariness, long-term residents work to balance continuity and change.

DISCUSSION

This section highlights the dual impacts of studentification in İşçi Blokları, relates them to previous research, and considers policy implications.

DOI: 10.15320/ICONARP.2025.345

Interpretation of Findings: The impacts of studentification are multifaceted, with both beneficial and detrimental effects on urban areas.

Comparisons with Previous Research: This study confirms previous findings on the socio-economic effects of studentification but also highlights unique challenges in different urban contexts.

Policy Implications and Recommendations (Affordability-anchored policy and cooperative feasibility):

Drawing on survey income groups and current rent data, we propose rent ceilings that keep rent-to-income ratios within 30–35% for typical 2+1 units (extendable to 1+1 as needed). These thresholds can anchor renewal subsidies and graduated property-tax rebates for landlords that meet maintenance, insulation, and safety standards.

We further outline a municipality–cooperative–university partnership that combines a municipal land/use agreement, a revolving renovation fund, and university nomination agreements to stabilize occupancy and rents. A 50–80 unit pilot with 10–15-year affordability covenants and no-displacement phasing provides a realistic test bed for governance, costs, and outcomes.

Based on survey and interview findings, this study proposes a Cooperative-Renewal Model for affordable student housing in İşçi Blokları (Figure 10). The model conceptually links rent regulation, cooperative renovation, and university nomination mechanisms under municipal coordination.

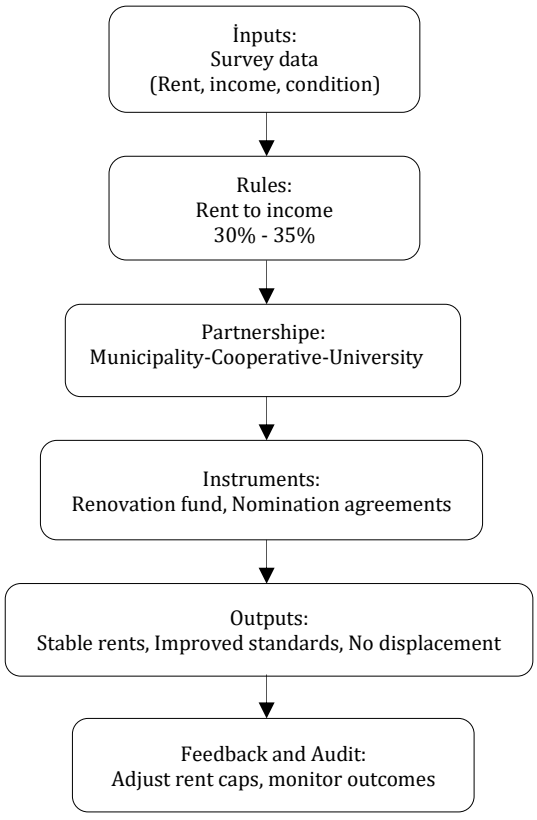


Figure 10. Cooperative-Renewal Model for affordable student housing in İşçi Blokları. Prepared by the author, 2024.)

This flowchart illustrates the proposed cooperative-renewal model, summarizing the inputs, mechanisms, and outcomes discussed above. The model connects affordability data with coordinated actions by the municipality, housing cooperatives, and universities. Rent limits (30–35%), renovation funds, and university agreements help stabilize rents, improve housing quality, and prevent displacement, with audits ensuring continual adjustment.

The model's feasibility depends on an enabling governance framework, transparent financial management, and phased implementation. With appropriate safeguards—fast-track retrofit permits, capped capex with contingencies, and annual audits—the proposal offers a credible, low-risk pathway toward sustainable, student-friendly housing renewal.

Findings from İşçi Blokları underscore the need for balanced strategies that protect affordability for long-term residents while accommodating student demand. As in other contexts, landlords can increase rental income by housing multiple students in a single apartment, making HMOs a lucrative investment (Hubbard, 2008); without appropriate regulation, however, such practices risk intensifying affordability pressures and undermining community well-being.

International evidence supports these directions. Planning frameworks can guide student-housing provision (Holton & Riley, 2014), while planning controls help prevent over-concentration and displacement (Atkinson & Kintrea, 2001). Purpose-built student accommodation (PBSA) can relieve pressure on the private rented sector and improve quality (Holton & Mouat, 2021), reducing overcrowding and mitigating environmental decline associated with unregulated rentals (Brennan et al., 2017). Beyond supply, dialogue initiatives between students and long-term residents and student well-being services can foster coexistence (McDougall et al., 2023). Aligning student-housing policy with neighborhood revitalization and sustainable transport links studentification to a broader urban-sustainability agenda (Stimson & Baum, n.d.).

Table 3. Challenges of student presence in İşçi Blokları, based on survey findings (2022–2023)

Challenges	Description
Rising rents and affordability pressures	Student demand drives up rents, creating burdens for working-class and elderly residents.
Deterioration of housing stock	Landlords neglect maintenance, assuming units will be rented regardless.
Risk of displacement	Long-term residents face growing difficulty remaining in the neighborhood.
Communication problems	Misunderstandings between students and permanent residents reduce neighborhood cohesion.
Cultural differences	Differences in lifestyles and daily rhythms contribute to social tensions.
Gentrification tendencies	Rising property values and shifting demographics gradually transform the neighborhood's identity.
Uniform housing stock	Standardized dwellings fail to meet the needs of diverse household types.

DOI: 10.15320/ICONARP.2025.345

Table 4. Positive impacts of student presence in İşçi Blokları, based on survey findings (2022–2023)

Benefits	Description
Economic vitality	Students sustain local cafés, restaurants, markets, and small businesses.
Cultural diversity	Young populations bring new lifestyles, perspectives, and cultural practices.
Knowledge and human capital	Students contribute to a knowledge-based economy through education and research.
Activation of public spaces	Students' use of parks, cafés, and shared areas increases vibrancy and social interaction.
Improved neighborhood visibility	Student demand enhances the neighborhood's profile and perceived attractiveness.
Enhancing safety and vibrancy	The presence of active youth populations makes the neighborhood livelier and perceived as safer.
Fostering innovation	Student activities encourage creativity, social initiatives, and entrepreneurial projects.
Art and cultural production	Students bring artistic practices, events, and performances that enrich the cultural life of the neighborhood.

ANALYSIS

Survey findings reveal a dual perception of students in İşçi Blokları. On the one hand, 32% of respondents regarded students as a distinct demographic, describing their lifestyles as temporary and incompatible, often summarized as a "clash of lifestyle" —a view consistent with previous studies where students were categorized as "others" (Sage et al., 2012; Hubbard, 2008; Long, 2016; Munro & Livingston, 2012). Accordingly, 65% of residents expressed a preference for dispersing student households across the city rather than concentrating them in specific areas, echoing broader evidence of resistance toward clustering (Munro & Livingston, 2012).

Such concerns are not limited to İşçi Blokları but also appear in wider policy discourse. The UK National HMO Lobby (2009, p. 1), a community advocacy group, argues that when students make up one-third of the population, an imbalance may arise, with the student community emerging as the dominant social group and contributing to the erosion of cohesion.

At the same time, survey responses indicate recognition of the positive contributions of students. A clear majority (90%) believed that students make a significant contribution to the city's development through cultural diversity, innovative ideas, and youthful energy. One shop owner remarked: "It is the students who keep the cafés open and the shops running—without them, this neighborhood would lose its heartbeat." Respondents emphasized students' role in stimulating economic growth, commercial activity, and new businesses, while also positioning them as drivers of cultural and educational vitality. Notably, 80% of student participants reported a sense of belonging to the neighborhood despite their temporary stay. A student interviewee reflected: "This neighborhood feels like home to me, even if I will only be here for a few years."

Regarding housing, 40% of respondents reported their homes to be in good condition, while opinions were split over the neighborhood's potential inclusion in an urban transformation project (53% in favor,

47% opposed). As one elderly resident put it: "These buildings are old, but they carry our memories. We don't want them demolished just for profit." A large share (77%) further described İşçi Blokları as possessing strong cultural and educational attributes, elevating it above other neighborhoods in Ankara in terms of identity and reputation.

To complement the survey results, observational notes and interview responses were systematically analyzed to capture the complexity of community relations and neighborhood perceptions in İşçi Blokları. The analysis focused on key themes such as student–resident relations, community cohesion, cultural and economic contributions, sense of belonging, and housing conditions. Table 5 synthesizes these findings, combining quantitative patterns with qualitative insights to illustrate how studentification shapes everyday life in the neighborhood.

Table 5. Observation and interview-based comprehensive analysis of community relations and perceptions among İşçi Blokları residents

Theme	Survey & Interview Findings	Observation Insights	Implications
Student-resident relations	32% regarded students as a distinct group ("others"); participants emphasized "clash of lifestyles" (different schedules, household practices)	Limited daily contact; older residents often seen in separate spaces from students	Perceptions of difference reinforce social distance
Community cohesion	65% preferred dispersal of student households across the city; National HMO Lobby (2009) warns of imbalance when students form one-third of a population	High turnover in housing stock, visible concentration of student rentals	Risk of weakening cohesion and dominance of student community
Cultural and economic contributions	90% reported students contribute to city development through culture, innovation, and energy; 77% valued neighborhood's cultural/educational attributes	Vibrant cafés, bars, and cultural spaces observed; local shops adapting to student demand	Students enhance neighborhood identity and visibility
Sense of belonging	80% of students reported feeling belonging despite temporary stay	Students integrate socially in shared housing and public spaces	Belonging is present but fragile, linked to short-term tenure
Housing and neighborhood conditions	40% reported homes in good condition; 53% supported urban transformation, 47% opposed	Buildings show physical aging; cooperative character still visible	Neighborhood at a crossroads between preservation and redevelopment

CONCLUSION

This study has shown that studentification in İşçi Blokları is a multi-dimensional process that reshapes housing, neighborhood life, and urban governance. Students contribute vitality, innovation, and cultural energy, yet their concentration also intensifies affordability pressures, accelerates housing deterioration, and fuels tensions with long-term residents. These dynamics highlight the importance of integrated policy measures that balance student needs with neighborhood sustainability.

The cooperative housing stock established in the 1970s is now facing significant physical decline, raising concerns over safety and livability. As one long-term resident explained, "Landlords don't repair anything

DOI: 10.15320/ICONARP.2025.345

because they know students will rent regardless." This deterioration is not only a technical issue but also one that threatens the neighborhood's ability to maintain its distinctive identity and long-standing social fabric, underscoring the urgency of aligning renewal with Ankara Municipality's broader strategies for sustainable urban development. Addressing these challenges requires policies that renovate aging stock, regulate landlord practices, and prevent speculative exploitation, while respecting the neighborhood's unique cooperative character.

Survey and interview findings reveal ambivalence: 32% of residents identified students as a separate demographic, and 65% favored dispersal across the city, echoing wider resistance to clustering. Yet 90% also acknowledged the positive role of students in cultural and economic life, and 80% of students themselves reported a sense of belonging despite their temporary stay. This dual perception underscores both the risks of social fragmentation and the potential for deeper integration. A 65-year-old resident reflected, "We used to know everyone in the building; now faces change every year." By contrast, a student interviewee emphasized, "For a student, finding a sense of home is rare, but in this neighborhood, I've found it." These perspectives reveal both tension and opportunity. Community engagement, cultural exchange, and student–resident initiatives could foster mutual understanding and strengthen cohesion, while acknowledging conflicts over lifestyle differences, housing turnover, and affordability.

Toward Cooperative and Sustainable Renewal

The findings point to an urgent need for renewal policies that go beyond cosmetic upgrading and market-driven redevelopment. In İşçi Blokları, the original five-story cooperative housing, built through collective organization in the 1970s, offers a socially cohesive yet physically deteriorated fabric. Instead of speculative, investor-led projects focused on 1+0 or 1+1 studio units, the neighborhood requires cooperative-based and socially mixed regeneration. A partnership model between Ankara Metropolitan Municipality, housing cooperatives, and residents could implement zero-interest renovation loans, structural reinforcement, and façade improvements while preserving affordability and mixed family typologies.

Such an approach would maintain the cooperative ethos of collective ownership, strengthen intergenerational coexistence, and avoid the displacement effects seen in conventional urban transformation projects.

Students' housing choices are closely tied to rent levels, accessibility, and household income. Survey data indicate that while students are drawn to İşçi Blokları for its proximity to METU and moderate rents, rising prices risk excluding both lower-income students and older residents. A data-informed housing policy—linking rental market analysis, household income profiles, and property values—is needed to determine viable rent ceilings and renewal priorities. In this sense,

ICONARP – Volume 13, Issue 2 / Published: 31.12.2025

revisiting the cooperative production model could provide an alternative path for producing affordable, collectively managed housing.

Internationally, examples from Germany, the Netherlands, and the United States demonstrate that university–municipality partnerships can address affordability through models such as municipal rental housing and cooperative student residences. Similar mechanisms could be adapted in Ankara, where universities facing dormitory shortages could collaborate with local authorities to lease or rehabilitate existing housing blocks near campuses. This would ensure affordable rents, maintain social diversity, and prevent uncontrolled commercialization of the housing market.

Table 6: Proposed model for building a sustainable, student-friendly community

Dimension	Key Strategies	Intended Outcome
Housing and Physical Renewal	1.Provide mixed dwelling types for students, families, and elderly residents. 2.Introduce zero-interest cooperative renovation schemes. 3.Integrate renewal within Ankara's sustainable development strategy.	Affordable, safe, and energy-efficient housing; preservation of cooperative identity.
Community and Social Integration	1.Support student–resident interaction via local events and co-designed spaces. 2.Encourage cultural exchange and shared use of facilities. 3.Diversify local businesses serving both groups.	Stronger social cohesion and cultural vitality.
Governance and Sustainability	1.Foster participatory governance with universities, municipalities, and residents. 2.Invest in green infrastructure and efficient public transport. 3.Promote recycling and low-carbon mobility.	Inclusive, resilient, and environmentally conscious governance.

The study concludes that studentification in İşçi Blokları is not merely a housing trend but a transformative socio-spatial process. Addressing its challenges requires cooperative renewal, inclusive housing policies, and multi-scalar governance that recognizes both the vulnerabilities and potentials of student-inhabited neighborhoods. By aligning municipal strategies with participatory models of housing production and management, Ankara can evolve toward a truly sustainable and student-friendly city—one that integrates higher education, social diversity, and spatial resilience.

ACKNOWLEDGEMENTS/NOTES

This article is derived from the author's doctoral dissertation at Istanbul Technical University.

REFERENCES

Allinson, J. (2006). Over-educated, over-exuberant and over here? The impact of students on cities. Planning Practice and Research, 21(1), 79–94. https://doi.org/10.1080/02697450600901541

DOI: 10.15320/ICONARP.2025.345

Atkinson, R., & Kintrea, K. (2001). Disentangling area effects: Evidence from deprived and non-deprived neighborhoods. Urban Studies, 38(12), 2277–2298. https://doi.org/10.1080/00420980120087162

Baron, M. G., & Kaplan, S. (2010). The impact of 'studentification' on the rental housing market.

Boersma, K. (2013). Paradoxes of studentification: Social mix versus gentrification in a disadvantaged neighborhood in Amsterdam East. The Open Urban Studies Journal, 6(1), 40–49. https://doi.org/10.2174/1874942901306010040

Brennan, E. M., Jones, K., Bender, R. E., & Elizabeth, R. (2017). Gentrification and displacement: An environmental justice challenge for social work in urban environments. PDXScholar. Retrieved from https://pdxscholar.library.pdx.edu/socwork_fac

Brookfield, K. (2019). Studentified areas as contested heterotopias: Findings from Southampton. Area, 51(2), 350–359. https://doi.org/10.1111/area.12458

Chatterton, P. (1999). University students and city centers – The formation of exclusive geographies. Geoforum, 30(2), 117–133. https://doi.org/10.1016/s0016-7185(98)00028-1

Chatterton, P. (2010). The student city: An ongoing story of neoliberalism, gentrification, and commodification. Environment and Planning A, 42(3), 509–514. https://doi.org/10.1068/a42293

Demirdag, İ., & Nirwansyah, A. W. (2025). Exploring university effect in Turkish regional development—A multifaceted statistical approach. *Cities, 159,* Article 105730. https://doi.org/10.1016/j.cities.2025.105730

Daneri, D., Trencher, G., & Petersen, J. (2015). Students as change agents in a town-wide sustainability transformation: The Oberlin Project at Oberlin College. Current Opinion in Environmental Sustainability, 16, 14–21. https://www.sciencedirect.com/science/article/abs/pii/S187734351500069X

Endeksa. *Ankara Çankaya İşçi Blokları: Demografi Nüfus, eğitim seviyesi, sosyoekonomik durum.* Retrieved from https://www.endeksa.com/tr/analiz/turkiye/ankara/cankaya/isci-bloklari/demografi

Fabula, S., Boros, L., Kovács, Z., Horváth, D., & Pál, V. (2017). Studentification, diversity and social cohesion in post-socialist Budapest. Hungarian Geographical Bulletin, 66(2), 157–173. https://doi.org/10.15201/hungeobull.66.2.5

Felsenstein, D. (1996). The university in the metropolitan arena: Impacts and public policy implications. Urban Studies, 33(9), 1565–1580. https://doi.org/10.1080/0042098966628

Foucault, M. (1986). Of other spaces. Diacritics, 16, 22–27. https://doi.org/10.2307/464648

Foucault, M. (1998). Different spaces. In J. Faubion (Ed.), Aesthetics, method and epistemology. (pp. 175–185). The New Press.

Hansu, Ç. (2023). *Unravelling the studentification process: A case study of İşçi Blokları neighborhood* (Master's thesis, Middle East Technical University).

Harvey, D. (2000). Spaces of hope. Berkeley, CA and Los Angeles: University of California Press.

He, S. (2014). Consuming urban living in 'villages in the city': Studentification in Guangzhou, China. Urban Studies, Advance online publication. https://doi.org/10.1177/0042098014543703

Holton, M., & Riley, M. (2014). Talking on the move: Place-based interviewing with undergraduate students. Area, 46(1), 59–65. https://doi.org/10.1111/area.12070

Holton, M., & Mouat, C. M. (2021). The rise (and rise) of vertical studentification: Exploring the drivers of studentification in Australia. Urban Studies, 58(9), 1866–1884. https://doi.org/10.1177/0042098020925246

Hubbard, P. (2008). Regulating the social impacts of studentification: A Loughborough case study. Environment and Planning A, 40(2), 323–341. https://doi.org/10.1068/a396

Hubbard, P. (2009). Geographies of studentification and purpose-built student accommodation: Leading separate lives? Environment and Planning A, 41(8), 1903–1923. https://doi.org/10.1068/a4149

Johnson, P. (2006). Unravelling Foucault's 'different spaces'. History of the Human Sciences, 19, 75–90. https://doi.org/10.1177/0952695106069669

Kenna, T. (2011). Studentification in Ireland? Analyzing the impacts of students and student accommodation on Cork City. Irish Geography, 44(2–3), 191–213. https://doi.org/10.1080/00750778.2011.618073

Kinton, C., Smith, D., & Harrison, J. (2016). De-studentification: Emptying housing and neighborhoods of student populations. Environment and Planning A, 48(8), 1617–1635. https://doi.org/10.1177/0308518X16642446

Kinton, C., Smith, D. P., Harrison, J., & Culora, A. (2018). New frontiers of studentification: The commodification of student housing as a driver of urban change. The Geographical Journal, 184(3), 242–254. https://doi.org/10.1111/geoj.12263

Knight Frank. (2019). *Global student property 2019: A global perspective on student property and investment*. Knight Frank. https://content.knightfrank.com/research/1775/documents/en/global-studentproperty-report-2019-may-2019-6426.pdf

Lees, L., Shin, H. B., & López-Morales, E. (2015). Global gentrifications. In Policy Press eBooks. https://doi.org/10.1332/policypress/9781447313472.001.0001

Ley, D. (2003). Artists, aestheticisation and the field of gentrification. Urban Studies, 40(12), 2527–2544. https://doi.org/10.1080/0042098032000136192

Ley, D., & Dobson, C. (2008). Are there limits to gentrification? The contexts of impeded gentrification in Vancouver. Urban Studies, 45(12), 2471–2498. https://doi.org/10.1177/0042098008097103

Long, J. (2016). Living with the consequences of policy decisions: Reactions to student lifestyles in the neighborhood. Journal of Policy Research in Tourism, Leisure and Events, 8, 176–195. https://doi.org/10.1080/19407963.2016.1157599

McDougall, E., Webber, K., & Petrie, S. (2023). Addressing the need for more nuanced approaches towards transit-induced gentrification: A case for a complex systems thinking framework. Geography Compass. John Wiley and Sons Inc. https://doi.org/10.1111/gec3.12681

Middle East Technical University. (2023). At a glance (Sayılarla ODTÜ): 2022–2023 student numbers. https://ilkbakista.metu.edu.tr/

DOI: 10.15320/ICONARP.2025.345

Middle East Technical University. (2024). At a glance (institutional indicators): Dormitory capacity and number of dormitories. https://kgpo.metu.edu.tr/tr/ilk-bakista-odtu

Middle East Technical University, Dormitories Directorate. (2025). General features (dormitories overview). https://yurtlar.metu.edu.tr/tr/genel-ozellikler

Moos, M., Revington, N., Wilkin, T., & Andrey, J. (2018). The knowledge economy city: Gentrification, studentification and youthification, and their connections to universities. Urban Studies, 56(6), 1075–1092. https://doi.org/10.1177/0042098017745235

Mulhearn, C. J., & Franco, M. (2018). If you build it will they come? The boom in purpose-built student accommodation in central Liverpool: Destudentification, studentification and the future of the city. Local Economy, 33(5), 477–495. https://doi.org/10.1177/0269094218792740

Munro, M., Turok, I., & Livingston, M. (2009). *Students in cities: A preliminary analysis of their patterns and effects.* Environment and Planning A, 41(8), 1805–1825. https://doi.org/10.1068/a41133

Munro, M., & Livingston, M. (2011). Student impacts on urban neighbourhoods: Policy approaches, discourses and dilemmas. *Urban Studies, 49*(8), 1679–1694. https://doi.org/10.1177/0042098011419237

Munro, M., & Livingston, M. (2012). Student impacts on urban neighborhoods: Policy approaches, discourses, and dilemmas. Urban Studies, 49, 1679–1694. https://doi.org/10.1177/0042098011419237

Nottingham City Council. (2024). *Purpose-Built Student Accommodation Supplementary Planning Document (PBSA SPD).* https://www.nottinghamcity.gov.uk/media/dyedumjv/purpose-build-student-accommodation-spd.pdf

Revington, N. (2018). Pathways and processes: Reviewing the role of young adults in urban structure. *The Professional Geographer, 70*(1), 1–10. https://doi.org/10.1080/00330124.2017.1288574

Revington, N. (2022). Post-studentification? Promises and pitfalls of a near-campus urban intensification strategy. *Urban Studies, 59*(7), 1424–1442. https://doi.org/10.1177/00420980211021358

Revington, N., & Wray, A. J. D. (2022). *Land-use planning approaches to near-campus neighborhoods and student housing development patterns in Ontario, Canada.* Housing Policy Debate, 34(5), 668–694. https://doi.org/10.1080/10511482.2022.2093939

Ruiu, M. L. (2017). Collaborative management of studentification processes: The case of Newcastle upon Tyne. Journal of Housing and the Built Environment, 32(4), 843–857. https://doi.org/10.1007/s10901-017-9549-2

Russo, A. P., Van Den Berg, L., & Lavanga, M. (2007). Toward a sustainable relationship between city and university. Journal of Planning Education and Research, 27(2), 199–216. https://doi.org/10.1177/0739456x07307208

Sage, J., Smith, D., & Hubbard, P. (2012a). The diverse geographies of studentification: Living alongside people not like us. Housing Studies, 27(8), 1057–1078. https://doi.org/10.1080/02673037.2012.728570

Sage, J., Smith, D. P., & Hubbard, P. (2012b). The rapidity of studentification and population change: There goes the (student)hood. Population, Space and Place, 18(5), 597–613. https://doi.org/10.1002/psp.690

Sage, J., Smith, D. P., & Hubbard, P. (2013). *New-build studentification: A panacea for balanced communities?* Urban Studies, 50(13), 2623–2641. https://doi.org/10.1177/0042098013477694

Sarıipek, D. B., Peker, Z., & Cerev, G. (2024). Addressing the housing crisis: Insights from a study on university students in Turkey. *Social Welfare: Interdisciplinary Approach, 14,* 54–69. https://doi.org/10.15388/SW.2024.14.4

Smith, D. P. (2005). 'Studentification': The gentrification factory? In R. Atkinson & G. Bridge (Eds.), *Gentrification in a global context* (pp. 72–89). Routledge.

Stimson, R. J., & Baum, S. (n.d.). Inner-city renaissance: The changing face, functions and structure of Brisbane's inner-city. National evaluation of the Common wealth Government's supported accommodation program. Retrieved from https://www.researchgate.net/publication/43481782

Turkish Statistical Institute [TÜİK]. (2023). *National education statistics, 2023.* Retrieved from https://data.tuik.gov.tr/Bulten/Index?p=National-Education-Statistics-2023-53444&dil=2

UK National HMO Lobby. (2009). Balanced communities and studentification.

UK Government. (2020). House in multiple occupation licence [Online]. https://www.gov.uk/house-in-multiple-occupation-licence [accessed 26 April 2020].

UK Government. (n.d.). *When is permission required?* (Planning Practice Guidance). https://www.gov.uk/guidance/when-is-permission-required

Weber, R. P. (1990). Basic content analysis. Beverly Hills, CA: Sage.

Yalçınkaya, G. (2020). *Ankara'da üniversitede barınma sorunu.* MADjournal (Mekânda Adalet Derneği).

Resume

Samaneh Sohrabi Akkoç is a PhD candidate in Urban and Regional Planning at Istanbul Technical University. Her research is situated at the intersection of urban sociology and urban studies, with a particular focus on studentification, gentrification, and the socio-spatial transformation of neighbourhoods. Her work engages with questions of urban inequality and everyday urban resilience, examining how different local actors negotiate coexistence within rapidly changing urban environments.

Funda Yırmıbeşoğlu is a full professor in the Department of Urban and Regional Planning, Faculty of Architecture, Istanbul Technical University (ITU). She received her diploma in architecture from the Faculty of Architecture at ITU in 1986, her master's degree in urban planning from ITU in 1990, and her PhD in urban planning from ITU in 1997.

She has been a member of the ITU Disaster Management Application and Research Center since 2017. She served as Chair of the Board of the ITU Housing Research and Education Center between 2018 and 2023 and as Chair of the Department of Urban and Regional Planning between 2022 and 2023.

She teaches undergraduate and graduate courses in urban planning, site planning, urban design, housing design, urban transformation, landscape planning, and emergency and disaster management.

DOI: 10.15320/ICONARP.2025.345

APPENDIX A. Survey and Interview Instruments

Survey structure.

The structured questionnaire (n = 200; 100 students and 100 non-students) included 25 items grouped into three themes:

Housing and affordability – rent levels, maintenance, sharing arrangements, and satisfaction with dwelling quality.

Neighborhood change – perceptions of student presence, amenities, and safety.

Social relations – sense of belonging, interaction with neighbors, and attitudes toward renewal.

Example survey items:

"How much of your household income is spent on rent?"

"How would you rate the maintenance and safety conditions of your dwelling?"

"How has the increasing student population affected your building's livability?"

"Would you support urban transformation in İşçi Blokları if it preserved affordability?"

"Do you feel a sense of belonging to this neighborhood?"

"How often do you interact with student/non-student neighbors?"

Interview guide.

Thirty semi-structured interviews were conducted with students, long-term residents, landlords, real estate agents, local business owners, and the neighborhood muhtar.

Main discussion themes included:

Affordability trade-offs and shared living

Landlord practices and housing quality

Neighborhood identity, belonging, and tension

Renewal expectations and attachment to place

Use in analysis.

Survey results informed quantitative comparisons (Section 4.5), while interviews provided qualitative insights into coexistence, belonging, and everyday adaptation (Section 4.6).

All responses were anonymized, and key excerpts are integrated in the text to illustrate participant perspectives.

ICONARP – Volume 13, Issue 2 / Published: 31.12.2025

ICONARP
International Journal of Architecture and Planning
Received: 25.12.2023 Accepted: 28.10.2025
Volume 13, Issue 2/ Published: 31.12.2025
Research Article *DOI: 10.15320/ICONARP.2025.346 E- ISSN:2147-9380*

Biophilic Design: Its Use in Architectural Structures and Different Areas — A Bibliometric Analysis

Ali Osman Özğan *
İclal Aluçlu **

Abstract

Biophilic design aims to enhance the connection between individuals and the natural environment by emphasizing natural elements in their living and working spaces. The fundamental principles of biophilic design include the integration of natural light and views, the use of plants and green spaces and a preference for organic forms and natural materials. The application of biophilic design in various domains promotes a balanced and harmonious lifestyle in line with the natural world, offering a range of benefits to both the environment and society. The aim of the study is to reveal the importance of using biophilic features in architectural designs using bibliometric analysis and to draw researchers' attention to biophilic design. In this study, bibliometric analysis was employed to measure and analyze the distribution and interaction of academic research related to biophilic design. The widely used Web of Science database was utilized for bibliometric analysis of scientific studies. Specifically, the bibliometric analysis focused on the most frequently used keywords in the titles of published articles on biophilic design. A total of 346 articles published in 184 journals between 2006 and 2023 were scanned for the subject of biophilic design. The most common keywords in the titles of scientific articles, following the term biophilic, include design, urban, workspace, green, natural, biophilia, architecture, health, environment, and other terms. Bibliometric analysis encompassed the examination of the most frequently used keywords, word cloud, trend keywords across years, keyword networks, and thematic evolution analysis. The analysis revealed that a diverse range of keywords (1165) were employed in the titles, and the frequency of keyword usage increased over time. Additionally, the usage of keywords evolved and changed over the years. These findings demonstrate that biophilic design is a popular and captivating topic that has garnered significant attention from researchers in various scientific fields.

Keywords: *Architecture, Biophilic design, Bibliometric analysis, Natural environment, Urban Design*

* Iğdir University Technical Sciences Vocational School, Design Department, Iğdır, Turkey. (*Corresponding author*)
E-mail: osmanaliozgan@gmail.com

**Dicle University Faculty of Architecture, Department of Architecture, Diyarbakır, Turkey.
E-mail: ialuclu@dicle.edu.tr

To cite this article: Özğan, A. O., & Aluçlu, İ. (2025). Biophilic Design: Its Use in Architectural Structures and Different Areas — A Bibliometric Analysis. *ICONARP International Journal of Architecture and Planning,* 13 (2), 805-826. DOI: 10.15320/ICONARP.2025.346

INTRODUCTION

The pace and intensity of modern life are distancing people from nature. Daily routines spent amidst concrete structures leave behind the tranquility of greenery and the beauty of nature (Beatley, 2016). However, the positive effects of nature on humans are a scientifically proven fact (Panagopoulos et al., 2020; White et al., 2019; Karataş, 2020). Biophilic design emerges as an approach aimed at re-establishing this natural connection (Alipour & Khoramian, 2023; DeLauer et al., 2022; Gür & Kaprol, 2022; Söderlund & Newman, 2017).

Biophilic design is a design philosophy that involves integrating elements and principles of the natural world into human-made environments (Sachs, 2022). This approach aims to strengthen the connection between humans and nature, enhance environmental awareness and improve the physical and mental well-being of users (Hung & Chang, 2021). Additionally, it embraces an approach where human senses take precedence; scents, sounds, and textures play a significant role in the design of space (Browning et al., 2014). Biophilic design creates a natural atmosphere by incorporating elements such as colors, forms, patterns, and textures found in nature into both indoor and outdoor spaces (Berto & Barbiero, 2017; Browning & Ryan, 2020; Kellert, 2012). Furthermore, by employing elements like natural light, vegetation, water features, and natural materials, this design approach enhances the quality of life in a space (Bowler et al., 2010; Liu et al., 2021). Biophilic design philosophy aims to enable individuals to live in an environment that is more conducive to health, happiness, and productivity.

When people are in nature or in environments that mimic nature, their mood generally tends to uplift (Söderlund & Newman, 2017). For instance, when a person takes a walk in the forest, they can often feel happier and more energetic due to the tranquility and serenity provided by nature (Özğan & Aluçlu, 2023). Another benefit provided by biophilic design is the reduction of stress levels. An area surrounded by elements such as water or greenery helps alleviate stress and relax the mind (Stavrianos,2016).

Biophilic design has effects that enhance human work concentration and attention. Working in a natural environment or spending time in a space with natural elements often leads to increased focus and attentiveness (Jabbarioun Moghaddami, 2019). Another advantage brought about by biophilic design is the enhancement of productivity (Soderlund & Newman, 2016). The colors, patterns and forms found in nature inspire designers to create new and intriguing concepts (Ertin & Karakaya, 2022).

From a perspective of human health, low blood pressure and heart rate can be considered as positive effects of interaction with the natural environment. Spending time in green spaces or resting in an environment with natural elements often leads to a decrease in blood pressure and a return to normal heart rate (Vincent et al., 2010). Additionally, contact with nature positively contributes to strengthening the immune system.

DOI: 10.15320/ICONARP.2025.346

Breathing clean air, consuming natural foods and spending time in nature generally contribute to boosting the immune system (Relf, 2009).

Biophilic design offers an effective solution to the disruptions in natural balance caused by industrialization and misguided urbanization. By integrating natural elements into the buildings, individuals strengthen their connection with nature and positively influence their physical and mental well-being (Sinemillioglu et al., 2010). Additionally, this design approach reduces urban stress and enhances livability, thus promoting ecological equilibrium within cities (Beukeboom et al., 2012). Consequently, biophilic design renders living spaces healthier, more serene, and balanced.

The principles of biophilic design are increasingly being embraced in disciplines such as architecture, interior design, landscape architecture, and urban planning (Dijkstra et al., 2008; Hady, 2021; McGee et al., 2019). Furthermore, in the healthcare sector, hospitals and healthcare facilities are employing biophilic design principles to create more serene environments that support healing, while in the field of education, schools are being designed to have greater interaction with the natural environment (Ellegaard & Wallin, 2015; Hady, 2021; Morawski & Dunnington, 2021; Russo & Andreucci, 2023). The effects of biophilic design are also observed in fields such as art, media, industry, agriculture, and tourism (Akyıldız & Olğun, 2021; Chang et al., 2020; Girginkaya Akdağ, 2021; Hähn et al., 2021; Tardast et al., 2021). This design approach has become an integral part of contemporary environmentally-friendly and human-centered designs.

Biophilic design is of great importance in the scientific world because it has positive effects that strengthen people's emotional connection with the natural world and improve quality of life (Peters & D'Penna, 2020). In academic journals and publications, there are many studies and articles on the positive effects of biophilic design on people's health, stress levels, concentration, finding innovative solutions, generating new and original ideas, and its contributions to sustainability and environmental awareness (Peters & Verderber, 2021).

Biophilic design supports an inclusive and sustainable lifestyle through its positive effects on the environment, health, social and economic domains. This design approach serves as a significant tool for enhancing people's quality of life in various areas, supporting projects that promote environmental awareness and ensuring the preservation of the natural environment (Şenozan, 2018). Strengthening our connection with the natural environment and integrating natural elements into our lives, the widespread adoption and implementation of biophilic design are crucial for a more balanced, serene, and satisfying life (Köseoğlu et al., 2023)

Biophilic design is a feasible and flexible approach as it can offer solutions suitable for different cultures and climates. Biophilic design can be applied in hospitals, schools, offices, homes, parks, tourist facilities and many other spaces. In this way, the positive effects of biophilic design can

ICONARP – Volume 13, Issue 2 / Published: 31.12.2025

be widely spread (Alipour & Khoramian, 2023) Academic journals and publications have published numerous studies and articles on the positive effects of biophilic design on people's health, stress levels, concentration and productivity, as well as its contribution to sustainability and environmental awareness.

Recent research have revealed that biophilic design is increasingly being applied in architecture across different scales and functions. In educational buildings, nature-based spatial elements have been found to increase students' focus and learning performance (Hussein et al., 2022). Biophilic interventions in office buildings have also been found to improve employee productivity and spatial satisfaction (Arif et al., 2021). Comprehensive models have been proposed for the systematic application of biophilic design frameworks at the building scale (Wijesooriya, 2023), and it has been determined that three-dimensional green facades enrich the spatial experience by strengthening the physical and visual connection with the natural environment (Zhong, 2024). The effects of biophilic approaches on energy efficiency, user health, and environmental sustainability have been evaluated using mixed methods (Agboola et al., 2024). Research trends in biophilic design in the field of architecture have also been examined from a bibliometric perspective (Tekin et al., 2025). A study conducted on city hospitals in Turkey shows that architectural models integrating biophilic and patient-centered design positively affect user satisfaction and the recovery process (Özğan, 2025). All these studies show that biophilic design has become a holistic approach that not only strengthens the psychological connection with nature, but also redefines the aesthetic, cultural, and technological dimensions of contemporary architecture, supporting human well-being and environmental sustainability.

MATERIAL AND METHODS

In this study, the development and significance of the subject of biophilic design, as well as the fields, topics, and frequency of academic research, are examined through bibliometric analysis. The methodological flowchart for the bibliometric analysis is presented in Figure 1.

Bibliometric analysis is a research method that examines the quantitative and qualitative characteristics of scientific publications or academic literature (Yang et al., 2024; Rodríguez-Soler et al., 2020; Celik et al., 2021). This type of analysis is used to present visual and numerical data regarding publication trends, publication years, most cited works, contributing countries and institutions, researchers' contributions, methodologies used, and various other features about research conducted on a specific topic or field (Arslan Selçuk & Öztürk Akbıyık, 2023). Bibliometric approaches have garnered a great deal of interest in diverse fields (Bulut and Yıldız, 2024; Çelik and Sarıboğa, 2023), as evidenced with high number of documents as 38.943 from Web of Science Core Collection. Of the documents, 69.41% of the documents have been

DOI: 10.15320/ICONARP.2025.346

disseminated in last five years, suggesting the increasing trends in bibliometric-aided analyses of the documents (Kulak and Gulmez-Samsa, 2023).

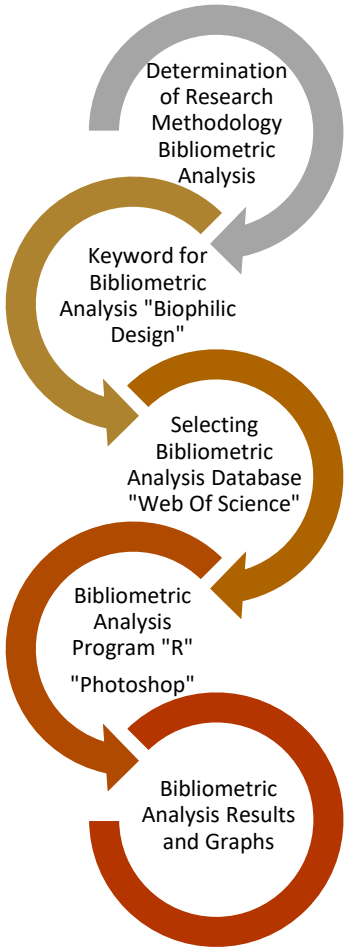


Figure 1. Study method flow chart

Among the primary objectives of bibliometric analysis are the evaluation of the current state of the research field, conducting trend analysis, identifying the journals or conferences where publications occur, understanding the role of countries and academic institutions, performing citation analysis, and determining researchers' contributions. This type of analysis is utilized to discern trends in research areas, strategize publication efforts, and forecast future research directions. Additionally, it serves as a crucial tool for assessing the impact of scientific publications and measuring researchers' academic achievements (Varshabi et al., 2022).

Bibliometric analysis serves as an effective tool for processing large datasets and tracking extensive scientific research (Patra et al., 2006). It evaluates data encompassing the content of scientific studies, citations, years of publication and more. Bibliometric analysis has a broad perspective, covering thousands or even millions of scientific documents. Therefore, when working with large datasets and aiming to analyze

extensive scientific research, bibliometric analysis is employed as a highly effective tool (Farrukh et al., 2020).

The selection of the keyword in bibliometric analysis holds critical importance for the success and validity of the analysis (Özğan & Aluçlu, 2023). At this stage, the identification of the correct keyword dictates the scope and focus of the research. Should incorrect or overly general keywords be chosen, the results of the analysis could be skewed and may not adequately reflect the true objective of the research. For instance, using a more general term like “natural design” instead of “biophilic design” would yield results that are overly broad and ambiguous. Additionally, the correct identification of the keyword ensures that relevant articles and studies are located in the appropriate databases, which is crucial for the comprehensiveness and validity of the analysis. This is also a significant step that greatly influences the success of the analysis.

In bibliometric analysis, the significance of the database is determined by factors such as scope, accuracy, and currency (Kokol et al., 2021).Comprehensive databases are preferred for international research, while databases providing access to leading publications in a specific field are favored for in-depth analyses in that area. Moreover, up-to-date and accurate databases ensure timely and reliable results in the analysis. The selection of a reliable and accurate database is crucial to prevent the distortion of analysis due to incorrect or erroneous data. The most commonly used databases in scientific circles include Web of Science, Scopus, and Google Scholar (Xian & Wang, 2021). One of the most important data sources in this field is Web of Science (Çavdar, 2021). Web of Science is a widely used database that covers extensive datasets, provides access to research in various disciplines, and is commonly used to measure and assess scientific impact (Chen et al., 2022). In this study, the Web of Science database, which is widely used in the scientific environment, was preferred to identify academic studies on biophilic design and to conduct bibliometric analysis. This study is limited to scientific studies conducted in the WOS database between 2006 and 2023. This time period was chosen to demonstrate the importance of biophilic design due to the recent increase in research on the subject.

Many computer programs are used for bibliometric analysis by evaluating the title, abstract and keywords of scientific studies. Each of the computer programs that perform bibliometric analysis has different features and advantages. In bibliometric analysis, various programs such as SPSS, Python, VOSviewer and R are used. SPSS is a widely used program for conducting statistical analyses and can be preferred for the statistical analysis of bibliometric data. Python is a general-purpose programming language used for processing large datasets. In bibliometric analysis, Python is utilized for data cleaning, analysis, and visualization. VOSviewer is a program used for visual analyses. The R program, chosen in this study, is a programming language used for a wide range of analytical processes, including statistical calculations, data

DOI: 10.15320/ICONARP.2025.346

manipulation, visualization, and modeling. In bibliometric analyses, R is often preferred for processing datasets, conducting analysis, and visualizing results. Particularly when working with large datasets, the flexibility and analytical capabilities of R provide a significant advantage. It is used to visually represent bibliometric data and visualize relationships (Guleria & Kaur, 2021). Researchers and academicians use the R program, which is a powerful analytical tool with its open-source structure, in their studies (Büyükkıdık, 2022). Additionally, the R program, with its extensive library and package support (Bibliometrix, Igraph, and Text Mining), easily performs tasks such as reading, cleaning, analyzing, and visualizing bibliometric datasets (Derviş, 2020). Researchers effectively present their study results thanks to the program's graphing and visualization capabilities tailored to their needs. Being a programming language, R enables automation of repetitive tasks while its ability to conduct complex analyses. Bibliometric analyses conducted with R provide an advantage in terms of the reproducibility of results (Büyükkıdık, 2022).

In this study, R computer program is used to perform bibliometric analysis of academic studies on biophilic design. The data of academic studies conducted between 2006-2023 using the keyword biophilic design in Web Of Science are analyzed bibliometrically using the bibliometrix package in version 4.3.1 of the R program. The data obtained are produced in tables and graphs. The bibliometric analysis data obtained using the R computer program were made more understandable using the photoshop program and presented in the research and findings section.

RESULTS AND DISCUSSION

Title words are an important bibliometric analysis method for analyzing the scientific literature by examining the publication titles of scientific studies on biophilic design (Rons, 2018). This method is used to understand trends, popular terms and developments related to biophilic design by analyzing the words in article titles.

Web of Science database was used for bibliometric analysis. When articles published between **2006 and 2023 using** the keyword biophilic design were searched, **346 articles published in 184 journals** were identified. When the words used in the titles of scientific studies were analyzed using bibliometric analysis method, 1165 words were identified. The 40 most frequently used words and the number of uses are given in Table 1.

In Table 1, the most frequently used words in the titles of scientific articles are listed in order: **Biophilic** 171, **Design** 140, **Urban** 48, and others are included in the table according to their frequency of use. According to the data in the table, it can be deduced that the most commonly used words in the titles of scientific studies are **Biophilic and Design**. Following these, the terms **Urban, Study, Green, Nature,**

Biophilia, Architecture, Health, Environments, Sustainable, Environment, Buildings and others are used.

Table 1. The most frequently used words in the titles of scientific articles and their frequency of use

Keywords Used in the Title	Frequency of Use	Keywords Used in the Title	Frequency of Use
Biophilic	171	Cities	14
Design	140	Well-Being	14
Urban	48	İmpact	13
Study	36	Performance	13
Green	34	Approach	12
Nature	31	City	12
Biophilia	25	İnterior	12
Architecture	24	Restorative	12
Health	23	Cognitive	11
Environments	22	Environmental	11
Sustainable	22	Space	11
Environment	21	Spaces	11
Buildings	17	Virtual	11
Effects	17	Architectural	10
İndoor	16	Framework	10
Planning	16	İnfrastructure	10
Review	16	Pilot	10
Sustainability	15	Potential	10
Urbanism	15	Residential	10
Building	14	Practice	9

Biophilic and Design are among the most frequently used terms in the biophilic design literature. This reveals that researchers are intensely interested in the theoretical foundations and practical applications in this field. Especially considering that biophilic design has developed as a methodology for integrating inspiration from nature with man-made environments, it is to be expected that these terms are frequently encountered.

The integration of green spaces in urban areas and nature in architecture is emphasized by the frequent use of words such as **Urban, Green, Nature** and **Architecture**. The frequency of these terms emphasizes how biophilic design is incorporated into urban planning, sustainable development and architectural practice, and shows that research in this field is centered around these themes.

The potential positive effects of biophilic design on human health and well-being can be understood by the frequency of use of words such as Health, Well-Being, Restorative and Cognitive. These terms reveal that biophilic design does not only have an aesthetic dimension, but also allows for applications that can provide functional and psychological benefits.

The words Sustainable, Sustainability, Environment and Ecological indicate the extent to which biophilic design is intertwined with environmental awareness and sustainability goals. The frequent use of these terms indicates that this approach plays an important role in efforts to preserve ecological balance and produce environmentally friendly solutions.

DOI: 10.15320/ICONARP.2025.346

Finally, the frequency with which the words Indoor, Interior Space, Space and Spaces are used reflects a growing interest in how biophilic design can be realized in interior spaces and how it can improve the quality of these spaces. The integration of biophilic elements into interior design has the potential to improve the aesthetic and functional quality of our living spaces.

The use of these terms indicates that biophilic design is a multidisciplinary field that intersects with different disciplines such as planning, architecture, health, psychology and environmental sciences. The frequency of these words emphasizes researchers' interest in the multidimensional nature of biophilic design and its potential to bridge various disciplines.

The use of words such as **Virtual, Framework** and **Infrastructure** may indicate a growing interest in the integration of biophilic design in digital environments and technological infrastructures. This is particularly relevant in the post-pandemic era with people spending more time indoors and the rise of technologies such as virtual reality.

Furthermore, words such as **Pilot** and **Potential**, Potential emphasize the new areas of application of biophilic design that are still being explored and the processes of testing the effectiveness of these applications. The use of such a word indicates that the field is developing and that pilot studies are being conducted to evaluate the impact of new biophilic design projects.

The most relevant words in the titles of scientific articles are those that best reflect the content of the articles. These words are used to quickly grasp the content of the articles or studies and identify the key topics. The most frequently used words in the titles of scientific articles on biophilic design are provided in Figure 2.

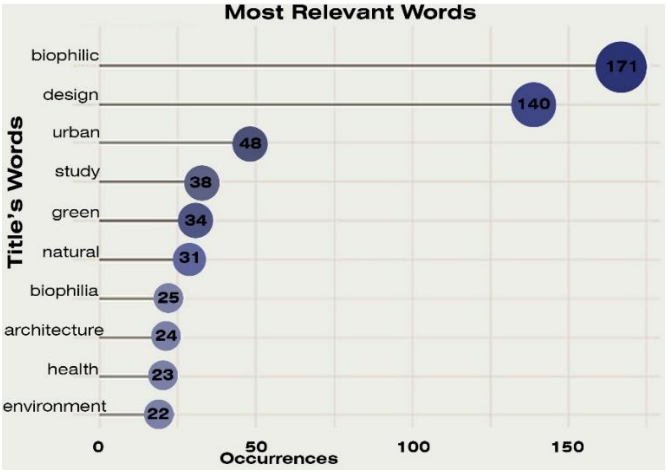


Figure 2. Most Frequently Used Words in Scientific Article Titles

Bibliometric analysis utilizes the most frequently used words in scientific article titles to define key topics, determine trends and focal points, narrow down the research field, and locate similar studies. The Figure 2 shows a frequency plot of the most frequently used terms in the titles of scientific articles on the topic of biophilic design. The X-axis

represents the number of occurrences of the terms and the Y-axis represents the terms themselves. The size of the circles in the graph indicates the frequency of use of the term, which gives researchers an idea of which terms are more dominant in academic discussions in this field. The frequency of these terms reflects which concepts and themes in biophilic design are more prevalent within the research community.

As shown in Figure 2, in the titles of scientific articles related to biophilic design, the term **biophilic** is the most frequently used word, appearing **171 times**, accounting for **17% of the total**. Following biophilic, the terms **Design (14%)**, **Urban (5%)**, **Study (3%)**, **Green (3%)**, **Natural (3%)**, **Biophilia (2%)**, **Architecture (2%)**, **Health (2%)** and **Environment (2%)** are used in the specified proportions, with other terms following suit. This shows that the terms **biophilic** and **design** are of central importance in the biophilic design literature and that terms such as urban, green, nature are important sub-themes in this field.

In addition, terms such as urban, study, and green are also used with significant frequency. This shows that biophilic design is also an important topic in the context of cities and sustainability. The presence of the terms **health** and **environments** points to the relationship between biophilic design and human health and environmental factors.

In bibliometric analysis, word clouds are an effective tool used to visually represent large sets of textual data. These clouds indicate the most frequently occurring words or terms in the text, adjusting the size based on the frequency of the word and providing a visual presentation in different colors. Word clouds are employed to comprehend, highlight, and identify key topics and trends in textual data. The most frequently used word cloud in the titles of scientific articles on biophilic design is presented in Figure 3.

Figure 3. Word cloud of the most frequently used words in scientific article titles.

As seen in Figure 3, the most frequently used words in the titles of studies on this subject are represented by the word **Biophilic** in the largest font size and green color. The word **Design** is in burgundy color, displayed in the second largest font size, followed by words like **Urban** and **Study** in different fonts and colors.

The distribution of trend topics in the titles of scientific articles, based on years, is used to understand the evolution of the subject, identify

DOI: 10.15320/ICONARP.2025.346

research trends, recognize innovation opportunities, and determine future research directions. These analysis results play a significant role in trends and decision-making processes in scientific research. When the most frequently used words in the titles of scientific articles related to biophilic design are examined through bibliometric analysis, trend topics are used to understand the changing significance, popularity and focus of the subject and field over time. The year-wise distribution of trend topics, representing the most frequently used words in the titles of scientific articles related to biophilic design, is presented in Figure 4.

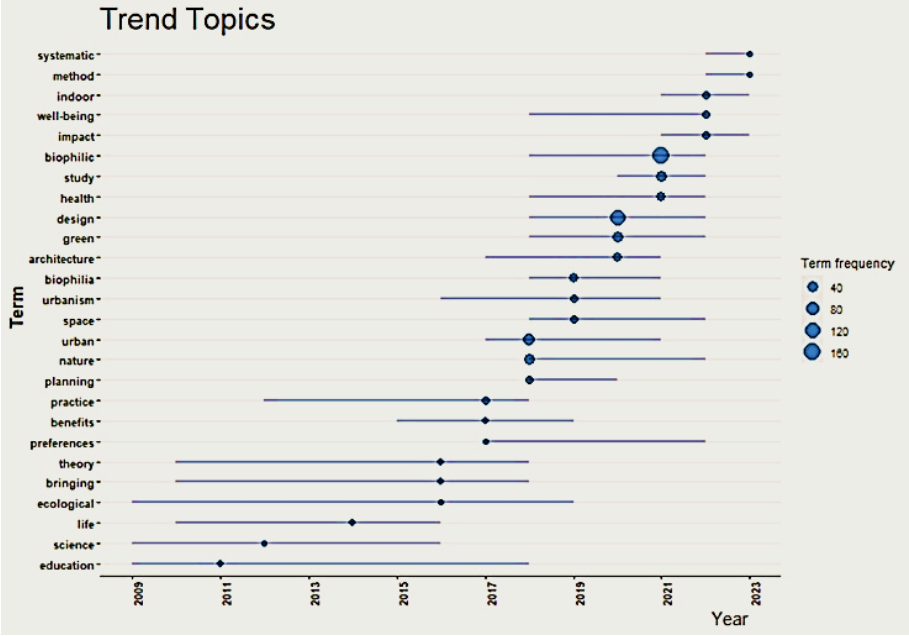


Figure 4. Distribution of the most frequently used trend topics in the titles of scientific articles over the years

Figure 4 is a trend topics scatter plot showing the frequency of use of certain terms over time in scientific article titles related to biophilic design. For each term, it can be seen how the frequency of use has changed in various years from 2006 to 2023. The horizontal lines show the first and last use of the term, while the size of the blue circles above the horizontal line represents the frequency of use of the term in a given year.

In Figure 4, With **Biophilic** appearing in **171** and **Design** in **140** article titles, they are prominently placed due to the publication years of the articles. The terms **Ecological (2009-2019)** and **Education (2009-2018)** have spanned across the years. On the other hand, terms such as **indoor**, **well-being** and **impact** have also been used significantly over time, with the frequency of use of these terms peaking in certain years. For example, the prominence of the term **well-being** in **2017 and 2019** indicates that human well-being and health is a central theme in biophilic design research.

In Figure 4, in the distribution of trend topics term used in the titles of scientific articles on Biophilic Design, the terms **Systematic** and **Method** are at the top, with publication years ranging from **2022 to 2023**. The

noticeable increase in the use of terms such as systematic and method in recent years indicates a growing interest in the development of research methodologies and the adoption of systematic approaches in the field of biophilic design. This suggests that future research may focus on these aspects.

The use of the terms over time shows that biophilic design is not limited to architecture or design, but is also related to other disciplines such as environmental science, psychology and public health. This reveals that biophilic design is a multidisciplinary field and acts as a bridge between these disciplines.

In bibliometric analysis, the co-word network of terms used in article titles is an analysis method used to visualize and understand the relationship and frequency of terms and words in scientific literature. The network of terms used in article titles on Biophilic Design is employed to visualize topic relationships, identify key subjects, comprehend trends and changes in the literature, and define research gaps. The most commonly shared word network in the titles of scientific articles related to Biophilic Design is presented in Figure 5.

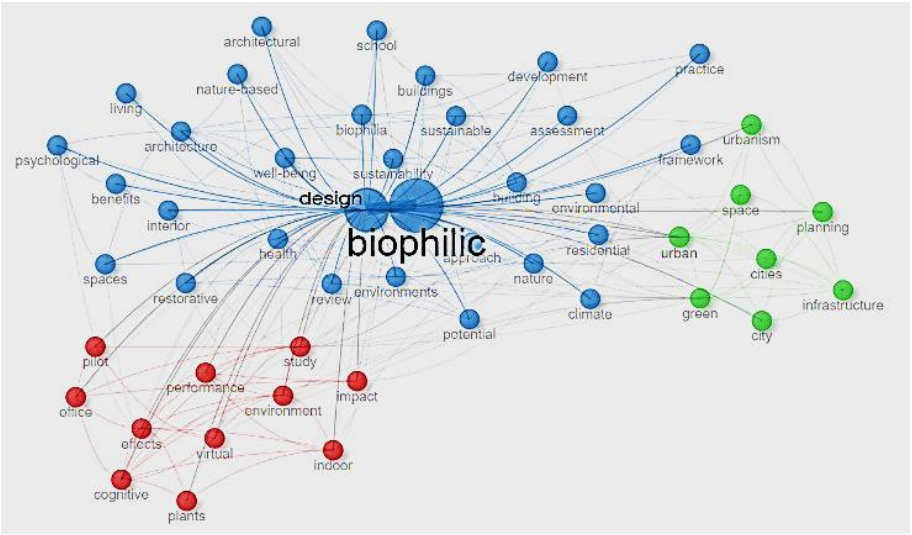


Figure 5. Co-word network of most frequently used words in scientific article titles

In this study, the co-occurrence of keywords used in the titles of scientific studies is illustrated in Figure 5, represented by three distinct colors. The color differentiation indicates the proximity and frequent co-usage of these terms within the same field. Lines connecting the spheres signify the co-occurrence of words. The size of the spheres in Figure 5 varies according to the number of connections each word has with others. The largest spheres are centrally located on the map and are colored blue, representing the words **Biophilic** and **Design**. Surrounding these central spheres are tightly connected networks of words such as **health, well-being, environments, approach, building, sustainable, nature, buildings, review** and **architecture**, all of which are also colored blue. Spheres colored red, representing words like **Study, Impact, Indoor, Environment, Virtual, Plants, Performance, Effects, Cognitive, Office**

DOI: 10.15320/ICONARP.2025.346

and **Pilot,** interact more frequently among themselves and also with the blue spheres. Spheres colored green, representing words like **Urban, Green, Space, Urbanism, Cities, City, Planning** and **Infrastructure** show interaction with the blue spheres. The interaction between the green and red spheres is observed to be minimal.

Terms at the edges of the network with fewer connections indicate potential gaps in biophilic design research or new areas of research that have not yet been fully explored. Terms such as cognitive or plants have fewer connections, indicating that these topics are not yet fully integrated or less studied in the biophilic design literature. This presents new and innovative areas of study for researchers and creates opportunities for a deeper examination of the concepts associated with these terms.

It is also suggested that these less connected terms could become a focal point in future research, contributing to a better understanding of various aspects of biophilic design. Research on these terms helps to explore broader areas of application and impact of biophilic design and opens new doors for interdisciplinary studies. In particular, topics such as cognitive aspects or the effects of plants on human psychology and health can provide a rich field to better understand the effects of biophilic design on human experience.

Thematic transformation in bibliometric analysis is an analysis used to understand how the most frequently used words in scientific article titles have evolved and changed over time. The thematic transformation of the most frequently used words in scientific article titles related to biophilic design is presented in Figure 6.

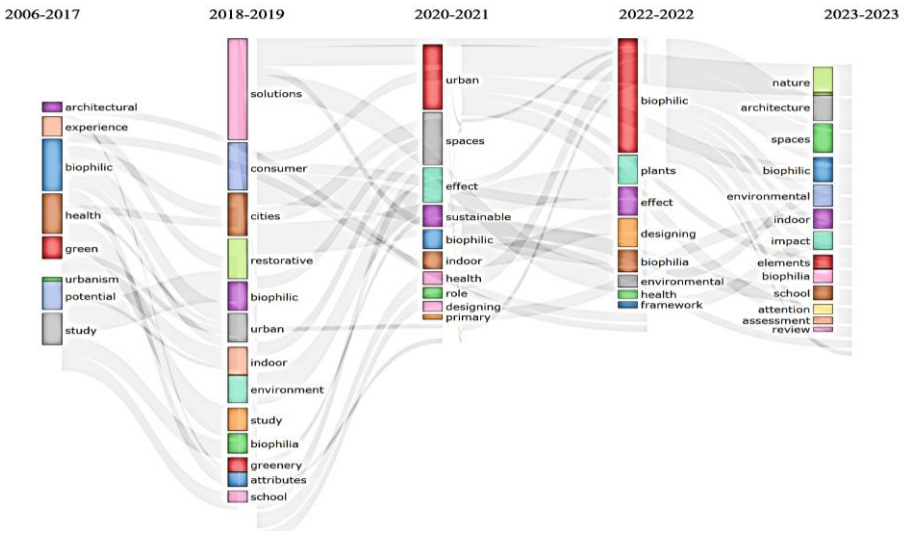


Figure 6. Thematic Transformation of the Most Frequently Used Words in Scientific Article Titles

In the realm of biophilic design, keywords used in the titles of scientific studies exhibit a thematic transformation over time, as illustrated in Figure 6. This image is a Sankey diagram reflecting the thematic transformation of the most frequently used terms in scientific article titles related to biophilic design. Each column represents a different time period and each color represents a different keyword. The position and width of the words in the column indicate their frequency of use during that period. The connections between the colors indicate the continuity

of the same words across different time periods or the emergence of new words. The word biophilic occupies an important place in all time periods, emphasizing its continuing importance.

On the other hand, new terms have emerged over time and some of them have lost their popularity. Urbanism and green are used more between 2006-2017, while terms such as nature and architecture are more common in the 2023-2023 period.

A thematic shift in the most frequently used keywords in the titles of scientific studies related to biophilic design is observed across **five distinct time periods:** 2006-2017, 2018-2019, 2020-2021, 2022, and 2023.

- In the 2006-2017 period, prominent keywords include architecture, experience, biophilic, health, green, urbanism, potential and study.
- In the 2018-2019 period, titles have increasingly featured words such as solutions, consumer, cities, restorative, biophilic, urban, indoor, environment, study, biophilia, greenery, attributes, and school.
- For the 2020-2021 period, the keywords that have gained prominence are urban, spaces, effect, sustainable, biophilic, indoor, health, role, design, and primary.
- In the year 2022, the standout keywords are biophilic, plants, effect, design, biophilia, environmental, health, and framework.
- Lastly, in the year 2023, the keywords that have gained prominence are nature, architecture, spaces, biophilic, environmental, indoor, impact, elements, biophilia, school, attention, assessment, and review.

These analyses show the emphases of biophilic design in different periods, its prominent subtopics and how it has evolved.

This research presents a bibliometric analysis of keywords in the titles of scientific studies in the field of biophilic design. The analysis reveals that the most frequently occurring words in the titles are biophilic and design. A noteworthy observation is the shifting emphasis of these keywords over the years. For instance, while architecture and experience were significant in the 2006-2017 period, the focus shifted to solutions and consumer in the 2018-2019 period. These evolutionary changes provide insights into how focal points in the field of biophilic design have developed over time. This information serves as a valuable guide for researchers in planning future studies.

The identification of the five periods is intended to more clearly analyze the thematic and theoretical transformations that have taken place in the biophilic design literature over time. This distinction highlights different stages of development in the discipline. The period 2006-2017 represents an initial period in which the foundations of biophilic design were laid and extensive studies were carried out. In this period, basic concepts such as architecture, green spaces and experience

DOI: 10.15320/ICONARP.2025.346

are at the forefront. In 2018-2019, the focus in the literature shifts to applied solutions, consumer behavior and restorative design. 2020-2021 is a period where issues such as health, indoor comfort and sustainability come to the forefront due to the impact of the COVID-19 pandemic. 2022 is a year in which environmental frameworks and the theoretical dimensions of biophilic plants are explored in more depth. 2023 focuses on the integration of nature into architecture, evaluation methods and the multidisciplinary effects of biophilic design.

This study aims to examine the impact of biophilic design on various disciplines through a bibliometric analysis. Our findings show that the words "biophilic" and "design" are used extensively in the literature, confirming that biophilic design is a fundamental approach to strengthen the relationship between human nature, as emphasized by Kellert and Calabrese (2015).

The results of the analysis show that biophilic design is not limited to the fields of architecture and design, but also intersects with other disciplines such as urban planning, environmental sciences, public health and workplaces. The frequent use of terms such as 'urban', 'green' and 'nature' in analysis is in line with the work of Beatley and Newman (2013) who emphasize the importance of integrating nature in urban spaces. This suggests that biophilic design not only has aesthetic value, but also has the potential to enhance urban sustainability and quality of life.

In recent years, biophilic design has played an important role in sustainable development and environmental sustainability (Totaforti, 2020). In particular, biophilic design has been shown to have positive effects on the health of employees in workplaces (Sanchez et al., 2018). Biophilic design has been observed to increase productivity, reduce stress and increase job satisfaction in workplaces (Gray & Birrell, 2014). Biophilic design also aims to maintain the human-nature connection by providing psychological benefits (Baldwin et al., 2011).

"The increasing use of the terms sustainability and health points to the positive effects of biophilic elements in improving indoor air quality and promoting psychological well-being in the studies by Wolverton et al. (1989). This supports that biophilic design can be an important tool for environmental and social sustainability.

The findings of the study on the role of technology and digital tools are in line with discussions by Pallasmaa (2014) on the potential of technology to enrich the human experience and connect with the natural world. Virtual and augmented reality applications can be used to rethink the ways in which biophilic design principles can be applied in interiors and urban environments.

This study also shows that biophilic design is a multidisciplinary field and bridges disciplines such as architecture, urbanism, psychology and environmental science. The theoretical foundations of biophilic design, beginning with Wilson's (1984) "Biophilia" hypothesis and continuing with Kellert's (2008) work, have evolved into practical applications and research initiatives, as bibliometric analysis findings show.

ICONARP – Volume 13, Issue 2 / Published: 31.12.2025

This bibliometric analysis reveals current research trends and conceptual emphases in the field of biophilic design. The findings of the study offer valuable insights into how this field can be expanded and deepened in future research. In particular, studies on the application of biophilic design in various disciplines such as health, education, urban planning and workplaces highlight the positive impacts of this approach on human well-being and environmental sustainability. Bibliometric analysis shows that biophilic design, the integration of natural elements with man-made environments, has direct positive impacts on the physical and mental health of individuals.

Future research should examine in more detail the effects of biophilic design on human behavior, health outcomes and social interactions. This is particularly important for the integration of technological advances and innovative uses of materials into biophilic design principles. There is also a need to understand how biophilic design can better align with ecological sustainability and biodiversity conservation strategies. In this context, the focus should be on the contribution of biophilic design to the development and protection of urban green spaces, air quality improvement and water management systems in cities.

Examining biophilic design in terms of cultural and geographical diversity can develop a comprehensive understanding of how this approach can be customized and applied in different communities and environments. Comparative studies on the perception and evaluation of biophilic design in different cultural contexts would further strengthen the universality and flexibility of this design approach.

Finally, economic evaluations and cost-effectiveness analyses of biophilic design can demonstrate not only the ecological and social benefits of this approach, but also its value in terms of economic sustainability. This would be an important step towards the widespread adoption and implementation of biophilic design.

Bibliometric analysis highlights the vast potential and versatility of biophilic design and provides a basis for how work in this field can expand in the future. Biophilic design will continue to be a rich field for both academic research and practical applications as an approach that strengthens the relationship between humans and nature, enhances health and well-being, and promotes ecological balance.

CONCLUSION

Biophilic design is gaining increasing importance in the scientific world as an approach that enhances quality of life by strengthening the emotional bond between humans and nature. This study examined the words appearing in the titles of scientific articles on biophilic design using bibliometric methods and revealed the fundamental trends in the field.

A total of 346 articles published in 184 journals in the Web of Science database between 2006 and 2023 were analyzed. The findings show that biophilic and design are the most frequently used terms. The frequency

DOI: 10.15320/ICONARP.2025.346

of the words urban, green, nature, and "architecture" reveals that biophilic design has a strong relationship with urban planning, sustainability, and architecture.

The frequent use of terms such as health, well-being, and cognitive shows that biophilic design has significant psychological and health effects, not just aesthetic ones. The words sustainable and environment emphasize that this approach is integrated with environmental awareness and ecological balance.

The analysis results reveal that biophilic design goes beyond architecture and intersects with disciplines such as environmental sciences, psychology, public health, and urban planning. Furthermore, the increasing use of concepts such as virtual and infrastructure shows that biophilic design is becoming increasingly important in digital environments as well.

Biophilic design has become a multidimensional field that integrates human health, sustainability, and technological innovation. This approach continues to shape the future of sustainable and human-centered spaces by strengthening the connection between nature and humans.

REFERENCES

Agboola, O. P., Olayemi, A. A., & Ajiboye, A. (2024). Assessing the effectiveness of biophilic design approach towards sustainable architecture. Nature Design and Innovation, Special Issue, 45–58. https://jomardpublishing.com/UploadFiles/Files/journals/NDI/SI2024/Agboola_et_al.pdf

Akyıldız, N. A., & Olğun, T. N. (2021). Darende/Balaban Geleneksel Yerleşim Dokusunda Biyofilik Tasarım İzlerinin İrdelenmesi. *Kent Akademisi*, *14*(3), 560–577. https://doi.org/10.35674/kent.983117

Al Sayyed, R. (2025). The impact of biophilic elements in full-scale virtual interiors on stress reduction. Journal of Digital Architecture and Design, 9(1), 55–70. https://doi.org/10.1016/j.jdades.2025.01.006

Alipour, L., & Khoramian, M. (2023). Investigating the impact of biophilic design on employee performance and well-being by designing a research instrument. *Kybernetes*, *ahead-of-print*,4431-4447 https://doi.org/10.1108/K-08-2022-1134

Arif, M., Kulonda, D. J., & Jones, J. (2021). The impact of biophilic design interventions on workplace satisfaction and productivity. Journal of Environmental Psychology, 76, 101640. https://doi.org/10.1016/j.jenvp.2021.101640

Arslan Selçuk, S., & Öztürk Akbıyık, S. (2023). A Bibliometric Analysis on Climate Change and Built Environments. *Planarch - Design and Planning Research*, *7*(1), 96–107. https://doi.org/10.5152/Planarch.2023.221736

Baldwin, R. F., Powell, R. B., & Kellert, S. R. (2011). Habitat as Architecture: Integrating Conservation Planning and Human Health. *Ambio*, *40*(3), 322–327. https://doi.org/10.1007/s13280-010-0103-7

Beatley, T. (2016). *Handbook of Biophilic City Planning & Design*. Island Press. https://books.google.com.tr/books

Berto, R., & Barbiero, G. (2017). *The Biophilic Quality Index. A Tool to Improve a Building from "Green" to Restorative. | Visions for Sustainability*. Visions for Sustainability, 8, 38-45. https://ojs.unito.it/index.php/visions/article/view/2333

Beukeboom, C. J., Langeveld, D., & Tanja-Dijkstra, K. (2012). Stress-Reducing Effects of Real and Artificial Nature in a Hospital Waiting Room. *The Journal of Alternative and Complementary Medicine*, *18*(4), 329–333. https://doi.org/10.1089/ACM.2011.0488

Bowler, D., Knight, L., & Pullin A. (2010). The Importance of Nature for Health: Is There A Specific Benefit Of Contact With Green Space? *In collaboration for Environmental Evidence Library.* www.environmentalevidence.org/SR40.html.

Browning, W. D., & Ryan, C. O. (2020). *Nature Inside: A biophilic design guide - William D. Browning, Catherine O. Ryan*. Routledge 1. https://books.google.com.tr

Browning, W. D., Ryan, C. O., & Clancy, J. O. (2014). *14 Patterns of Biophilic Design*. Terrapin Bright Green. https://www.terrapinbrightgreen.com/reports/14-patterns

Bulut, C., & Yıldız, F. (2024). Bibliometric analysis of laser powder bed additive manufacturing of high-entropy alloys: where are we and how far have we come? Progress in Additive Manufacturing, 1-20. https://doi.org/10.1007/s40964-024-00840-5

Büyükkıdık, S. (2022). A Bibliometric Analysis: A Tutorial for the Bibliometrix Package in R Using IRT Literature. *Eğitimde ve Psikolojide Ölçme ve Değerlendirme Dergisi*, *13*(3), 164–193. https://doi.org/10.21031/epod.1069307

Çavdar, E. (2021). Yeşil Lojistik: WoS Verilerine Dayalı Bibliyometrik Bir Analiz (2000-2021). *Econder International Academic Journal*, *5*(2), 359–373. https://doi.org/10.35342/econder.1006218

Chang, C. C., Cheng, G. J. Y., Nghiem, T. P. Le, Song, X. P., Oh, R. R. Y., Richards, D. R., & Carrasco, L. R. (2020). Social media, nature, and life satisfaction: global evidence of the biophilia hypothesis. In *Scientific Reports 2020 10:1* (Vol. 10, Issue 1). Nature Publishing Group. https://doi.org/10.1038/s41598-020-60902-w

Celik E, Durmus A, Adizel O, Nergiz Uyar H (2021) A bibliometric analysis: what do we know about metals(loids) accumulation in wild birds? Environ Sci Pollut Res 28:10302–10334. https://doi.org/10.1007/s11356-021-12344-8

Çelik E, Sarıboğa L (2023) Assessment of the role of birds in seed distribution: a bibliometric analysis of studies on this subject. In: Murat oduncuoğlu, Kurt APDHİ (eds) Recent advances in natural and engineering Sciences. *Livre de lyon*, Lyon, pp 29–53. http://dx.doi.org/10.5281/zenodo.14547581

Chen, Y., Xiong, K., Ren, X., & Cheng, C. (2022). An overview of ecological vulnerability: a bibliometric analysis based on the Web of Science database. *Environmental Science and Pollution Research*, *29*(9), 12984–12996. https://doi.org/10.1007/s11356-021-17995-1

DeLauer, V., McGill-O'Rourke, A., Hayes, T., Haluch, A., Gordon, C., Crane, J., Kossakowski, D., Dillon, C., Thibeault, N., & Schofield, D. (2022). The impact of natural environments and biophilic design as supportive and nurturing spaces on a residential college campus. *Cogent Social Sciences*, *8*(1), 1–19. https://doi.org/10.1080/23311886.2021.2000570

Derviş, H. (2020). Bibliometric Analysis using Bibliometrix an R Package. *Journal of Scientometric Research*, *8*(3), 156–160. https://doi.org/10.5530/jscires.8.3.32

Di Giuseppe, M. (2024). Biophilic design in immersive virtual environments: Evaluating spatial and emotional experiences through VR technology. Frontiers of Architectural Research, 13(2), 210–225. https://doi.org/10.1016/j.foar.2024.02.005

Dijkstra, K., Pieterse, M. E., & Pruyn, A. (2008). Stress-reducing effects of indoor plants in the built healthcare environment: The mediating role of perceived attractiveness. *Preventive Medicine*, *47*(3), 279–283. https://doi.org/10.1016/J.ypmed.2008.01.013

DOI: 10.15320/ICONARP.2025.346

Ellegaard, O., & Wallin, J. A. (2015). The bibliometric analysis of scholarly production: How great is the impact? *Scientometrics*, *105*(3), 1809–1831. https://doi.org/10.1007/S11192-015-1645-z

Ertin, T. D. G. , & Karakaya, A. B. (2022). Biyomorfik Form Ve Örüntülerden Esinlenen Tasarimlar Üzerine Bir Stüdyo Deneyimi. *SED-Sanat Eğitimi Dergisi*, *10*(1), 33–45. https://doi.org/10.7816/sed-10-01-03

Farruk h, M., Meng, F., Raza, A., & Tahir, M. S. (2020). Twenty-seven years of Sustainable Development Journal: A bibliometric analysis. *Sustainable Development*, *28*(6), 1725–1737. https://doi.org/10.1002/SD.2120

Girginkaya Akdağ, S. (2021). Biyofilik Tasarım ve Teknoloji Arakesitinde: Yeni Alışveriş Mekan ve Deneyimleri. *Kent Akademisi*, *14*(4), 1043–1058. https://doi.org/10.35674/kent.982905

Gray, T., & Birrell, C. (2014). Are Biophilic-Designed Site Office Buildings Linked to Health Benefits and High Performing Occupants? *International Journal of Environmental Research and Public Health*, *11*(12), 12204–12222. https://doi.org/10.3390/ijerph111212204

Guleria, D., & Kaur, G. (2021). Bibliometric analysis of ecopreneurship using VOSviewer and RStudio Bibliometrix, 1989–2019. *Library Hi Tech*, *39*(4), 1001–1024. https://doi.org/10.1108/LHT-09-2020-0218

Gür, M., & Kaprol, T. (2022). The Participation of Biophilic Design in the Design of the Post-Pandemic Living Space. *IGI Global*, 75–106. https://doi.org/10.4018/978-1-7998-6725-8.CH004

Hady, S. I. M. A. (2021). Activating biophilic design patterns as a sustainable landscape approach. *Journal of Engineering and Applied Science*, *68*(1), 1–16. https://doi.org/10.1186/S44147-021-00031-X

Hähn, N., Essah, E., & Blanusa, T. (2021). Biophilic design and office planting: a case study of effects on perceived health, well-being and performance metrics in the workplace. *Intelligent Building International*, *13*(4), 241–260. https://doi.org/10.1080/17508975.2020.1732859

Hung, S. H., & Chang, C. Y. (2021). Health benefits of evidence-based biophilic-designed environments: A review. *Journal of People, Plants, and Environment*, *24*(1), 1–16. https://doi.org/10.11628/KSPPE.2021.24.1.1

Hussein, H., Elkady, S., & Abd El-Razek, A. (2022). Enhancing learning environments through biophilic design strategies in educational buildings. Sustainability, 14(21), 13974. https://doi.org/10.3390/su142113974

Jabbarioun Moghaddami, H. (2019). *Re-thinking Biophilic Design Patterns In Preschool Environments For Children* [Master's thesis, Middle East Technical University]. *Open METU*. https://open.metu.edu.tr/handle/11511/45239

Karataş, T. (2020). Çevresel Sanat Uygulamalarının Sürdürülebilirliğe Katkısı ve Biyomimikri. Iğdır Üniversitesi Sosyal Bilimler Dergisi(24), 721-744. Retrieved from https://dergipark.org.tr/tr/pub/igdirsosbilder/issue/66831/1045320

Kellert, S. R. (2012). *Building for life: Designing and understanding the human-nature connection*. https://books.google.com/books

Kokol, P., Blažun Vošner, H., & Završnik, J. (2021). Application of bibliometrics in medicine: a historical bibliometrics analysis. *Health Information and Libraries Journal*, *38*(2), 125–138. https://doi.org/10.1111/HIR.12295

Köseoğlu, E., Katuk, D., Taşdemir, E., & Genç, H. (2023). A Bibliometric Analysis of Emotion at the Intersection of the Concepts of Biophilic and Design. *SAR Journal - Science and Research*, *6*(2), 61–72.

Kulak, M., & Gulmez-Samsa, C. (2023). Nanoparticles and medicinal plants: A visualized analysis of the core and theme content of the reports in the period

of 2018–2022. In V. Fotopoulos & G. Gohari (Eds.), *Engineered nanoparticles in agriculture: From laboratory to field* (pp. 59–92). De Gruyter. https://doi.org/10.1515/9781501523229-002

Liu, Z., Yang, Z., Osmani, M., Van Den Berg, P., Dane, G., & Birenboim, A. (2021). The relationship between sustainable built environment, art therapy and therapeutic design in promoting health and well-being. *International Journal of Environmental Research and Public Health, 18*(20), 10906.https://doi.org/10.3390/IJERPH182010906

McGee, B., Park, N. K., Portillo, M., Bosch, S., & Swisher, M. (2019). Diy Biophilia: Development of the Biophilic Interior Design Matrix as a Design Tool. *Journal of Interior Design*, *44*(4), 201–221. https://doi.org/10.1111/JOID.12159

Morawski, C., & Dunnington, C. L. (2021). Biophilia and visual art education: Two teachers narrate their own connections. *International Journal of Education and the Arts*, *22*(9), 1–26. https://doi.org/10.26209/IJEA22N9

Özğan, A. O., & Aluçlu, İ. (2023). Doğayla Uyumlu Mekânlar: Biyofilik Tasarımın Bibliyometrik Değerlendirmesi. *İdealkent*, *15*(41), 483–505. https://doi.org/10.31198/idealkent.1350785

Özğan, A.O. ve Aluçlu, İ. (2023). Biyofilik Tasarimin Akademik Değerlendirmesi. Türkiye Orman Bilimleri Dergisi, 7(2), 267-283. https://doi.org/10.32328/turkjforsci.1347473

Özğan, A. O. (2025). Integrating biophilic and patient-centered design: A healing architectural model for Turkish city hospitals [Doctoral dissertation, Dicle University, Institute of Science]. YÖK National Thesis Center. https://tez.yok.gov.tr/UlusalTezMerkezi

Pallasmaa, J. (2021). The embodied image: Imagination and imagery in architecture. Hoboken, NJ: Wiley.

Panagopoulos, T., Sbarcea, M., & Herman, K. (2020). A biophilic mind-set for a restorative built environment. *Landscape Architecture and Art, 17*, 68–77. https://doi.org/10.22616/j.landarchart.2020.17.08

Patra, S. K., Bhattacharya, P., & Verma, N. (2006). Bibliometric Study of Literature on Bibliometrics. *Desidoc Bulletin of Information Technology*, *26*(1), 27–32. https://doi.org/10.14429/dbit.26.1.3672

Peters, T., & D'Penna, K. (2020). Biophilic Design for Restorative University Learning Environments: A Critical Review of Literature and Design Recommendations. *Sustainability 2020, Vol. 12, Page 7064*, *12*(17), 7064. https://doi.org/10.3390/SU12177064

Peters, T., & Verderber, S. (2021). Biophilic Design Strategies in Long-Term Residential Care Environments for Persons with Dementia. *36*(3), 227–255. https://doi.org/10.1080/26892618.2021.1918815

Rodríguez-Soler, R., Uribe-Toril, J., & Valenciano, J. D. P. (2020). Worldwide trends in the scientific production on rural depopulation, a bibliometric analysis using bibliometrix R-tool. Land use policy, 97, 104787. https://doi.org/10.1016/j.landusepol.2020.104787

Relf, P. D. (2009). The therapeutic values of plants. Journal of Therapeutic Horticulture, 8(3), 235–237. https://doi.org/10.1080/13638490400011140

Rons, N. (2018). Bibliometric approximation of a scientific specialty by combining key sources, title words, authors and references. *Journal of Informetrics*, *12*(1), 113–132. https://doi.org/10.1016/j.joi.2017.12.003

Russo, A., & Andreucci, M. B. (2023). Raising Healthy Children: Promoting the Multiple Benefits of Green Open Spaces through Biophilic Design. *Sustainability 2023, Vol. 15, Page 1982*, *15*(3), 1982. https://doi.org/10.3390/SU15031982

DOI: 10.15320/ICONARP.2025.346

Sachs, N. A. (2022). E. O. Wilson: A Legacy of "Biophilia." *Health Environments Research & Design Journal*, *15*(4), 283–286. https://doi.org/10.1177/19375867221120409

Sanchez, J. A., Ikaga, T., & Sanchez, S. V. (2018). Quantitative improvement in workplace performance through biophilic design: A pilot experiment case study. *Energy and Buildings*, *177*, 316–328. https://doi.org/10.1016/j.enbuild.2018.07.065

Şenozan, M. I. (Muazzez I. Ş. (2018). *İnsan-mekan-doğa etkileşiminin sürdürülebilir bir öğretisi olarak biyofilik tasarım (Master's thesis).* Mimar Sinan Fine Arts University. Retrieved from http://acikerisim.msgsu.edu.tr/xmlui/handle/20.500.14124/1296

Sinemillioglu, M. O., Akin, C. T., & Karacay, N. (2010). Relationship Between Green Areas and Urban Conservation in Historical Areas and Its Reflections: Case of Diyarbakir City, Turkey. *European Planning Studies*, *18*(5), 775–789. https://doi.org/10.1080/09654311003612620

Soderlund, J., & Newman, P. (2016). Biophilic architecture: a review of the rationale and outcomes. *AIMS Environmental Science*, *2*(4), 950–969. https://doi.org/10.3934/environsci.2015.4.950

Söderlund, J., & Newman, P. (2017). Improving Mental Health in Prisons Through Biophilic Design. The *Prison Journal*, *97*(6), 750–772. https://doi.org/10.1177/0032885517734516

Stavrianos, A. (2016). Green inclusion: biophilia as a necessity. *British Journal of Special Education*, *43*(4), 416–429. https://doi.org/10.1111/1467-8578.12155

Tardast, Z., Meshkini, A., & Rajabi, A. (2021). Explain the Strategic Planning Model of Biophilic Tourism Case Study: Tehran Metropolis. *Urban Tourism*, *8*(2), 65–79. https://doi.org/10.22059/JUT.2021.299414.782

Tekin, M., Demirci, Z., & Aydın, S. (2025). Biophilic design in the built environment: Trends, gaps and future directions. Buildings, 15(14), 2516. https://doi.org/10.3390/buildings15142516

Totaforti, S. (2020). Emerging Biophilic Urbanism: The Value of the Human–Nature Relationship in the Urban Space. *Sustainability*, *12*(13), 5487–5503. https://doi.org/10.3390/su12135487

Varshabi, N., Selçuk, S. A., & Avinç, G. M. (2022). Biomimicry for Energy-Efficient Building Design: A Bibliometric Analysis. *Biomimetics 2022, Vol. 7, Page 21*, *7*(1), 21. https://doi.org/10.3390/biomimetics7010021

Vincent, E., Battisto, D., Grimes, L., & McCubbin, J. (2010). The Effects of Nature Images on Pain in a Simulated Hospital Patient Room. *Health Environments Research & Design Journal,* *3*(3), 42–55. https://doi.org/10.1177/193758671000300306

White, M. P., Alcock, I., Grellier, J., Wheeler, B. W., Hartig, T., Warber, S. L., Bone, A., Depledge, M. H., & Fleming, L. E. (2019). Spending at least 120 minutes a week in nature is associated with good health and wellbeing. *Scientific Reports 2019 9:1*, *9*(1), 1–11. https://doi.org/10.1038/s41598-019-44097-3

Wijesooriya, S. (2023). Biophilic design frameworks: A review of structure and applications. Frontiers of Architectural Research, 12, 100–115. https://doi.org/10.1016/j.foar.2023.04.002

Xian, N., & Wang, W. (2021). Research on Intelligent Facility Design of Medical Indoor Space Based on Barrier-free Design. *2021 2nd International Conference on Intelligent Design (ICID)*, 451–457. https://doi.org/10.1109/icid54526.2021.00095

Yang, S., Luo, J., Zou, W., Zhu, Q., Cen, J., & Gao, Q. (2024). Research trends in vascular chips from 2012 to 2022: a bibliometrix and visualized analysis. *Frontiers in Bioengineering and Biotechnology*, 12, 1409467. https://doi.org/10.3389/fbioe.2023.1409467

Zhong, Y. (2024). Implementing biophilic design in architecture through three-dimensional green façade applications. Building and Environment, 242, 111016. https://doi.org/10.1016/j.buildenv.2024.111016

Resume

Ali Osman Özğan completed his undergraduate education in 2013 at the Faculty of Architecture at Süleyman Demirel University. He received his master's degree in 2019 from the Institute of Science at Kahramanmaraş Sütçü İmam University. He completed his doctoral education in 2025 at the Department of Architecture at the Institute of Science at Dicle University. He has been working as a lecturer in the Interior Design Program, Department of Design, Technical Sciences Vocational School, Iğdır University since 2019. His academic research areas include biophilic design, architecture, interior organization, urban morphology, sustainable design, and the development of environmentally sensitive building materials and technologies. He is particularly engaged in research on patient-centered biophilic hospital design, nature-based spatial concepts, and user experience-focused interior design.

İclal Aluçlu completed her undergraduate studies at Dicle University, Faculty of Architecture in 1990, and her master's degree in the Department of Architecture at Dicle University Graduate School of Natural and Applied Sciences in 1993. She completed her doctoral studies in the Department of Architecture at Yıldız Technical University Graduate School of Natural and Applied Sciences in 2000. She started working as a Research Assistant at Dicle University, Faculty of Architecture in 1993 and currently works as a faculty member in the positions of Assistant Professor, Associate Professor, and Professor. Her main research areas include architecture, architectural design planning, and aesthetics in architecture.

DOI: 10.15320/ICONARP.2025.346

ICONARP
International Journal of Architecture and Planning
Received: 02.05.2025 Accepted: 01.12.2025
Volume 13, Issue 2/ Published: 31.12.2025
DOI: 10.15320/ICONARP.2025.347 E- ISSN:2147-9380

Research Article

ICONARP

Creative Design in Action: Exploring Basic Design Principles and Self-Assessment through Workshop Practice

Mümüne Selen Abbasoğlu*
Feriha Urfalı Doğu**

Abstract

The Basic Design course is a fundamental foundation in design education that introduces students to basic visual principles and creative problem-solving approaches. However, it creates challenges for students transitioning from traditional, rote-based learning environments to more abstract and conceptual thinking. The current study investigated how students comprehend and apply basic design principles through a workshop in the Basic Design I course at the European University of Lefke. The workshop, involving 81 first-year students from four design departments (Architecture, Interior Architecture and Environmental Design – Landscape Architecture – Visual Communication Design) and employed wire art as an applied vehicle for visualising and comprehending theoretical knowledge. The students underwent practical and reflective segments, allowing them to attain in-depth knowledge of design principles like balance, contrast, rhythm, symmetry, proximity, and unity. A guided survey was conducted after the workshop to identify student perceptions of these principles based on demographic factors like age, gender, and academic department. The results showed statistically significant perceptual differences depending on department, with the Visual Communication students especially having a more nuanced consciousness of visual principles. Age also showed significance, especially for the principle of proximity, as a sign of developmental or experiential processes in perception. Moreover, gender differences were found, and male and female students varied in sensitivity to the principles of contrast and symmetry. These findings support the need for integrating physical, three-dimensional workshops within foundation design education. They also highlight the diverse ways students of different backgrounds and disciplines learn about design. Future research must more comprehensively explore how spatial and material experience influences cognitive and creative growth within design learning spaces.

Keywords:
Basic design education, Creativity, Design principles, Self-Assessment, Interdisciplinary design

*Department of Interior Architecture and Environmental Design, Faculty of Architecture and Design, European University of Lefke, Lefke, Northern Cyprus

Email: sabbasoglu@eul.edu.tr

**Second Author's Affiliation: Department of Interior Architecture and Environmental Design, Faculty of Architecture and Design, European University of Lefke, Lefke, Northern Cyprus

Email: furfali@eul.edu.tr

To cite this article: Abbasoğlu, M., S., & Urfalı Doğu, F. (2025). Creative Design in Action: Exploring Basic Design Principles and Self-Assessment through Workshop Practice. *ICONARP International Journal of Architecture and Planning,* 13 (2), 827-849. DOI: 10.15320/ICONARP.2025.347

INTRODUCTION

The basic design course is the backbone of design departments but the designer candidates have great difficulty in understanding it. The basic design course, a specific and fundamental course for all disciplines related to design, is provided for students as a mandatory course in the first semester of their 1st year. It encompasses many departments such as architecture, interior design, graphic design, and industrial design in the faculties of architecture and fine arts (Sarıoğlu Erdoğdu, 2016). Although there are differences of scale and product between disciplines, basic design comprises the foundation for all of them.

While the course generally targets students gaining problem-solving abilities, from one perspective, this process focuses on teaching abstract and conceptual thinking. In this context, the basic design course plays an important role in the development of creativity (Aşkın, 2018, p.1) and develops students' imaginations. In this course teaching two- and three-dimensional abstract representative methods, generally gestalt design principles adapted from the perception psychology of the Bauhaus school are practiced (Sarıoğlu Erdoğdu, 2016).

In the basic design course, where design principles are taught theoretically and reinforced by practice, the design process is very important. In this process, designer candidates who have completed high school education find themselves within a new system. Contrary to the current rote-learning system, the course-producing work based on visual expression and targeting abstract and conceptual thinking and learning is a very difficult process for designer candidates. The first step in design education is to deal with the design process as a problem-solving action. It is possible to conceptually analyze real and given problems, bring them from the concrete to the abstract plane, produce ideas, and then convert them back to reality with basic design (Sarıoğlu Erdoğdu, 2016).

Within the scope of the course, students are required to learn the concepts of repetition, harmony, contrast, concept, unity, balance, equality, and emphasis among basic design principles; gestalt rules (visual perception rules) of proximity, similarity, continuity, integrity and symmetry; and concepts of point, line, orientation, form, scale, value, color and texture (Gürer & Güler, 2004) among basic design elements. The aim is to ensure the development of creativity among students and to teach methods to produce new and original solutions. Thus, the design process is developed through creativity and current modes of thinking may change (Denel, 1979; Bayraktar et.al., 2012). Recently basic design workshops are shaped by focusing on design principles and concepts and different practices have been notable in basic design courses (Erbay et.al., 2018). In this context, various practices like workshops and group projects are implemented in this course.

Moving from this point, in this study, within the scope of the 'Basic Design I' course, what students learned was tested with the workshop implemented at the end of the theoretical knowledge period. The aim of this workshop study is to question the effects of variables like age, sex,

DOI: 10.15320/ICONARP.2025.347

and department on the student's perceptions regarding design principles. In this context, the study proposed the following hypotheses:

1. There are significant differences between the perceptions towards the design principles of students from the visual communication department and students from other departments.

2. There are significant differences between the perceptions towards the design principles of students from the architecture department and students from the interior design department.

3.. There are significant differences between the perceptions towards the design elements like negative/positive space and proximity and other design elements among students.

4. There are significant differences between perceptions towards the design elements according to age.

5. There are significant differences in perceptions towards the design elements like contrast and symmetry between male and female students.

The structure of the article consists of a short introduction, defining the relevance of the study; literature review, examining the related research about the topic; methodology section, describing the methods used in the study; results and discussion part, indicating the results obtained from the survey and the conclusion, which summaries general results and outlines future research. Additionally, this study emphasizes the importance of self-assessment in basic design education, encouraging students to become active participants in evaluating their own learning and creative processes.

LITERATURE REVIEW

The Basic Design course is offered in many different disciplines where design education is provided. It is offered in the first half of the semester in schools offering design education, under different names like 'Basic Design', 'Visual Design', 'Foundation Courses' or 'Enseignement Pre´liminaire' and applied design, the course encourages creative and abstract thinking through collaborative and individual work in a studio environment. The pedagogy of the classical schools of design and architecture is also touched up on in this course (Boucharenc, 2006).

Despite the differences in name, the main purpose of the course is to teach the basic design elements and principles of visual design, including line, shape, space, value, texture, volume and color. Focusing mainly on Gestalt, perceptual theory is mentioned, and in the final section it is applied to various projects based on the basic design principles.

At this point, the basic course content of the American, Turkish and Cypriot schools whose syllabuses were obtained were examined and general conclusions were drawn. At this stage, the course contents of Tohono O'odham Community College, University of Texas at El Paso from America, Hacettepe University, Karadeniz Technical University, Osman Gazi University, Middle East Technical University and ITU Faculty of Architecture from Turkey, Lefke European University, Eastern Mediterranean University and Girne American University from the

Turkish Republic of Northern Cyprus were accessed and conclusions were drawn through examples (Chappel, 2024; Foerster, 2024).

As far as the course is concerned, in Turkey, basic design was first included as a course in the programme of the Istanbul Tatbiki Fine Arts Academy in 1957. (The name of the course in the programme is Basic Art Education) (Kaya, 2018). In the early period of the course's provision, its curriculum was analogous in Turkey and worldwide, with two-dimensional applications and the theoretical infrastructure generally supporting many design schools' basic design courses. In recent years, however, three-dimensional applications have assumed greater importance, and the number of two-dimensional applications has been reduced (Araz et al., 2015).

The course's experiential and hands-on approach, emphasizing practical learning, was identified as a pivotal element in facilitating student learning, fostering creativity, and challenging preconceived notions (Özkar & Steino, 2012; Erkan, 2006). In addition, studies have demonstrated that collaborative work in a shared environment significantly impacts the course, with social interaction contributing to learning outcomes (Krejins et al., 2004).

The following are the results of the curriculum analysis. The course curriculum includes the following topics:

- Elements of design: point, line, direction, size, shape, value, texture, color.
- Visual perception: figure-ground relationship, organization principles, proximity relationship, similarity, shape properties.
- Principles of design: balance, concept, contrast, harmony, hegemony, repetition, unity.
- Space, form and geometry: two and three-dimensional concepts (Akbulut, 2010).

Depending on the course content, the course process is enhanced through workshops in different schools, which facilitate the integration of theoretical and visual knowledge with real-life applications and the contribution of production to the perception of design. One such workshop was conducted within the METU Architecture and Planning department. The METU Architecture department offers Basic Design courses with a more concrete (environment) focus during certain periods (Özer, 1966; Özgüner, 1966; Erdoğdu, 2016).

An additional example was implemented at Bursa Orhangazi University. The students participating in this course were able to apply their theoretical knowledge to real-world scenarios by engaging in practical workshops utilizing clay and sand, which took place in an open-air setting. In the ITU Architecture Department, a sand study was conducted on the beach between 2007 and 2008 (Dursun et al., 2009; Şenel, A., & Onur Sönmez, N., 2014). The objective of this workshop was to facilitate the learning of natural materials and the execution of design exercises with them (Şenel, A., & Onur Sönmez, N., 2014). At Karadeniz Technical University, the workshops were conducted at different periods

DOI: 10.15320/ICONARP.2025.347

with the aim of investigating the question of whether there were any parallelism between the acquisition of basic design course and the design process (Ustaömeroğlu et al., 2015). One of the other workshops was applied to test whether the participants could use the course acquisitions on a concrete object or which acquisitions they would use more. The objective of this particular workshop was to explore the transformation of fundamental design principles into the realm of product and interior furniture design (Erbay et.al. 2018). In another workshop, students were instructed in the use of materials and colors to design an original composition. This study was conducted at Konya University in the fall semester of 2022-2023. The culmination of this educational endeavor entailed the practical application of the abstract concepts acquired throughout the academic year, manifesting in the creation of a composition that seamlessly integrated functionality and aesthetic appeal. (Azkur &Oral, 2023).

The structure of design education is to be founded upon compulsory theoretical and studio courses. The integration of unique activities, such as informal short-term studies and diverse group organizations, into the formal curriculum is posited as a means of engendering a more creative atmosphere for students (Kahvecioglu, 2007).

In addition to fostering an environment conducive to creativity for the students, a key characteristic of these workshops is the process of transferring the abstract knowledge acquired from the course to tangible designs. This transfer process, in turn, is integrated into the design applications on concrete objects. Concurrently, it is regarded as the inaugural step in acquiring the pertinent material. In these studies, a variety of teaching techniques are employed in the design course process and workshop studies.

A review of the extant literature reveals three distinct approaches: the short-term training method, learning by doing, and the action research method.

Short- Term training method; The definition of the workshop as an educational tool may be expressed as follows: "An educational meeting where a small group explores a subject, develops a skill or technique, or carries out a creative project, etc." Workshops represent a significant informal learning environment, offering an effective short-term training method that can be utilized in a diverse range of settings across a wide array of topics. (Brooks-Harris & Stock-Ward, 1999).

The learning by doing method is defined as a pedagogical approach that encompasses experiential learning activities and experiences for students, encouraging them to engage with and apply their knowledge in real-world contexts (Erbil, 2008). This approach is also holistic in nature, engaging students in all stages of the creative process and preparing them to effect change on a global scale through innovative design and forward-thinking (Learning by Doing: How Student Projects Give Architects and Designers Room to Grow, 2020). It is evident that the aforementioned educational environment facilitates experiential learning in the domains

of building area, structure, material and material handling (Şahin, 2013). Consequently, product construction constitutes a pivotal component in comprehending the design process. Consequently, construction is an integral element of the design process. The learning by doing method encompasses the following subjects: Thinking and doing, cooperation (teamwork, unity of purpose, awareness of responsibility), service to the community and communication skills (Şahin, 2013; Güzelçoban Mayuk & Coşgun, 2020).

Action research (AR) can be defined as a novel methodology for the systematic organization of teaching practice in emergent contexts. Currently, AR has been employed in several areas of higher education, especially to comprehend a phenomenon in depth that has no documented experiences. This methodology has been employed in various fields, including the comprehension of architectural concepts such as sustainability and architectural design (Kowaltowski et al., 2019), the development of collaborative research for the study of architectural design (Caldwell et al., 2016), and the utilization of virtual reality for spatial design in architecture (Nisha, 2019). In conclusion, action research can be defined as a method for understanding teaching as a research method through experience, reflection, and practice (Bausela Herreras, 2004; Morales, 2022).

Following a comprehensive review of the extant literature, it can be concluded that the overarching structure of the workshop study was formulated through the integration of the initial two methodologies within the purview of the study. The Short-Term Training method, which involves the execution of the study in small groups in an informal environment for a short-term period, and the Learning by Doing method, were amalgamated in the study, thereby giving rise to the method of the workshop study.

DESIGN AND CREATIVE DESIGN APPROACH

Emergence of the Basic Design Concept

Basic Design creates the required base for any professional design training and various departments like Graphic Design, Industrial Design, and Interior Design offer it as a common course (Kocadere & Özgen, 2012). The idea of the requirement for a foundation course for professional design training was proposed by the founders of the influential and famous design school Bauhaus in 1919 (Westphal, 1991).

''Bauhaus'', founded in Germany in 1919 by Walter Gropius was the first design education school. Gropius' Bauhaus aimed at creating handcrafts that combined architecture, sculpture, and pictures (Beşgen et all., 2015). Its main goal was to reinvent the tangible world in order to express the unification of all the arts, which was a novel concept (Griffith Winton, 2000; Beyaz & Erçin, 2023). The Nazi regime abolished the Bauhaus School in 1933, so many of the scholars continued to apply the Bauhaus philosophy in various countries (Lloyd Jones, 1969).

DOI: 10.15320/ICONARP.2025.347

Bauhaus aimed at integrating art through design into everyday life and combined fine arts and applied arts by removing the boundaries in between them (Feierabend & Fiedler, 2000). The conventional basic design instruction is arranged towards teaching visual composition through elements and principles (Kaya, 2018). The major aim of the basic design education course was to guide the students to integrate components like line, color, point in a coherent manner through fundamental design principles like contrast, emphasis, harmony, repetition, and balance (Thiel, 1981; Wong, 1993; Wender & Roger, 1995).

The basic design course is very crucial among the other design courses due to the fact that the freshmen design students first learn about the design phenomena in these courses (Denel, 1998, Abbasoğlu Ermiyagil & Urfalı Doğu, 2019). Saranlı (1998), Sausmarez (1983) and Teymur (1998) define the design education process by indicating that it gives way to various solutions through distinct points of views by encouraging originality in interpretation and expression. Studio environments are prepared for design courses where the students actively take part and are evaluated in everyday life projects. Instead of imitating 19th century old styles, the design courses deal with research that are entirely abstract and with studies that are not based on a specific function, (Sözen & Tanyeli, 1992). Currently, many basic design instructions inhibit and continue with this tradition and approach. Students are encouraged to make creative designs through the basic design courses and these abilities are supported with workshops.

Innovation Concept/ Creative Design Approach

According to the American Heritage Dictionary (2000), the term ''innovation'' originally comes from 'novus' which is a Latin word meaning 'new'. The word then turned into the verb 'in+novare' covering the meaning 'to make new'. Thus, basically 'to innovate' has the meaning of 'to begin or introduce (something new) for the first time' and resulted in having the meaning of 'the act of introducing something new'. Leonard and Swap (1999) define 'creativity' as ''... a process of developing and expressing novel ideas that are likely to be useful'', therefore, highlighting that innovation is the conclusion of a creative activity (Mutlu & Er, 2003).

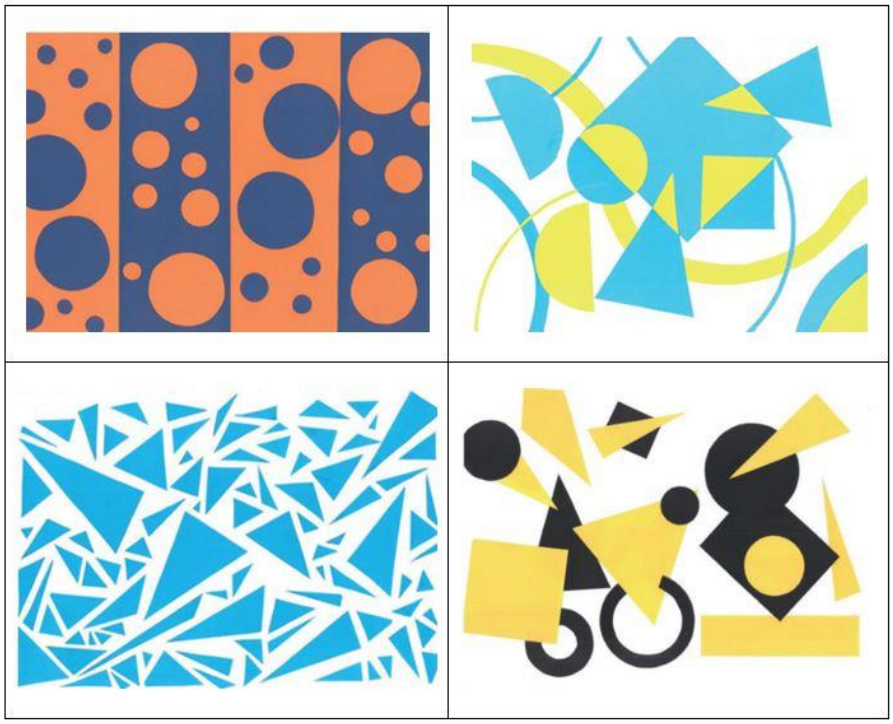
Being creative and original has always been the nature of basic design. Every designer candidate learns the idea of being creative during the design process in workshops. At this point, it is necessary for the student to accurately experience the design process. Participation during the course should be interactive, involving the exchange of ideas with the lecturers. Conversion of theoretical knowledge to abstract design is experienced in the studio environment during the design process and creativity plays an important role in this sense. The originality of the design idea of a product is closely linked to success.

Process of Basic Design Courses

Within the scope of the Basic Design I course, students are initially taught the theory of design elements and principles. Later, students perform 2-dimensional abstract studies using the presented design elements and principles (Table 1, Table 2, Table 3, Table 4). The course mainly continues in this way until the first half of the semester.

Table 1. Two Dimensional Works demonstrating Figure-Ground Relationship (Source: Authors).

Table 2. Two Dimensional Works demonstrating Harmony & Contrast (Source: Authors).



DOI: 10.15320/ICONARP.2025.347

Table 3. Two Dimensional Works demonstrating Rhythm & Repetition (Source: Authors).

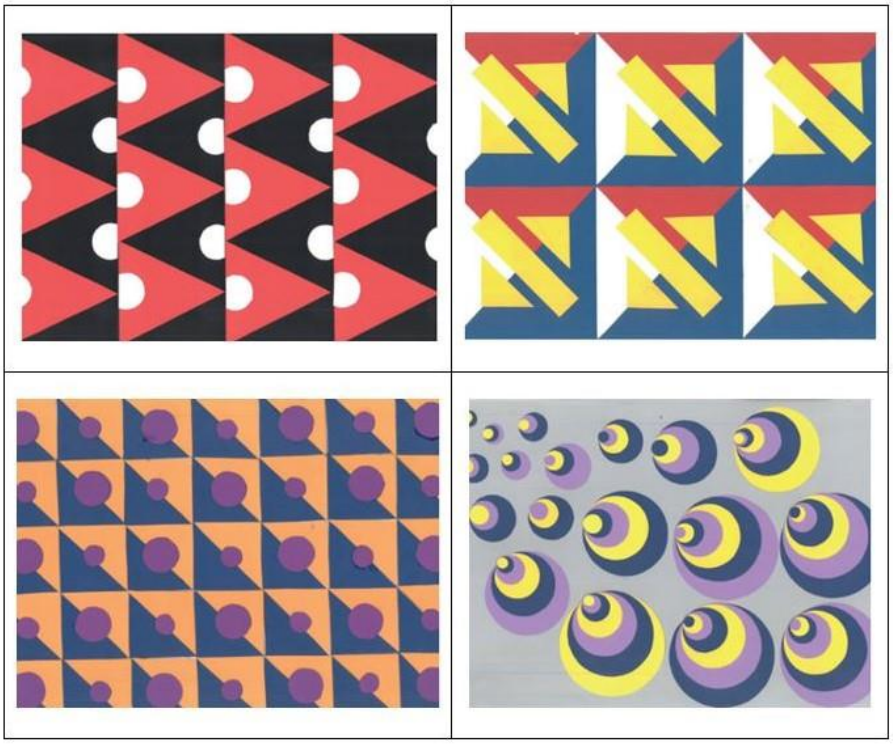
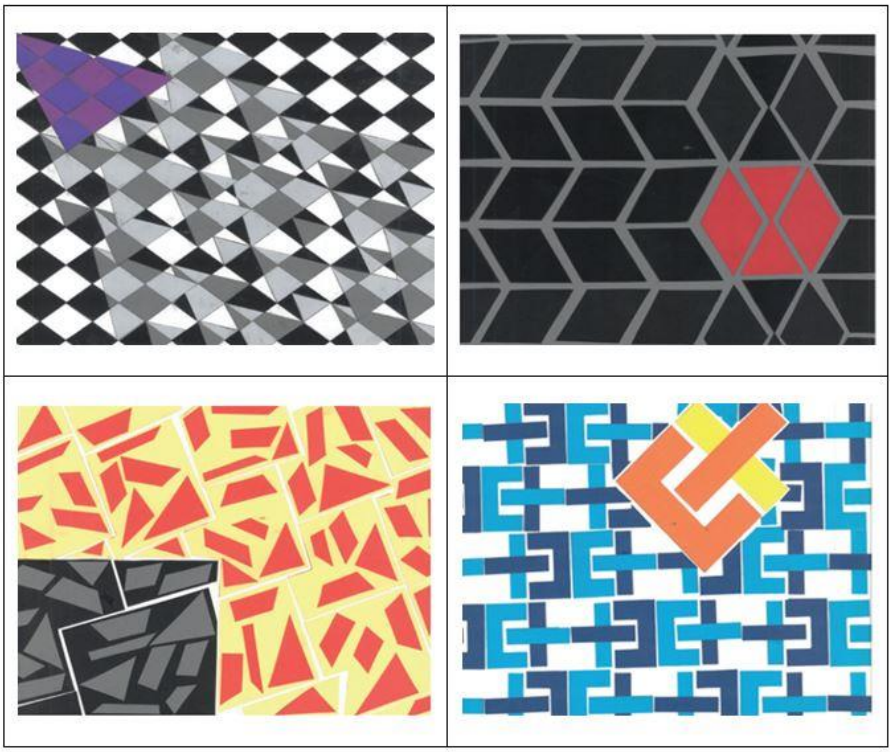


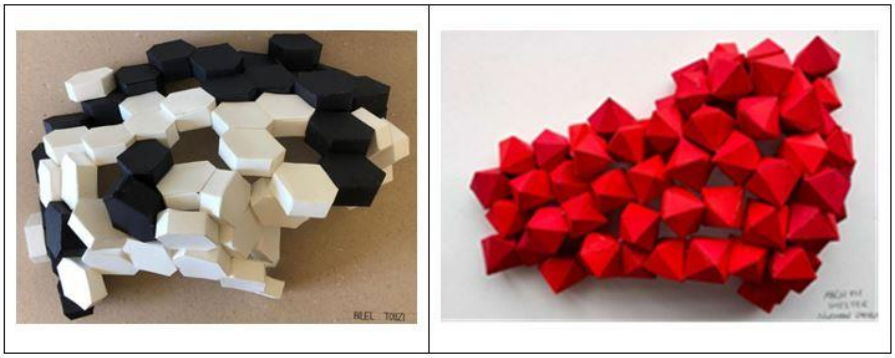
Table 4. Two Dimensional Works demonstrating Emphasis & Unity & Balance (Source: Authors).



After covering two-dimensional studies, the course continues with 3-dimensional studies. Visualization of the theoretical knowledge acquired in 3 dimensions assists students to better understand these principles. In this context, space studies are performed with the acquired knowledge accumulation. The aim is to revive the basic design principles in an

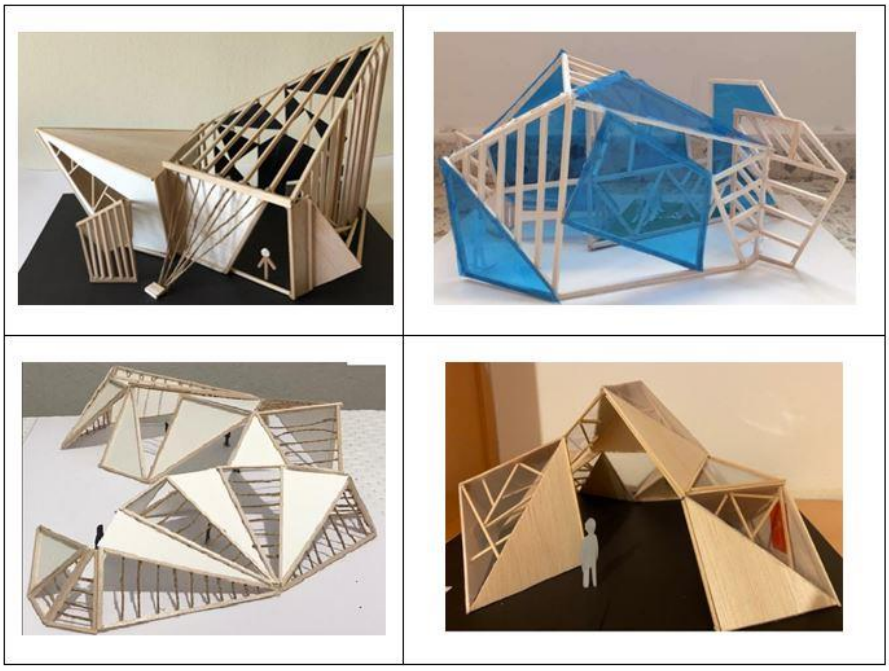
abstract way in space. With this aim, the students complete abstract studies related to daily life depending on the concept of space. Immediately after this, the space concept is supported with the topic of shelter. In the current study, students were requested to create their own original forms and multiply these for shelter designs. With the condition of designing abstract units. Students experience the case of space for the first time by designing a single unit shelter. Table 5 demonstrates some of the student works about shelter, produced in the Arch 151 course during the 2021-2022 fall semester.

Table 5. Students' Shelter Works (Source: Authors).



In the next stage, the course continues with the topic of creating architectural spaces. In this project, students experience the topic of architectural space using different units and various materials. Table 6 below shows some student works regarding the architectural space topic created during the 2021-2022 fall semester. With this study, the load-bearing system for space was also conceptualized. The abstract studies continue to be supported by workshops.

Table 6. Architectural Space Works (Source: Authors).



DOI: 10.15320/ICONARP.2025.347

Many workshops on space are offered during the design week which is traditionally held every year by our faculty. This ensures that the students strengthen their knowledge. In these workshops, students are asked to produce 1:1 scale space studies (Table 7). The students experience designing shelters with realistic scales of the space and thus, raise awareness.

Table 7. 1/1 Scale Architectural Space Works (Source: Authors).


METHODOLOGY

In relation to the literature review, there are numerous advantages to learning by doing and short-term training methods. The rationale behind the selection of these methodologies was to enhance students' creativity, facilitate knowledge exchange, and promote collaborative learning and experiential learning in the design and production processes. Consequently, it was determined to develop a workshop study that would be conducted in a manner independent from the course studies. The study's structure was devised by integrating these methodologies. The primary rationale for incorporating the workshop study into the course framework was to facilitate the transformation of abstract designs into concrete applications, drawing upon the experiential knowledge of the course instructors. To this end, the concept of eliminating deficiencies was elucidated through an examination regarding the aims and outcomes of the applied workshops.

In the context of this study, a questionnaire was administered to students enrolled in the 2020–2021 fall semester basic design studio course. The utilization of a structured survey was driven by its capacity to expedite data collection and reach a substantial audience. The survey was disseminated to first-year undergraduate architecture students enrolled in basic design course during the current semester. The survey was administered to undergraduate students enrolled in the European University of Lefke's Faculty of Architecture and Design, specifically from four distinct departments: 24 architecture, 11 interior design, 14 graphic design and 5 visual communication. A total of 81 students participated in the survey, which was divided into two sections.

In the first part, students' demographic data, including gender, age, and department, was collected. The second section of the survey related to the perceptual evaluation of student projects by their peers. The evaluation of all projects was conducted by the students who attended

the workshop. The Likert scale, a method of data collection that employs a five-point rating system, was utilized to assess each project. The indicators presented in the questionnaire are based on the degree of visual perception, which in turn is represented by proportion, repetition, rhythm, harmony, contrast, emphasis, balance, unity, negative/positive, proximity, similarity, continuity, symmetry, and enclosure.

Workshops are important tools in the basic design courses to give a clearer understading for the students to increase visual perception and creativity. It is known that theoretical knowledge is more easily perceived through products emerging from workshop studies. In this context, the theoretical knowledge taught during the basic design course in the Faculty of Architecture and Design at the European University of Lefke is interrogated with these workshops. The study included students from four different disciplines, interior design, architecture, graphic design and visual communication, departments. The interdisciplinary workshops, with the participation of students from four different disciplines, involve the original aspect of the research.

The workshop also encouraged both peer and self-assessment to strengthen reflective learning. Following the completion of the practical phase, each student was asked to evaluate their own creative process in terms of how effectively they applied the design principles. This reflective component aimed to foster metacognitive awareness, self-regulation, and a deeper understanding of visual perception in line with the perspectives of Braund & DeLuca (2018) and Wanner & Palmer (2018). As emphasized by Masatlıoğlu and Balaban (2024), "reflective thinking and self-assessment processes play a crucial role in fostering students' awareness of their own design decisions and creative growth within the architectural studio environment." In accordance with this understanding, the reflective self-assessment stage was completed through guided prompts such as: "Which design principles did I use effectively?", "What visual relationships were hardest to express in 3D form?", and "How can I improve my next design study?" Students' responses were documented qualitatively and compared with peer evaluations to identify overlaps and divergences in perception. The general structure of the study can be seen in the flowchart below (Figure 1).

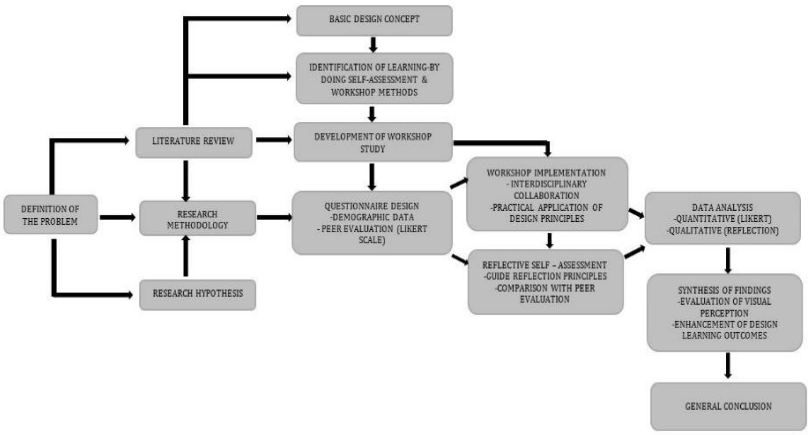


Figure 1. Flowchart of the methodology (created by authors). (created by authors).

DOI: 10.15320/ICONARP.2025.347

Definition and Method of Workshop Studies

Workshops are included in the basic design courses for the students to better understand the current system and to increase visual perceptions and creativity. It is known that theoretical knowledge is more easily perceived through products emerging from workshop studies. In this context, the theoretical knowledge taught during the basic design course in the faculty of architecture and design at the European University of Lefke is interrogated with these workshops. The study included students from four different disciplines, architecture, interior design, visual communication, and graphic design departments. The interdisciplinary workshops, with the participation of students from four different disciplines, comprise the original aspect of the research.

The workshop considered artistry in the present day and wire art as a tool to visualize theoretical knowledge. Wire art is a form of art, with a history dating back thousands of years, based on obtaining several products using different types of metal wires like iron, aluminium, and copper. In this workshop, students developed working skills with wires using basic design principles and simple tools like pliers and wire cutters.

This workshop was carried out in three phases (Figure 2):

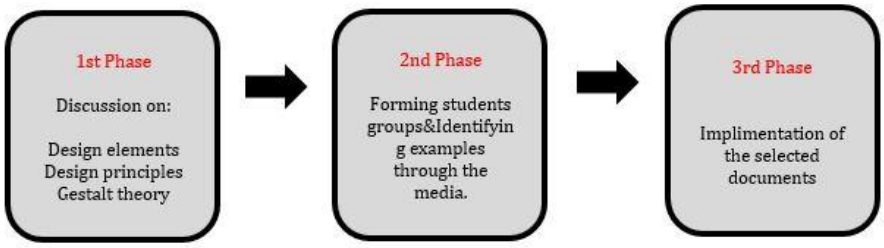


Figure 2. Phases of The Workshop (created by authors).

First stage: Discussions were carried out about different examples, repeating the conceptual framework and knowledge explained within the scope of the basic design course. In this context, basic design elements like point, line, scale, orientation, interval, color, and texture; basic design principles like repetition, harmony, rhythm, contrast, emphasis, balance, and unity; and gestalt perception concepts (Lang et al., 1974; Lang, 1987; Gürer, 1990; Güngör, 2005; Gökaydın, 2010) like shape-floor, proximity, similarity, and enclosure were summarized and explained in short and supported with examples (Erbay et al., 2018).

Second stage: After repeating the conceptual framework and knowledge, students were requested to form groups within their own disciplines and to research their own examples through media. Within the scope of the course, the 81 students from 4 different disciplines were grouped within their own disciplines. A variety of examples reflecting architecture, interior design, graphic communication, and visual communication departments in media, were identified together with the lecturers. The selection of contemporary art examples was made with great care, with the aim of identifying works that demonstrate an abstract interpretation of fundamental design principles. These principles, which underpin all forms of design, encompass aspects such as balance,

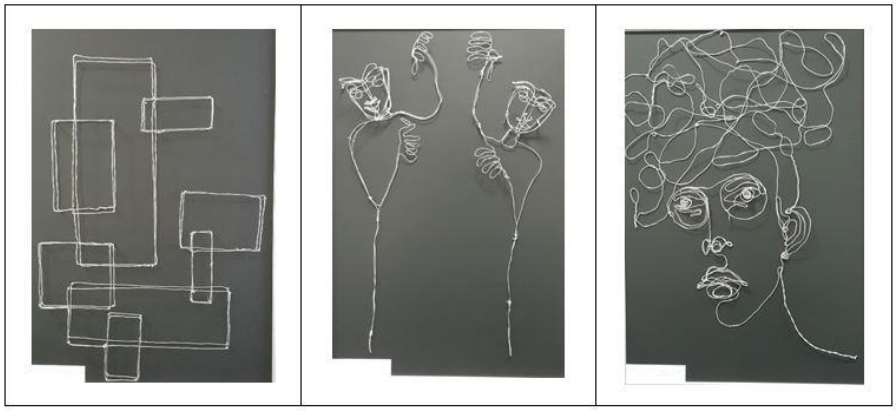
composition, visual aesthetics and the way in which a design engages with its audience. (Galchynska et al., 2023).

Third stage: This stage was the implementation stage. Each group was given pliers, wire, and 70 x 100 scale foam cardboard as working tools. Later, the chosen example studies were applied to the foam cardboard using wire elements. At the end of the workshop, a total of 15 different wire projects were produced (Table 8 shows 3 examples of these projects).

Data obtained at the end of the workshop were entered into the SPSS program for analysis. In accordance with the aim of the research, the accuracy of the hypotheses was interrogated.

In this context, the research scope included a total of 54 students who attended the course and the projects they produced. A survey was conducted with these students about how they perceived the theoretical knowledge and the degree to which they perceived this knowledge (basic design principles and gestalt perception principles) taught within the scope of the basic design course. At the end of the questionnaire, the data obtained were discussed within the scope of the study.

Table 8. Some Workshop Examples (Source: Authors).



RESULTS AND DISCUSSION

In this part, firstly demographic data is provided. Demographic data like gender, age, and the department of the students was collected through the questionnaire. Undergraduate students from the European University of Lefke, in Lefke, were selected from The Faculty of Architecture and Design from 4 different departments (24 architecture, 11 interior design, 14 graphic design and 5 visual communication first year students pursuing their bachelor degrees). The demographic data of the groups were similar regarding gender containing 53,7% males and 46,3% females. 44,4 % architecture students, 20,4% interior design students, 25,9% graphic design students, and 9,3% from the visual communication department. The students ages varied between 18 to 26 years. The age groups consisted of 18 to 20 years and this made up 57,4% of the groups, another group consisted of 21 to 23 year olds and this made up 31,5% of the students, and finally the remaining 11,1% of the students were 24 to 26 year olds (Table 9).

DOI: 10.15320/ICONARP.2025.347

Table 9. Demographic Information (created by authors).

Demographic Information		
Gender	Number	Percent
Female	25.0	46.3
Male	29.0	59.7
Department	Number	Percent
Architecture	24	44.4
Interior Architecture	11	20.4
Graphic Design	14	25.9
Visual Communication	5	9.3
Age	Number	Percent
18-20	31	57.4
21-23	17	31.5
24-26	6	11.1
27-29	0	0
30-32	0	0
Total	54	100

The second part is a perceptual evaluation of the students about student projects. All the projects were evaluated by the students who attended the workshop. The second part includes the perceptual evaluation of all the projects by all the students who attended the workshop. Table 10 demonstrates the distribution of the scores through the 5-point Likert scale. Indicators are presented in the tables in the findings section and the scales depend on the degree of visual perception (representing proportion, repetition, rhythm. harmony, contrast, emphasis, balance, unity, negative/positive, proximity, similarity, continuity, symmetry, enclosure).

Table 10. Likert Scale Description (created by authors).

Likert Scale Description	Likert Scale
Strongly Disagree	1
Disagree	2
Neutral/Uncertain	3
Agree	4
Strongly Agree	5

In the evaluation section, design principles were accepted as "dependent variables" and gender, departments and age were accepted as "independent" variables. There are different reliability tests but the Cronbach alpha, which is the most widely used nowadays, was applied in this study. The reliability test for responses to the questionnaire obtained with the Cronbach's alpha method is shown in Table 11. This test is also suitable for use with Likert-type scales. According to the Cronbach alpha test in Table 3, the reliability value for the semantic differential scale average of eight design principles and 54 questions was 0.964. Cronbach (1951), and Panayides (2013) stated that the alpha reliability coefficients for all items can be accepted as "reliable" when they are above 0.70. The test results show that Cronbach's alpha is above the threshold of 0.7 recommended by Hair et al., (1998), Cronbach (1951), and Panayides (2013) as reliability statistics indicate that the overall level is .964 meaning that the measurement items in this study are reliable (Alotaibi,

2023). The Cronbach alpha coefficient in this study was above this value and this indicates the semantic differential scale was reliable.

Table 11. Table Dependent Variable Reliability Test Results (created by authors).

Reliability Statistics	
Cronbach's Alpha	N of Items
.964	143

Within the scope of the research, the t-test analysis was used to reveal the differences in the perception of design principles (dependent variables) according to the independent variable of gender. The results of the analysis found statistically significant differences between males and females for the design principles of repetition, contrast, and symmetry (Table 12).

Table 12. Test Results for Difference in Gender (created by authors).

Test Results for Difference in Gender										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
Dependent Variables		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Proportion	Equal variances assumed	1.944	0.169	-0.873	52	0.387	-1.876	2.150	-6.189	2.437
	Equal variances not assumed			-0.860	46.391	0.394	-1.876	2.182	-6.267	2.516
Repetition	Equal variances assumed	0.016	0.899	-2.251	52	**0.029**	-4.997	2.220	-9.452	-0.542
	Equal variances not assumed			-2.258	51.388	0.028	-4.997	2.213	-9.440	-0.555
Rhythm	Equal variances assumed	0.000	0.989	-1.403	52	0.167	-3.495	2.491	-8.494	1.503
	Equal variances not assumed			-1.417	51.985	0.162	-3.495	2.466	-8.444	1.453
Harmony	Equal variances assumed	0.674	0.416	-0.636	52	0.528	-1.072	1.686	-4.456	2.312
	Equal variances not assumed			-0.642	51.966	0.524	-1.072	1.671	-4.424	2.281
Contrast	Equal variances assumed	1.332	0.254	-3.360	52	**0.001**	-7.172	2.135	-11.456	-2.888
	Equal variances not assumed			-3.308	46.210	0.002	-7.172	2.168	-11.537	-2.808
Emphasis	Equal variances assumed	5.681	0.021	-1.292	52	0.202	-3.476	2.690	-8.874	1.922
	Equal variances not assumed			-1.261	42.876	0.214	-3.476	2.755	-9.033	2.081
Balance	Equal variances assumed	2.311	0.135	-1.888	52	0.065	-4.052	2.146	-8.358	0.254
	Equal variances not assumed			-1.854	45.056	0.070	-4.052	2.186	-8.455	0.351
Unity	Equal variances assumed	0.020	0.887	-0.375	52	0.709	-0.709	1.891	-4.503	3.085
	Equal variances not assumed			-0.371	47.848	0.712	-0.709	1.911	-4.553	3.135
Negative/ Positive	Equal variances assumed	0.076	0.784	0.833	52	0.409	2.446	2.935	-3.445	8.336
	Equal variances not assumed			0.831	50.178	0.410	2.446	2.944	-3.467	8.358
Proximity	Equal variances assumed	1.112	0.297	-1.285	52	0.205	-3.668	2.855	-9.396	2.061
	Equal variances not assumed			-1.276	49.052	0.208	-3.668	2.875	-9.445	2.110
Similarity	Equal variances assumed	0.564	0.456	-1.082	52	0.284	-2.623	2.424	-7.488	2.241
	Equal variances not assumed			-1.079	50.105	0.286	-2.623	2.432	-7.508	2.261
Continuity	Equal variances assumed	0.950	0.334	-1.221	52	0.227	-2.310	1.892	-6.106	1.486
	Equal variances not assumed			-1.199	45.023	0.237	-2.310	1.927	-6.192	1.571
Symmetry	Equal variances assumed	1.920	0.172	-2.497	52	**0.016**	-6.687	2.677	-12.060	-1.314
	Equal variances not assumed			-2.478	48.826	0.017	-6.687	2.699	-12.111	-1.263
Enclosure	Equal variances assumed	28.707	0.000	-0.455	52	0.651	-1.422	3.123	-7.688	4.844
	Equal variances not assumed			-0.435	34.248	0.666	-1.422	3.266	-8.058	5.214

In the second stage, the effects of the department on the dependent variables were interrogated. As the number of departments was more than two, a one-way analysis of variance (ANOVA) test was applied to analyze the interactions with dependent variables, instead of the t-test. As a result of the analysis, which departments and design principles

DOI: 10.15320/ICONARP.2025.347

induced significant differences in the theoretical knowledge were questioned. The theoretical knowledge was examined according to each department and also about which design principles indicated significant differences. Within this context, according to Table 13, significant variations in perceptions of negative/positive space, proximity, continuity, and enclosure principles were identified according to different departments.

Table 13. ANOVA Results for Difference regarding Departments (created by authors).

ANOVA Results for Difference regarding DEPARTMENTS						
		Sum of Squares	df	Mean Square	F	Sig.
Proportion	Between Groups	293.683	3	97.894	1.643	0.191
	Within Groups	2979.354	50	59.587		
Repetition	Between Groups	335.263	3	111.754	1.624	0.196
	Within Groups	3441.496	50	68.830		
Rhythm	Between Groups	411.456	3	137.152	1.679	0.183
	Within Groups	4084.470	50	81.689		
Harmony	Between Groups	189.943	3	63.314	1.748	0.169
	Within Groups	1810.890	50	36.218		
Contrast	Between Groups	474.349	3	158.116	2.326	0.086
	Within Groups	3398.466	50	67.969		
Emphasis	Between Groups	284.491	3	94.830	0.962	0.418
	Within Groups	4929.509	50	98.590		
Balance	Between Groups	163.377	3	54.459	0.832	0.482
	Within Groups	3271.882	50	65.438		
Unity	Between Groups	301.668	3	100.556	2.285	0.090
	Within Groups	2200.703	50	44.014		
Negative/Positive	Between Groups	1142.458	3	380.819	3.844	**0.015**
	Within Groups	4953.042	50	99.061		
Proximity	Between Groups	1673.782	3	557.927	6.648	**0.001**
	Within Groups	4196.310	50	83.926		
Similarity	Between Groups	585.452	3	195.151	2.703	0.055
	Within Groups	3609.882	50	72.198		
Continuity	Between Groups	581.846	3	193.949	4.878	**0.005**
	Within Groups	1988.025	50	39.760		
Symmetry	Between Groups	542.881	3	180.960	1.787	0.162
	Within Groups	5062.452	50	101.249		
Enclosure	Between Groups	1463.762	3	487.921	4.542	**0.007**
	Within Groups	5370.997	50	107.420		

In the following stage, the Tukey test was applied with the aim of revealing which departments perceived the principles differently. The perception of the 4 design principles identified with the ANOVA test was analyzed for all departments. Differences between the means in these groups were numerically identified. The star (*) beside these numerical values indicate a significant difference between the two means. When Table 14 is evaluated, negative/positive space, proximity, continuity, and enclosure (dependent variables) were mostly perceived differently by students in the visual communication department compared to students from other departments. The table below shows which department is significantly different from other departments for each construct.

Table 14. Tukey HSD - Multiple Comparisons Table (created by authors).

Tukey HSD - Multiple Comparisons							
Dependent Variable			Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Negative/Positive	Architecture	Interior Architecture	0.576	3.624	0.999	-9.06	10.21
		Graphic	-0.333	3.347	1.000	-9.23	8.56
		Visual Communication	15,867*	4.893	0.011	2.86	28.87
	Interior Architecture	Architecture	-0.576	3.624	0.999	-10.21	9.06
		Graphic	-0.909	4.010	0.996	-11.57	9.75
		Visual Communication	15,291*	5.368	0.031	1.02	29.56
	Graphic	Architecture	0.333	3.347	1.000	-8.56	9.23
		Interior Architecture	0.909	4.010	0.996	-9.75	11.57
		Visual Communication	16,200*	5.185	0.015	2.42	29.98
	Visual Communication	Architecture	-15,867*	4.893	0.011	-28.87	-2.86
		Interior Architecture	-15,291*	5.368	0.031	-29.56	-1.02
		Graphic	-16,200*	5.185	0.015	-29.98	-2.42
Proximity	Architecture	Interior Architecture	3.273	3.336	0.761	-5.59	12.14
		Graphic	-1.929	3.081	0.923	-10.12	6.26
		Visual Communication	18,400*	4.504	0.001	6.43	30.37
	Interior Architecture	Architecture	-3.273	3.336	0.761	-12.14	5.59
		Graphic	-5.201	3.691	0.500	-15.01	4.61
		Visual Communication	15,127*	4.941	0.018	2.00	28.26
	Graphic	Architecture	1.929	3.081	0.923	-6.26	10.12
		Interior Architecture	5.201	3.691	0.500	-4.61	15.01
		Visual Communication	20,329*	4.773	0.001	7.64	33.01
	Visual Communication	Architecture	-18,400*	4.504	0.001	-30.37	-6.43
		Interior Architecture	-15,127*	4.941	0.018	-28.26	-2.00
		Graphic	-20,329*	4.773	0.001	-33.01	-7.64
Continuity	Architecture	Interior Architecture	-2.549	2.296	0.685	-8.65	3.55
		Graphic	3.673	2.121	0.318	-1.96	9.31
		Visual Communication	8,342*	3.100	0.046	0.10	16.58
	Interior Architecture	Architecture	2.549	2.296	0.685	-3.55	8.65
		Graphic	-1.123	2.541	0.971	-7.88	5.63
		Visual Communication	10,891*	3.401	0.012	1.85	19.93
	Graphic	Architecture	3.673	2.121	0.318	-1.96	9.31
		Interior Architecture	1.123	2.541	0.971	-5.63	7.88
		Visual Communication	12,014*	3.285	0.003	3.28	20.74
	Visual Communication	Architecture	-8,342*	3.100	0.046	-16.58	-0.10
		Interior Architecture	-10,891*	3.401	0.012	-19.93	-1.85
		Graphic	-12,014*	3.285	0.003	-20.74	-3.28
Enclosure	Architecture	Interior Architecture	5.519	3.774	0.467	-4.51	15.55
		Graphic	-3.494	3.485	0.749	-12.76	5.77
		Visual Communication	14,792*	5.095	0.027	1.25	28.33
	Interior Architecture	Architecture	-5.519	3.774	0.467	-15.55	4.51
		Graphic	-9.013	4.176	0.149	-20.11	2.08
		Visual Communication	9.273	5.590	0.356	-5.58	24.13
	Graphic	Architecture	3.494	3.485	0.749	-5.77	12.76
		Interior Architecture	9.013	4.176	0.149	-2.08	20.11
		Visual Communication	18,286*	5.400	0.007	3.94	32.64
	Visual Communication	Architecture	-14,792*	5.095	0.027	-28.33	-1.25
		Interior Architecture	-9.273	5.590	0.356	-24.13	5.58
		Graphic	-18,286*	5.400	0.007	-32.64	-3.94

In Table 14, two-way comparisons were performed between the three different age groups, and numerical differences between the mean values for the groups were provided. As can be seen, there were significant differences in the means of these two-way comparisons. given. In other words, there were significant differences in the means in these two-way comparisons.

Table 15. ANOVA Results for Difference regarding Age (created by authors).

Multiple Comparisons - Tukey HSD							
Dependent Variable			Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Proximity	18-20	21-23	0.786	2.957	0.962	-6.35	7.92
		24-26	13,737*	4.371	0.008	3.19	24.29
	21-23	18-20	-0.786	2.957	0.962	-7.92	6.35
		24-26	12,951*	4.653	0.020	1.72	24.18
	24-26	18-20	-13,737*	4.371	0.008	-24.29	-3.19
		21-23	-12,951*	4.653	0.020	-24.18	-1.72

DOI: 10.15320/ICONARP.2025.347

In the next stage, the Tukey test was performed with the aim of determining differences regarding age intervals in terms of perception. Table 15 shows which age group was significantly different from the other age groups regarding proximity.

CONCLUSIONS

The basic design course, which is common in a number of different disciplines, represents a pivotal component within the broader framework of design education. In the context of this study, a workshop was conducted as part of the Basic Design I course, which is offered in the first semester at the Faculty of Architecture and Design at the European University of Lefke. The study utilized visual analysis and survey methods to examine the impact of variables such as age, sex, and department on students' perceptions of design principles. The data obtained were entered into the SPSS programme for analysis. The results obtained in this analysis are reported below and are related to the hypotheses.

- A significant difference was observed between the perceptions of design principles exhibited by students from the visual communication department and those from other departments. In line with the hypothesis, these findings indicate variations in the perception of basic design principles among different academic departments.
- A significant inequality was identified in the perceptions of design elements, such as negative/positive space and proximity, when contrasted with other design elements among the students. Concurrently, substantial disparities were identified between perceptions of design elements such as continuity and enclosure and other design elements among students. The hypothesis was confirmed within the scope of the study.
- Furthermore, significant variations were observed in relation to the age variables, with the proximity design element demonstrating distinct differences in perception when compared to other design elements. The hypothesis that age is an important factor in perception regarding the proximity element was confirmed.
- The study revealed substantial differences in perceptions of design elements, such as contrast and symmetry, between male and female students. Furthermore, notable gender-related variations were identified in the perception of the repetition element.

This study investigated how different design principles are perceived according to variables such as department, age and gender. The study analyzed two-dimensional projects. In conclusion, differences were found in the perception of principles in the visual communication department compared to the other departments. Related to this, the students visually perceived the design elements of negative/positive space, proximity, continuity and enclosure more clearly. In the second stage, age related investigations revealed that the age variable was a factor in the perception of the design element of proximity. In the final stage of analysis, significant differences were identified according to

gender in the contrast and symmetry elements. In relation to these results, it is recommended that future research should target the identification of differences between departments by focusing on three-dimensional studies.

An additional finding derived from the reflective stage of the workshop indicates that self-assessment activities can meaningfully contribute to the development of metacognitive skills in basic design education. By reflecting on their own creative decisions, students became more aware of their perceptual tendencies and problem-solving strategies.

Future research should integrate both quantitative (statistical) and qualitative (self-assessment/reflection) data to offer a more holistic view of how students learn design principles. Such an approach can deepen understanding of the relationship between spatial reasoning, creativity, and self-awareness in foundational design education.

REFERENCES

Abbasoğlu Ermiyagil, M.S., & Urfalı Doğu F., (2019). Temel tasarım, Bauhaus Okulu'nun izinden gitmek: Mimarlık fakültesi. Lefke Avrupa Üniversitesi.

Akbulut, D. (2010). The effects of different student backgrounds in basic design education. Procedia Social and Behavioral Sciences, 2(2), 5331-5338. https://doi.org/10.1016/j.sbspro.2010.03.868

Alotaıbı, A.N. (2023). Antecedents of individuals' participation in the community of practice. Amazonia Investiga, 12(68), 162-171. https://doi.org/10.34069/AI/2023.68.08.15

ArchDaily. (2020, January 23). Learning by Doing: How Student Projects Give Architects and Designers Room to Grow. https://www.archdaily.com/932346/learning-by-doing-how-student-projects-give-architects-and-designers-room-to-grow

Aşkın, D. G. (2018, June 28 - July 1st). Creative thinking in interior architecture education: Basic design courses [Conference session]. SHS Web of Conferences, İstanbul, Turkey. https://doi.org/10.1051/shsconf/20184801052

Azkur, H. S., & Oral, M. (2023). A workshop example of basic design education in interior architecture. Turkish Journal of Agriculture - Food Science and Technology, 11(s1), 2559–2565. https://Doi.Org/10.24925/Turjaf.V11is1.2559-2565.6461

Bayraktar, N., Tamer, N.G., Tekel, A., Gürer, N., Kızıltaş, A.C., & Köroğlu, B.A. (2012). Görsel eğitimde yaratıcılık ve temel tasarım. Nobel Akademik Yayıncılık.

Beşgen, A., Kuloğlu, N., & Fathalızadehalemdarıc, S. (2015, November 28-29). Teaching/Learning strategies through art: Art and basic design education [Conference session]. 4th World Conference On Educational Technology Researches, Wcetr2014, Barcelona, Spain. https://doi.org/10.1016/j.sbspro.2015.04.813

Beyaz, C., & Erçin, C. (2023). Sustainability in the modern architecture of Nicosia: A retrospective view. Amazonia Investiga, 12(69), 9-26. https://doi.org/10.1016/j.sbspro.2015.04.813

Boucharenc, C.G. (2006). Research on basic design education: An ınternational survey. International Journal of Technology and Design Education, 16(1), 1–30 https://doi.org/10.1007/s10798-005-2110-8

DOI: 10.15320/ICONARP.2025.347

Braund,H. & DeLuca, C.(2018). Elementary students as active agents in their learning: an empirical study of the connections between assessment practices and student metacognition. The Australian Educational Researcher, 45(1), 65-85. DOI: https://doi.org/10.1007/s13384-018-0265-z

Brooks-Harris, J. E., & Stock-Ward, S. R. (1999). Workshops: Designing and facilitating experiential learning. SAGE Publications, Inc. https://doi.org/10.4135/9781452204864

Caldwell, G. A., Osborne, L., Mewburn, I., & Nottingham, A. (2015). Connecting the space between design and research: Explorations in participatory research supervision. Educational Philosophy and Theory, 48(13), 1352–1367. https://doi.org/10.1080/00131857.2015.1111129

Chappel, L. (2024, November 7). Art 100 basic design course outline. Retrieved June 2, 2024, from https://tocc.edu/wp content/uploads/2020/05/ART100.UPDATED_LChappel.pdf

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. Psychometrika, 16, 297–334. https:// https://doi.org/10.1007/BF02310555

Denel, B. (1979). A method for basic design. Middle East Technical University, Faculty of Architecture Publication.

Denel, B. (1998). Temel tasarım ve değişim. In N. Teymur & T.A. Dural (Eds.), Temel tasarım/Temel eğitim (pp. 29-34). ODTÜ Mimarlık Fakültesi Yayınları.

Dursun, P., Köknar, S.A., Şenel, A., Kürtüncü, B., Uz Sönmez, F., ve Türkkan, S. (2009). Birinci sınıf işler 07-08. İTÜ Geliştirme Vakfı.

Erbay, M., Ustaömeroğlu, A.A., Küçük, P., & Sadıklar, Z. (2018). Temel tasarım öğretilerinin ürüne dönüşümü: İç mekânda mobilya. International Journal of Innovative Research in Education, 5(1), 11-21. https://doi.org/10.18844/ijire.v5i1.1264

Erbil, Y. (2008). Mimarlık eğitiminde yaparak/yaşayarak öğrenme. E-Journal of New World Sciences Academy Social Sciences, 3(3), 579-587. https://dergipark.org.tr/en/download/article-file/186420

Erkan, D. Ç. (2006). Temel tasarım eğitimini sorgulayan bir araştırma [Unpublished master thesis]. Yıldız Teknik Üniversitesi.

Ersine Masatlıoğlu, C. S., & Balaban, Özge C. (2024). Reflective thinking and self-assessment: A model for the architectural design studio. Journal of Design for Resilience in Architecture and Planning, 5(1), 35–49. https://doi.org/10.47818/DRArch.2024.v5i1118

Fiedler, J., & Feierabend, P. (2000). Bauhaus. Konemann.

Foerster, C. (2024). ART 1300— Art Appreciation. Retrieved November 26, 2024, from https://digitalmeasures.utep.edu/ai/cafoerster/schteach/ARTF%201301%20-.%20CRN%2027497%20-%20Basic%20Design%20I%20-%20Foerster%20(Spring%202012)-1.pdf.

Galchynska, O., Petrova, I., Martynenko, A., Kvasnytsya, R., & Kryvoruchko, M. (2023). Comparative analysis of aesthetic and functional aspects of design approaches in the context of contemporary art. Amazonia Investiga, 12(72), 216-225. https://doi.org/10.34069/AI/2023.72.12.19

Gökaydın, N. (2010. Temel sanat eğitimi. Diasan Matbaası.

Griffith Winton, A. (2000). The Bauhaus, 1919–1933. Heibrunn Timeline of Art History.

Güngör, İ. H. (2005). Temel tasar. Esen Ofset Matbaacılık.

Gürer, L. (1990). Temel tasarım. İTÜ Matbaası.

Gürer, L., & Güler, G. (2004). Temel tasarım. Birsen Yayınevi.

Güzelçoban Mayuk, N., & Coşgun, S. (2020). Learning by doing in architecture education: Building science course example. IJEAD International Journal of Education in Architecture and Design, 1(1), 2-15.

Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. L. (1998). Multivariate data analysis. Upper Saddle River, NJ: Prentice Hall.

Herreras, E. B. (2004). La docenci a a través de la investigación-acción. Revista Iberoamericana de Educación, 35(1), 1. https://doi.org/10.35362/rie3512871

Houghton Mifflin Harcourt. (2000). Innovation. In The American Heritage Dictionary of the English Language.

Jones, P.L., (1969). The failure of basic design. Leonardo, 2(2), 155-160. https://doi.org/10.24925/turjaf.v11is1.2559-2565.6461

Kahvecioglu, N.P. (2007). Architectural design studio organization and creativity. In O. Hacıhasanoğlu (Ed.), New approaches to creativity and creative thinking (pp. 6-26). ITU A|Z.

Kaya, Ö. (2018). Basic design education. In M. H. Bulut & Ö. Kaya (Eds.), Academic Studies in Fine Arts and Design (pp. 3-17). İKSAD Publishing House.

Kocadere, S. A., & Ozgen, D. (2012). Assessment of basic design course in terms of constructivist learning theory. Procedia - Social and Behavioral Sciences, 51, 115 – 119. https://doi.org/10.1016/j.sbspro.2012.08.128

Kowaltowski, D., Silva, V. G. Da, Neves, L., Deliberador, M., Zara, O., Colleto, G., & Ramos, E. (2019). Actionresearch and architectural sustainable design education: A case study in Brazil. International Journal of Technology and Design Education, 30, 815–836. https://doi.org/10.1007/s10798-019-09525-5

Krejins, K., & Kirschner, P.A. (2004). Desining sociable cscl environment. In J.W. Strijbos, P.A. Kirschner & R.L. Martens (Eds.), What we know about CSCL (pp. 221-243). Kluwer Academic Publishers.

Lang, J. Burnette, C., Moleskı, V., & Vachon, D. (1974). Designing for human behaviour artchitecture and the behaviour sciences. Dowden Hutchinson & Ross Inc.

Lang, J. (1987). Creating architectural theory. Van Nostrand Reinhold.

Leonard, D., & Swap, W. (1999). When Sparks fly: Igniting creativity in groups. Harvard Business School Press.

Morales, N.L.R., Rodriguez, A.G., Rueda, J.C.O., Zambrano, V.V., Malfa F.C., & Mesa, R.R. (2021). Teaching-learning process of architecture workshops in virtual environments based on research-action methodology. Journal of Education and Learning, 11(1), 11- 27. http://10.5539/jel.v11n1p11

Mutlu, B., & Er, A. (2003, April 28-30). Design innovation: Historical and theoretical perspectives on product innovation by design [Conference session]. Proceedings of the 5th European Academy of Design Conference, Barcelona.

Nisha, B. (2019). The pedagogic value of learning design with virtual reality. Educational Psychology, 39(10), 1233–1254. https://doi.org/10.1080/01443410.2019.1661356

Özer, B. (1966). Mimarlık eğitiminde temel dizayn: Tarihçe, felsefe ve gerekçesi. Mimarlık, 7(4), 6-7.

Özgüner, O. (1966). Odtü mimarlık fakültesinde basic design uygulamaları (Basic design applications at the Middle East Technical University {metu} architecture faculty). Mimarlık, 8 (6).

Özkar, M. & Steino, N. (2012). Shaping design teaching: Exploring form as an agent in design reasoning and pedagogy. Aalborg Universitetsforlag.

Panayides, P. (2013). Coefficient Alpha: Interpret with caution. Europe's Journal of Psychology, 9(4), 687–696. https://doi.org/10.5964/ejop.v9i4.653

DOI: 10.15320/ICONARP.2025.347

Şahin, A. (2013). Mimarlık eğitiminde bir stüdyo yöntemi: Tasarla-yap stüdyosu. [Unpublished master thesis]. Istanbul Technical University.

Saranlı, T. (1998). Başlangıçtan bugüne temel tasarım. In N. Teymur & T.A. Dural (Eds.).

Sarıoğlu Erdoğdu, G. P. (2016). Basic design education: A course outline proposal. Planlama, 26(1), 7-19. DOI: 10.5505/planlama.2016.52714

Sausmarez, M. (1983). Basic Design: The Dynamics of Visual Form. The Hebert Press.

Şenel, A., & Onur Sönmez, N. (2014). Mimarlık okulları 1. Sınıf stüdyosu buluşması. https://www.youtube.com/@mimarlkokullar1.snfstudyol537

Sözen, M., & Tanyeli, U. (1992). Dictionary of art concepts and terms. Remzi Kitabevi.

tasarım/Temel eğitim (pp. 29-34). Ankara: ODTÜ Mimarlık Fakültesi Yayınları.

Teymur, N. (1998). Tasarlanacak bir dünya için temel tasarım eğitimi. In T.A. Dural & N. Teymur (Eds.), Temel Tasarım/ Temel Eğitim. ODTÜ Mimarlık Fakültesi Yayınları.

Thiel, P. (1981). Visual awareness and design. University of Washington Press.

Ustaömeroğlu A.A., Aydıntan E., Erbay M., Küçük P., & Sadiklar, Z. (2015). The ımpact of basic design studio courses on ınterior design: KTU model. Procedia-Social and Behavioral Sciences, 197, 1889- 1896. https://doi.org/10.1016/j.sbspro.2015.07.251

Wanner,T. & Palmere E.2018). Formative Self- and Peer Assessment for Improved Student Learning: The Crucial Factors of Design, Teacher Participation and Feedback. Assessment & Evaluation in Higher Education. DOI: https://eric.ed.gov/?id=EJ1190198

Wendler, W. V., & Rogers, J. S. (1995). The design life space: verbal communication in the architectural design studio. Journal of Architectural and Planning Research, 12(4), 319–336. http://www.jstor.org/stable/43029175

Westphal, U. (1991). The Bauhaus. Studio Editions.

Wong, W. (1993). Principles of form and design. Van Nostrand Reinhold.

Resume

Assist. Prof. Dr. Mümüne Selen ABBASOĞLU graduated from Eastern Mediterranean University and earned her MSc and PhD in Architecture. Since 2011, she has been teaching undergraduate and graduate courses in the Faculty of Architecture and Design at the European University of Lefke and has over 50 national and international publications on design, education, public spaces, cultural identity, resilience, and interdisciplinary practice.

Assist. Prof. Dr. Feriha URFALI DOĞU, graduated from European University of Lefke, Faculty of Architecture, and she completed her Master and Ph.D degrees at the same university. She is currently working as Assist. Prof. Dr. at European University of Lefke, Faculty of Architecture and Design in North Cyprus. Her interest areas are; Social sustainability, forced displacement and its effects on society and cities, housing and architecture, vernacular architecture.

ICONARP
International Journal of Architecture and Planning
Received: 01.05.2025 Accepted: 02.12.2025
Volume 13, Issue 2/ Published: 31.12.2025
Research Article *DOI: 10.15320/ICONARP.2025.348 E- ISSN:2147-9380*

Adaptation of Interior Design Course to Distance Education During Covid 19 Pandemic Period

E. Esen Gençaydın*
Esra Orhan Yılmaz**

Abstract

In a period when the changing living conditions with the Covid-19 pandemic are effective in all areas of life, this research is an example that investigates how the second-year undergraduate Interior Design I applied course, which is carried out in Hacettepe University (HU), Department of Interior Architecture and Environmental Design in formal education, can be efficiently adapted to distance education and develops methods on this subject. A mixed research method combining qualitative and quantitative approaches was used to analyse students' adaptation, motivation and project outcomes. In the research, it is aimed that the Interior Design I course, which was conducted online in the early period of the pandemic, will contribute to the related courses in case of a transition to distance education system due to different reasons. The course was divided into five different sections. Each section was taught by a different lecturer and a teaching assistant. In addition to the fact that the topics of all sections were the same, the requirements, evaluation criteria and exam dates were designed simultaneously. The research was conducted through the students (16) who chose this course in Branch II and their project studies. Various methods were developed to ensure the efficiency achieved in formal education. In line with the opinions, feedbacks and project outputs of the students who are the subjects of this process, suggestions for the adaptation of distance education to interior design courses have been developed. The findings revealed that students successfully adapted to online design education and achieved creative results comparable to face-to-face learning. The study focused on the adaptation process of traditional hand drawing to the digital environment applied in the distance education period. This study provides insights that can guide the development of flexible and sustainable design education models for future crisis conditions.

Keywords: *Design studio, Distance learning, Interior architecture education, Pandemic, Tiny house*

*Hacettepe University: Interior Architecture and Environmental Design, Faculty of Fine Arts, Ankara, Türkiye
Email: esenk@hacettepe.edu.tr

**Artvin Çoruh University: Interior Architecture and Environmental Design, Faculty of Art and Design, Artvin, Türkiye (*Corresponding author*)
Email: orhanesraa@gmail.com

To cite this article: Gençaydın, E. E., & Orhan Yılmaz, E. (2025). Adaptation of Interior Design Course to Distance Education During Covid 19 Pandemic Period. *ICONARP International Journal of Architecture and Planning,* 13 (2), 850-872. DOI: 10.15320/ICONARP.2025.348

INTRODUCTION

Kindly read this note carefully. This document serves as a template as well as an instruction to authors in preparing full paper submission. Authors are fully responsible for their papers, including references and proper credit for use of the work of others. Papers are accepted with the understanding that they have not been published elsewhere. All papers are to be electronically submitted in Microsoft Word document format.

Throughout history, there have been various epidemics affecting public health such as plague, cholera and Spanish flu. The Covid-19 outbreak, which started in China and then gained a global dimension, emerged as a serious epidemic in terms of its rapid spread to every country. The World Health Organization declared a pandemic on 11 March 2020 as a result of the wide spread of the disease. On the day the pandemic was declared, the first case was seen in Turkey (Ministry of Health, 2020). The pandemic had a great impact on social, economic and daily life. As a result of the global pandemic, all higher education institutions in Turkey were suspended on 16 March 2020 (Council of Higher Education, 2020). On 23 March, the education sector made a serious and rapid method change and switched to distance education (Yamamoto & Altun, 2020).

Emergency Remote Teaching (ERT), later referred to as Emergency Distance Education (EDE), describes the temporary shift of instructional delivery to an online format during a crisis, in which face-to-face courses are rapidly adapted to digital platforms (Hodges et al., 2020). This differs fundamentally from planned distance education, which is built on structured instructional design, established digital materials, and learner-centered flexibility. While distance education offers students multiple pathways and deliberate pedagogical choices, emergency implementations prioritize continuity over optimization and emerge as compulsory responses to extraordinary circumstances such as the Covid-19 pandemic. Consequently, both students and instructors were required to develop immediate and creative solutions to sustain learning processes under mandatory home confinement and technological limitations.

The point to be emphasized here is that the global crisis with the covid-19 pandemic did not present internet-based education as an option. The autumn term of the 2020-2021 academic year, which has compulsorily evolved into distance education, needed creative solutions. In this situation, both students and educators have produced different solutions to adapt to the internet-based education model, which has become compulsory. Therefore, this process has been a period of going beyond the standard patterns, containing creativity, making instant decisions according to the situation, and creating new methods and approaches.

When the universities that provide distance education, in other words, completely distance education, are examined, it is seen that there are more programs such as web design, graphic design, animation, where the

DOI:10.15320/ICONARP.2025.348

course output can be exhibited in digital environment, in other words, two-dimensional, while there are less education in disciplines such as architectural design, interior design, product design, industrial design, where the course output is three-dimensional. This situation is thought to be caused by the student-student and student-teacher communication in application-based education in fields that require three-dimensional thinking and designing action, the fact that design goes beyond drawing or sketching and includes three dimensions, that is, prototype and model making, and the criticisms given in the jury system in the evaluation phase of the projects (Öztürk, 2016).

Especially in design education; in addition to the theoretical courses based on measurement and evaluation, where information is directly transferred, such information is tested with design problems. In studio education, students learn and use basic design principles to produce alternative solutions to design problems and gain practice by combining the knowledge obtained with practice (Yıldırım, Özen & İnan, 2010). In addition to the theoretical course, the interaction with other design practices during the criticism, as well as the evaluations received by the students among themselves and the teachers in the design courses carried out with a focus on practice, reveals the importance of face-to-face communication in design education.

The shift to online studio education introduces new pedagogical dynamics, as suggested by recent studies on situated learning in digital design studios, in which the studio is reconceptualized both as method and environment (Buldan, 2021).

In the 21st century, technological developments and the widespread use of digital tools have led to the use of technology in almost every environment. On the other hand, social events have led to the development of distance education models that can be accessed from anywhere, regardless of location, in order to prevent interruption of education. Online environments, three-dimensional rapid modelling tools have been included in the design process and started to be used in almost every field.

Tauke (2003) summaries the reflections of the impact of today's developments in the field of technology on design education as: the transfer of traditional methods such as hand drawing, technical drawing, etc. to the virtual environment, the increase in the interaction of students and teachers as a result of the increase in the use of online resources, and the necessity of understanding other disciplines and working interdisciplinary with them (Cited in Yang, You & Chen, 2005). According to Nigel Corss; a new model is needed in design education that will adapt to the post-industrial design culture. Thus, design education should be more accessible and open (cited in Holden & Garner, 2005).

Recent studies have shown that design studios rapidly shifted toward digital, hybrid, and fully online formats after the pandemic, revealing both pedagogical challenges and opportunities (Süner –Pla-Cerda, Öztürk & Ünlü, 2025; Şuta, 2022). These studies emphasize issues such as reduced

peer interaction, the transformation of studio culture, and the increased reliance on digital modelling tools. However, they also highlight the potential of flexible studio models that combine physical and virtual environments. Despite this growing literature, few studies have examined how a traditionally hand-drawing–based, concept-oriented studio can systematically adapt to emergency online education while preserving iterative critique, tactile processes, and three-dimensional thinking. This gap forms the foundation of the present research.

This research is considered to be an example that investigates how the applied course carried out in formal education can be adapted to distance education efficiently and develops methods related to this issue, depending on the existence of some or all of the daily life online with the pandemic period. This study, which was carried out in the early period of the pandemic; It is aimed to contribute to the relevant courses in case of a possible transition to a distance education system for different reasons. Unlike many previous studies focusing solely on the challenges of online design education, this research provides a structured model demonstrating how an applied design studio course can be effectively transformed into a flexible, hybrid system adaptable to both emergency and future learning conditions. Recent studies on online design studios (Tafahomi, 2022) mostly examine student experiences, digital challenges and instructional limitations; however, very few address the adaptation of a hand-drawing-based second-year studio to an online format (Cihanger Ribeiro., 2022). This study fills this gap by analyzing how traditional analogue design processes were sustained, transformed and supported during the transition to a distance education model.

INTERIOR DESIGN COURSE AT HU DEPARTMENT OF INTERIOR ARCHITECTURE AND ENVIRONMENTAL DESIGN

Hacettepe University Distance Education Application and Research Centre (HUZEM) quickly adapted to this process. Detailed information was provided to both students and educators through HUZEM. In the Department of Interior Architecture and Environmental Design, meetings were held on how to adapt applied and theoretical courses to the distance education process in the most efficient way. New methods have been designed based on formal education learning principles.

The fact that theoretical and practical studies took place together in the Interior Design I course, which was discussed in the study, made it compulsory to develop more than one approach and method. In the designed programme, new arrangements were made in the process by taking into account the opinions, requests and difficulties experienced by the students.

The project topics given within the scope of the course are determined as a result of the joint decision of the course coordinators based on the current events of the period. The main factor in choosing this project topic as Tiny House; Based on the Covid-19 epidemic, which is the current natural disaster of the period, it has been to prepare students both in

DOI:10.15320/ICONARP.2025.348

terms of education and professional practice for solutions and action plans that can be developed in the face of extraordinary situations that may occur in the future. As a matter of fact, many people in ten provinces were left homeless and suffered painful losses as a result of the great destruction caused by the Kahramanmaraş earthquake on 6 February 2023. Initiatives such as container houses, tents, etc., which were made to solve the shelter problem in the fastest possible time, created an important shelter problem that needs to be solved quickly. Tiny House, which came to the agenda again during the Covid-19 pandemic, has been emphasised to be sustainable in addition to maintaining its importance and topicality in terms of being integrated into similar and possible natural disaster situations.

Interior Design course is a studio course of HU Department of Interior Architecture and Environmental Design. The course takes place in the third semester of the four-year undergraduate programme (Figure 1). In the first and second semesters of undergraduate education, basic courses that prepare students for design education are taken. Students synthesize all the knowledge gained from these courses and use them in the Interior Design course.

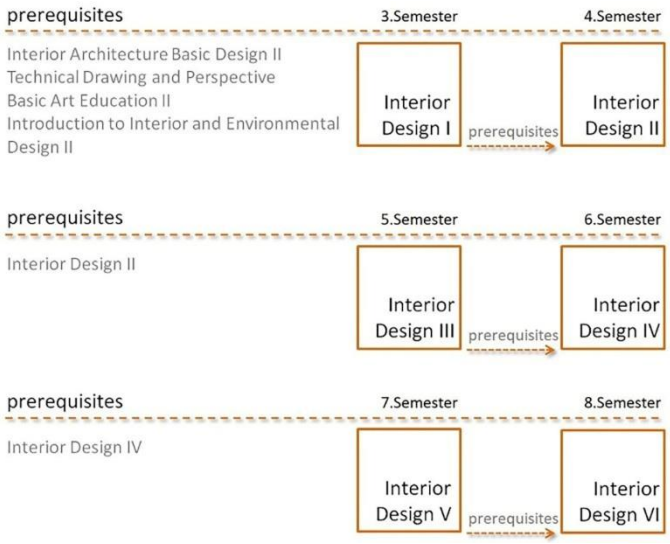


Figure 1. Graphic presentation of the term and prerequisites of Interior Design I course
This information has been tabulated by researchers based on data from Hacettepe University's official website, 2021

The Interior Design I course begins in the second year and continues conditionally for six semesters. Each term, different topics and criteria are defined within the studio courses. This first course is particularly important as it marks the transition to project-based design education in the field. Students make decisions by blending the desired data with their knowledge, realize spatial constructions, create the human-space relationship by considering user needs, and address the concepts of function and aesthetics with a holistic approach (Tarakçı Eren, Yılmaz & Düzenli, 2023).

The aim of the Interior Design I course is to enable students to acquire the ability to design space. To experience the process of designing by triggering original thought processes and creativity; it is aimed to be able to produce a product at the end of this process (Figure 2).

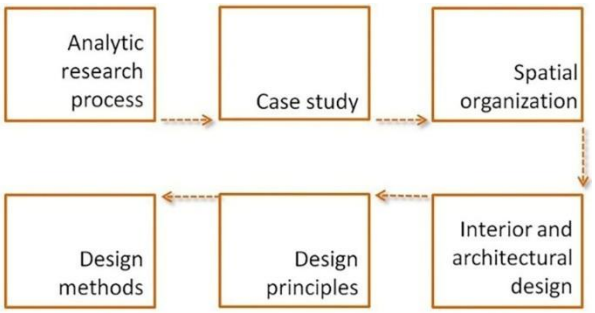


Figure 2. Interior Design I course content scheme
Hacettepe University, 2021

In case of successful completion of this course, students are expected to be able to do the actions expected to be able to do as learning outcomes of the course: analytically analyze any building, analyze and define the design codes that make up any design, design by using two or three dimensional thinking processes in coordination with each other, transform the analyzed spatial and structural information and values into concrete architectural space, establish the relationship between the building and its environment, establish the structural system of the building and prepare idea sketches, architectural projects and visual presentations of the designed building (Hacettepe University, 2025).

At Hacettepe University, each semester is structured as a 14-week course programme. The studio course, which is the subject of this research, is based on face-to-face critiques and practices twice a week. In each new semester, a current and different project topic is decided. The semester course workflow is shared with the students before the course starts.

A similar approach was taken in the transition of the course, which is conducted face-to-face in formal education, fed by the studio environment and can be intervened manually, to distance education without loss of quality. In times of crisis such as the Covid-19 pandemic, it is not possible to make plans covering a long time and to implement them quickly.

Due to the Covid-19 pandemic, quarantine practices were carried out at various levels to maintain social distance by suspending the functioning of public and private educational institutions almost all over the world, especially in the spring semester of the 2019-2020 academic year (Aghakhani, Memarian, & Shalbafan, 2021; Daniel, 2020). In line with quarantine practices, educational institutions were closed in many countries. In this case, it is stated that it has affected approximately 90-92 per cent of the student population worldwide (Unesco, 2020).

Schools at various levels all over the world have started the distance education process so that students do not fall behind in their education. On this occasion, every educator and learner, with or without distance education experience, suddenly had to teach or take courses with distance education method. Educational institutions and educators have searched for how courses can be conducted through distance education and how various online tools can be used (Karip, 2020).

DOI:10.15320/ICONARP.2025.348

Interior Design course aims to develop students' creative and analytical thinking processes by providing them with the skills of designing and analysing spaces. At every stage of the education process, students are expected to produce various design solutions using a combination of theoretical knowledge and practical applications. Although unexpected situations such as the Covid-19 pandemic have affected the quality of education, the sustainability of the process has been ensured thanks to distance education practices. Educators and students have adapted in this process and moved their education methods to the digital environment and tried to ensure the continuity of learning under all conditions. In this context, the fact that the Interior Design course is carried out effectively not only face-to-face but also through distance education once again reveals the importance of flexibility and technology use in education.

METHOD

This case study was designed not only to analyse a single semester experience but also to extract transferable strategies for integrating studio-based design education into online or hybrid environments. Hacettepe University, Faculty of Fine Arts, Department of Interior Architecture and Environmental Design, within the scope of Interior Design I course, before each semester, course instructors prepare the content of the project course by determining a common current topic. In the process continuing with distance education in the 2020-2021 autumn semester; the difficulties experienced, the advantages and disadvantages of distance education, the attempts made to adapt to the compulsory online situation are discussed within the scope of the branch II students of the course and the course (in the context of the project studies produced).

In this study, mixed research method was used. As stated by Creswell (2021), mixed method research can be defined as a unique method orientation in which analyzing, collecting data and interpreting all these are at the center. In doing so, the importance of research questions, philosophy and methods should not be ignored. A mixed research method was employed by combining quantitative data such as weekly performance tracking and project evaluation results with qualitative data obtained from instructor observations and student feedback collected during the design process. The research focuses on three main questions aiming to analyse the distance education process of the Interior Design course:

1- How did students adapt to design education conducted online?

2- How did the transition from hand drawing to digital drawing affect creativity and motivation?

3- What pedagogical and technical methods can improve efficiency in distance design education?

Within the scope of the course, while quantitative data were used in the adaptation of the students to the course, their morale and motivation

levels, and the weekly required course outputs; qualitative data were used in the information obtained as a result of classroom observations and project evaluations carried out throughout the semester, in learning their experiences about the process and in interpreting all these data with a critical perspective.

These parameters include problem definition, form generation, and functional correspondence, which were used to evaluate students' adaptation and project outcomes within the online learning context (Table 1).

Table 1. Parameters, related variables and data sources used in the study (Personal archive, 2025)

PARAMETER	RELATED VARIABLE	DATA SOURCE / EVIDENCE
Student Adaptation	Online learning process	Observation notes, project progression
Creativity & Motivation	Digital vs. manual drawing	Student feedback, project outcomes
Efficiency	Pedagogical and technical tools	Instructor reflections, course records

In order to ensure equality in the number of Interior Design I students, which constitutes the field of the research, the course was opened with five different branch codes under the supervision of five different lecturers. Within the quota, each student voluntarily chose the branch he/she wanted. In this period of distance education, each instructor developed his/her own teaching method. Although the same subject was designed within the same programme in all branches, there were differences in the methods of branch instructors in the operation of the course. Since all five branches of the course were conducted simultaneously, each branch could not be observed throughout the process. For this reason, the research was carried out in branch II.

Methodology of the Study

The pandemic process and conditions experienced during the period when the course was conducted did not offer equal opportunities for everyone. However, the fact that all studies will be evaluated online during the semester made computer and internet access compulsory. For this reason, all students were warned to provide computers, internet access and working microphone camera systems before the start of the course period. The branch manager informed the students that he/she could request online drawing whenever he/she deemed necessary. Therefore, it was very important to provide drawing equipment and technical equipment that could be seen by the student and his/her desk while working.

DOI:10.15320/ICONARP.2025.348

Course critiques were made with the method and frequency to be determined by the instructor of each branch. Observations made during these critiques formed one of the key qualitative data sources of the study. All notifications for the course were made synchronously or asynchronously via Moodle, Zoom, Huzem, WhatsApp group created for the course. Following every announcement made during the distance education process has been a very important factor for students to complete this process successfully. In order to overcome or minimise the disadvantages of distance education, attending online courses and completing weekly homework regularly has been a non-compulsory requirement. Because the result has been a situation of taking part in a study in which the result makes sense with the process rather than the product.

No digital drawing is accepted during the semester in the Interior Design I course carried out in formal education. When it is detected that any drawing is carried out in digital environment, the student's project is not evaluated. However, with the compulsory transition to distance education, the most prominent change in the course has been: two-dimensional and three-dimensional studies have been offered the option of hand-drawing or digitally depending on the student's desire and opportunity (Figure 3). On the other hand, although two and three dimensional studies were allowed to be done digitally, students were asked to realise three dimensional studies with the materials they could provide, especially in the process of developing the concept and translating the concept into space. The most important reason for this was to ensure that the ability to develop three-dimensional thinking at the maximum level by using hand-eye-brain coordination as a whole. However, considering the difficulties of access to materials, the use of programmes such as AutoCAD, Sketch up, 3dsMax was kept free for the sheets presented in the critiques within the time and criteria permitted by the branch coordinator.

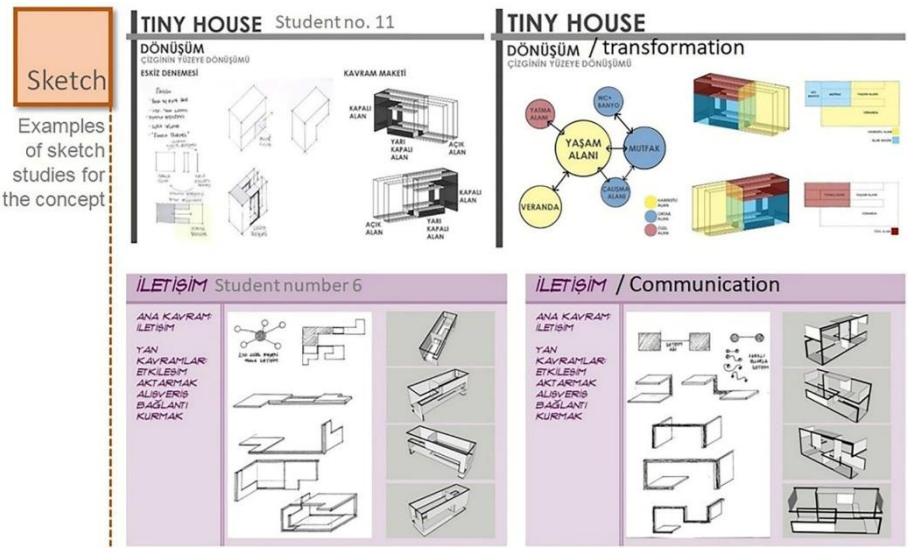


Figure 3. Examples of sketches, stains and models made during the concept development process
Personal archive, 2021

In the Tiny House Project given within the scope of the project, the maximum criteria required from the students were shared before the start date of the project course. These criteria were created to draw the main boundaries of the project and to prevent students from having any hesitation. In addition, some variables that will form the scenario of the project were asked to be determined by the students, enabling the students to create the original values of each project and to realize original designs according to their own fiction. In this way, each student was obliged to construct the scenario of the study in detail. In doing so, the maximum criteria required of everyone:

- Tiny House should be designed to be used by one or two people. Users should be informed about their profiles,
- Whether the structure is mobile or fixed should be determined within the scope of the scenario,
- The land where the building will be located should not be chosen hypothetically. Each designer should choose the land depending on the scenario,
- Within the scope of the scenario, it should be clearly stated for what, how and how often the structure is used.

The work carried out during the semester was based on weekly critiques. Therefore, the process became as important as the final product output presented at the end of the semester. Managing the process correctly and making more progressive and creative design approaches based on the critiques has been the most important step of the evaluation system. To summarise; all students were evaluated on weekly critiques and class participation in addition to midterm and final exams.

Interior Design I course is very important as it is the first project course of Hacettepe University Department of Interior Architecture and Environmental Design. Because the technical knowledge, design principles, abstract thinking and the knowledge of transferring this abstract thinking to three dimensions learnt in the first year are blended within the scope of this course and evolve into producing concepts, transforming into space and creating atmosphere. For this reason, the course requires a devoted work for both instructors and students. The aim of the course is to enable students to acquire the ability to design spaces, to experience the design process by triggering their original thought processes and creativity, and to produce a product at the end of this process.

Within the scope of the course, students were first asked to make a literature review on the given subject and to make analyses on existing examples in order to better understand the subject. These analyses were made both in plan, i.e. two-dimensional, and three-dimensional volume and mass.

Secondly, in order for them to understand the importance of the user in design, they were then expected to create a scenario for the user and to determine the criteria such as the identity, physical characteristics,

DOI:10.15320/ICONARP.2025.348

tastes, interests, etc. of this user. Based on the scenario, the students are expected to produce a concept, analyse the concept, create a concept map and experience the analysis of the forms that can be the formal equivalent of this concept with sketches, reliefs and abstract models. The design conceived in the mind should first be presented with concept analyses and studies, freehand abstract sketch drawings and 1/50 or 1/20 (depending on the project subject) abstract draft models. At this point, the priority is that the formal constructions should not resemble any existing shape or form, as well as having an attitude away from analogical approaches. In this way, it is desired that the student shows maximum creative performance.

The course that is considered within the scope of the research is a compulsory and prerequisite course of HU, Faculty of Fine Arts, Department of Interior Architecture and Environmental Design. The selection of this course is made in case of success in the first year undergraduate courses Basic Art Education I and II, Basic Design, Interior Architecture and Environmental Design I-II and Technical Drawing and Design Geometry I-II. Therefore, students can be expected to first use what they have learnt in these courses, to make two-dimensional and three-dimensional sketches while developing their projects, and to undergo an abstract and concrete synthesis process.

Those who succeed in creating a successful synthesis of design principles and elements with the literature review can move faster in producing abstract concepts. If they can develop abstract concept analyses, two and three dimensional formal searches produced as a result of all the data obtained, great ease can be provided in the creation of interior space fiction and atmosphere.

The digital transformation in education under the pandemic conditions offered different opportunities for students to develop their creative and technical skills, while at the same time once again revealing the importance of original thinking and design processes. In this process, the studies carried out in line with the limits and freedoms given allowed students to develop a deep understanding of space design and emphasised the importance of design and concept generation. In this context, at the end of a period in which each student developed the ability to understand and design the space in accordance with the determined criteria and by focusing on their creative processes, the training process was successfully completed.

FINDINGS

Overall, the analysis of student works revealed that the Interior Design I course enabled students to make significant progress despite the limitations of distance learning. The evaluation conducted through the parameters of problem definition, form generation, and functional correspondence made it possible to observe how students adapted to the online studio environment and how their conceptual, technical, and spatial reasoning skills evolved throughout the semester.

In the second stage, students demonstrated their ability to transform conceptual analyses into spatial decisions. After completing basic concept evolution, they conducted material and detail research aligned with their scenarios. This process required them to generate original spatial and equipment solutions, which formed a critical component of their design development. These outputs were evaluated in relation to the parameters defined in the methodology.

Although the findings are presented in a continuous narrative, they directly relate to the study's research questions. Observations throughout the semester highlighted issues of student adaptation to distance education, transitions to digital drawing tools, and the instructional strategies developed to support the design process. These elements naturally overlap within the studio environment, and therefore are discussed together in an integrated structure.

The education that the person receives in line with his/her own experience and behaviour in line with his/her wishes is aimed at ensuring the occurrence of changes related to certain purposes. As Ergün (2015) stated, the concept of education can be interpreted in different ways. These differences may also cause changes in the learning method. In other words, all branches of science have different and unique learning methods. It can be said that art and design fields differ from others in terms of both theoretical and practical aspects. The drawing types used in the process of creating design in the field of interior architecture are presentation and application orientated (Soygeniş, 2006). With the development of technology and its inclusion in daily life, education areas have also changed. In this sense, Interior Architecture education and applied fields have made progress by rapidly integrating technology into the process both in presentation methods and techniques and in the project drawing stage.

In March 2020, with the Covid-19 pandemic, which emerged as a global crisis, it was decided to continue all education and training life with distance education (online). With the beginning of the transition to distance education, resources on abstract thinking and concept generation, which is one of the important outcomes of the course, were first shared with the branch II students (16 students) of the course, which was taken into consideration within the scope of the research. The students were expected to decide how many people will use the Tiny House model to be designed in line with the given resources and their own researches, how many people will use the Tiny House model, the user profile and whether it will be fixed or mobile. The first step of concept development, which is one of the objectives of the course, was taken at this stage. Table 2 shows the scenario and concept information of the students who took the course.

DOI:10.15320/ICONARP.2025.348

Table 2. The scenario and concept information of the students taking the course are tabulated (Personal archive, 2021)

Student No	Fiction	Number of people	Tiny House Model	The Concept
1	The visually impaired audio blogger aims to reach other individuals in the world through various seminars and trainings. She lives with her mother and guide dog.	2 (Himself and his mum) and Dog	mobile	Touch
2	The musician is constantly on the road as he is on tour in Europe. He uses it for both travelling and accommodation. He also gives short concerts on the road.	1	mobile	Ladybug
3	He resigns from his job as a manager in a theoretical firma and starts travelling and providing consultancy services on the internet.	1 and the cat	mobile	Contact
4	The graphic designer wants to return to his own essence. Therefore, he decides to live in a place not far from the city.	1	immobile	Cycle, transformation
5	The acrobat often travels because he works in circuses. He wants to prefer the comfort of home on these journeys, so he starts living in a tiny house.	1	mobile	Movement, motion, change
6	Zoologist and writer. Travelling a lot and seeing family/friends in different countries	2 (Married couple)	mobile	Interaction
7	An individual who is bored with business life decides to go on a world tour. While doing this, he will also run a coffee shop.	1	mobile	Birth, awakening, movement
8	Vlogger produces travel and promotional content. He is constantly travelling due to his job.	1	immobile	Interaction
9	He uses it when he wants to paint and write away from the city tempo and responsibilities.	1	mobile	Purification
10	The yoga instructor aims to enlighten his or her inner world in seclusion.	1	mobile	Moment of realisation
11	Busy private sector employees often use it to relax with their friends at the weekend.	2 (Married couple)	immobile	Transformation
12	The cook wants to meet different cultures and learn about the food of these cultures. He is on the road to transfer what he knows and to establish a connection.	1	mobile	Connection
13	The healer seeks his essence by integrating with nature and experiencing the natural elements.	1	immobile	Return to essence
14	The painter is constantly travelling because he enjoys being in touch with nature. That's why he turns to tiny house.	1 and the cat	mobile	Trace
15	Manager. He works very intensively, uses it to stay in balance.	1	mobile	Balance
16	The painter paints nature.	1	mobile	Internalise

Another aim of the study is for students to exhibit a design approach towards the concept. In doing so, they were expected to synthesise the researchers conducted by adhering to the scenario in an original way. At this stage, more than one concept model was studied, alternatives were produced and the final concept model was reached. When the concept study and model experiments reached the desired level, studies on the reflection of the concept on the space started. Below is an example (Figure 4) of how the students looked at the design process and how they evaluated the subject.

Figure 4. Example of alternative model studies carried out in the process of transforming the concept into three dimensions
Personal archive, 2021

In the work of student number 1 (Figure 5), the concept reached was: touching. The reason for this is based on the scenario he prepared. According to his scenario; the visually impaired audio blogger adjusts his schedule to change his location every three to four months to attend international trainings and seminars and aims to touch other visually impaired individuals. She is accompanied by her guide dog and her mother on these journeys. Since he lives with his mother, two different sleeping area solutions were considered. Since he is a visually impaired individual, an accessible housing design has been determined as the main

purpose. From this point of view, the personal demands of the user were also determined.

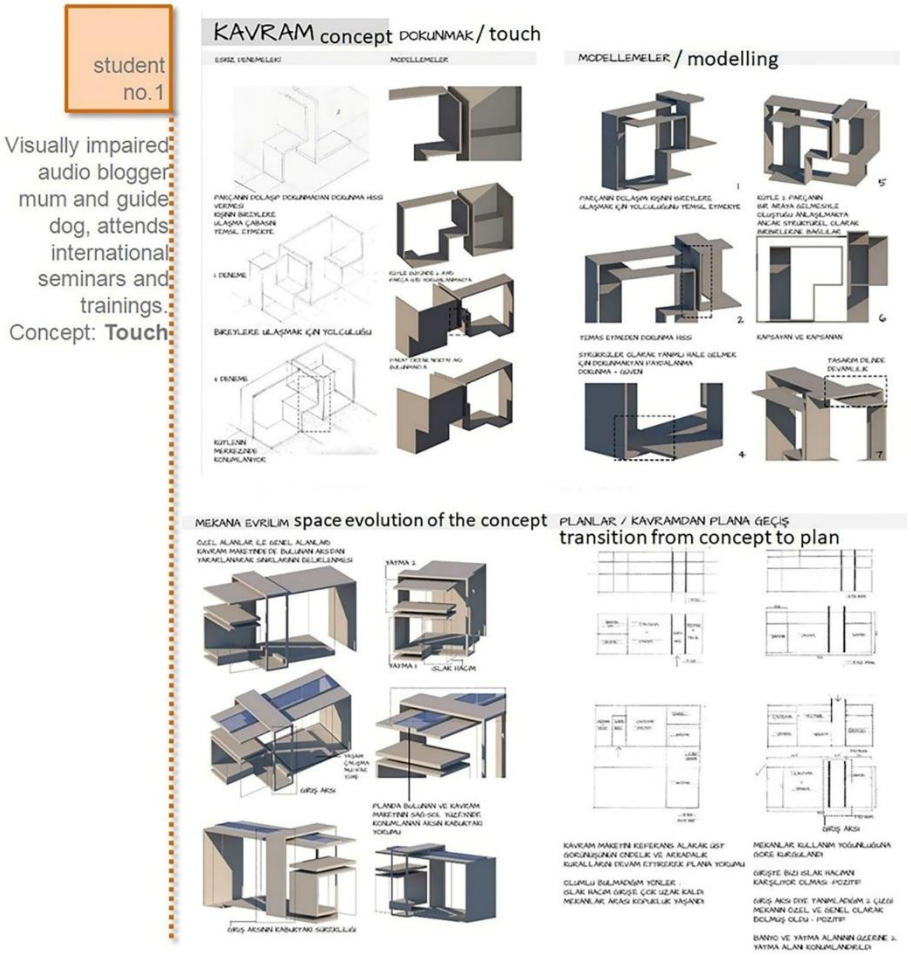


Figure 5. Concept model and spatial transformation of Student 1
Personal archive, 2021

Taking the concept of touching as a starting point, student number 1, based on the visually impaired user's experience of the space by touching, aimed for the piece to give the feeling of touch without moving around and touching, and represented the person's effort to reach individuals. Although the perception that the designed masses are formed by the combination of two separate parts in the whole is created, they are structurally connected to each other. The aim of this structure is to give the feeling of touching without contact, to reinforce the sense of trust with a design that covers and is covered, and to provide these with continuity in the design language.

In student number 6's study, the user is a married couple who enjoy travelling. They like travelling both because of their profession and to interact with their friends far away. Interacting with other people is an important part of their lives. The work of student number 6, who associates the desire to interact with people with the fact that the space interacts within itself and contains continuity, is shown in Figure 6. In the process of evolving the concept of interaction into space; the interaction between surfaces, fittings and spaces was achieved by establishing a

DOI:10.15320/ICONARP.2025.348

relationship with different connections (lighting, fittings, etc.). In doing so, two different linear elements, thick and thin, were used.

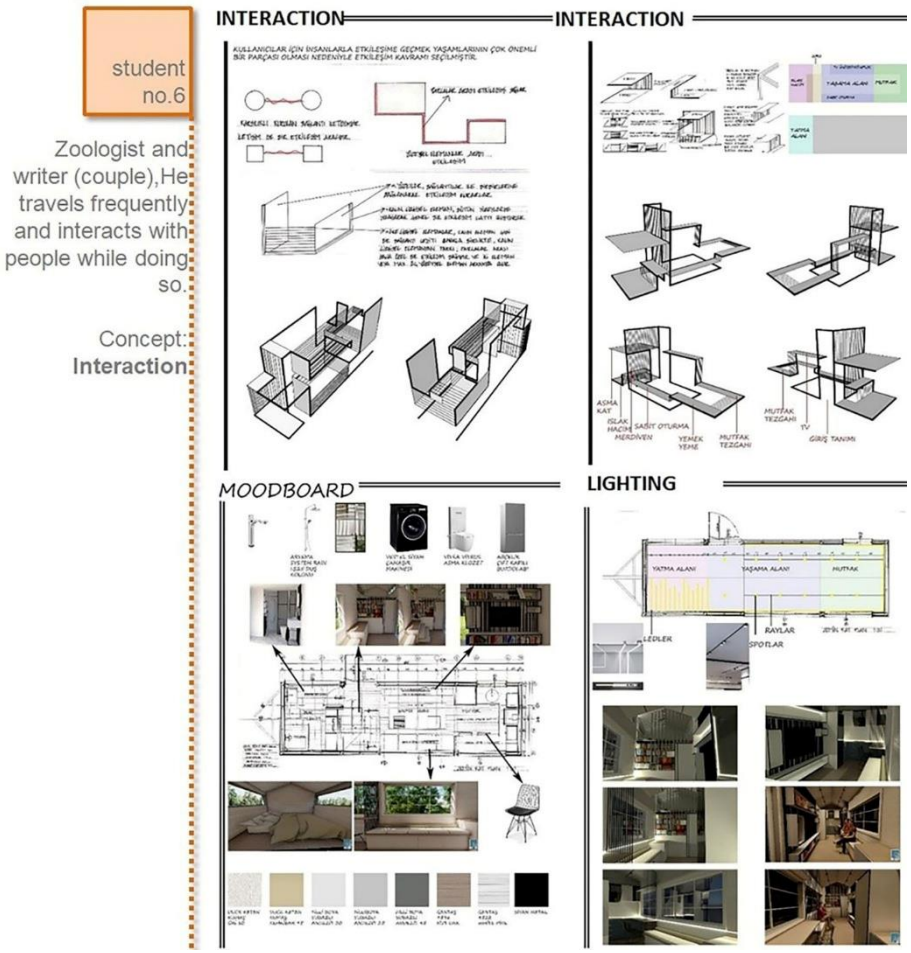


Figure 6. Student No. 6's work on the scenario, concept and spatial reflection of the concept
Personal archive, 2021

In the scenario of student number 7, who wants to go on a world tour with a mobile Tiny House and at the same time participate in workshops to run a coffee shop, promote his own culture and get to know different cultures, the user lives alone. From this point of view, the student started from the concepts of birth-awakening. Asserting that every new beginning will create a new birth, the student transferred this view to his design based on the idea that there can be a single starting point or more than one starting point (Figure 7). As a result of the continuity of movement, different spaces were designed within the building. With the opening and closing service window and bar section designed to serve coffee, it is aimed to evoke the starting state. In order to make the concepts of rebirth and awakening more palpable in the space and to create the desired atmosphere, great importance was given to lighting solutions and openings in the building.

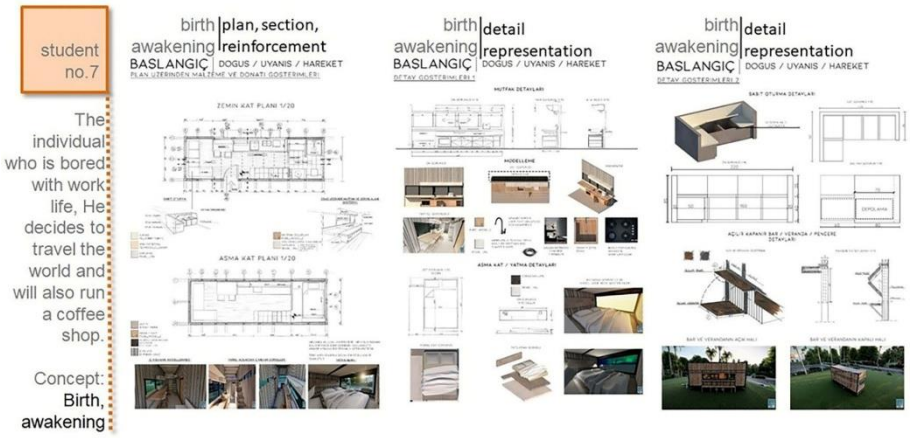


Figure 7. Material and detail work of student number 7
Personal archive, 2021

The process of an abstract work evolving into a concrete space and the process of creating an atmosphere of the determined concept constitutes another important step of the Interior Design I course. In this context, many alternatives were produced on how the concept models would evolve into the space. The work done in each lesson was criticized online via Zoom. When the concept models reached the desired stage, it was requested to scan visuals from various sources for creating atmosphere, which is another step of the study. From the images found, each student created a mood board sheet with reference to his/her own work. In this way, it was aimed to adapt the small-scale concept model to the scale of the space and to exhibit the design approach that enables the same language to be read throughout the building. In Figure 8, there are mood board examples prepared by some students for their own scenario and concept studies.

Figure 8. Examples of Moodboard works
Personal archive, 2021

During the online sessions, it was observed that students' motivation occasionally decreased. At such times, informal online discussions were initiated to understand the difficulties encountered by the students. The aim was to determine whether these difficulties stemmed from the course method or from external factors. Based on the observations and student feedback, the factors affecting their motivation are summarised below (Table 3).

DOI:10.15320/ICONARP.2025.348

Table 3. Positive and negative sources of motivation (Personal archive, 2021)

Positive Motivations	Negative Motivations
Increased interaction by organising events online (workshops, symposiums, etc.)	Disruptions in internet access
Allowing the drawings to be made within the scope of the course to be made in digital environment, allowing students to learn drawing and modelling programmes by experiencing them	The environment (home, library, etc.) does not always have suitable conditions for the course, the student's access to technology is limited and insufficient
Since the drawings are allowed to be made digitally, expenses such as paper and printouts are eliminated	Inability to easily obtain stationery materials to be used for model making, lack of space and equipment
Time and energy spent on the road can be fully diverted to work	Restricted access to libraries due to the curfew during the pandemic
Easy and fast access to the course instructors outside of class hours through the WhatsApp group created for the course	Emotional breakdown due to restricted socialisation

The ongoing and unpredictable conditions make it necessary to revise course planning by rethinking teaching strategies, course content, learning outcomes, learning activities, and assessment approaches. To keep both instructors and students motivated toward achieving learning goals, system quality, course structure, learner-learner interaction, learner-content interaction, and self-discipline play a crucial role in course design (Suo & Guo, 2021). In line with this pedagogical framework, the evaluation of student projects focused on how learners applied these principles within the online studio environment.

The analysis of student works was carried out based on the parameters defined in the methodology section, focusing on how each student addressed problem definition, form generation and function correspondence under online conditions. This categorization enabled a structured evaluation of design performance and adaptation levels.

Based on this framework, the following section summarises how these parameters were reflected in student projects. All students who took the course successfully completed the concept development process and started to research materials and details in line with their scenarios after completing the evolution of the concept into space. At this point, each student was expected to produce original space and equipment analyses by going through the creative design process as required by the scenario.

These original designs constituted another key point in the stage of reflecting the concept to the space (Figure 9).

Figure 9. Examples of material and detail studies
Personal archive, 2021

Finally, students were asked to organize their works according to a previously shared format for the exhibition to be opened on the artsteps website, an online exhibition platform, at the end of the semester. Since the organized exhibition work was not a planned part of the course period, it was not subject to any grading and participation was voluntary. Nevertheless, all students wanted to participate. The fact that additional works were requested for the exhibition and that these were completed quickly, as well as the production of more than what was requested, once again emphasized the importance of motivation sources in the study process. Some of these are: student 6, who prepared an amateur animation work with his own effort and uploaded it to YouTube website (Youtube, 2025); and student 1, who redesigned all his works on a single sheet by naming his work ToucHouse (Figure 10).

DOI:10.15320/ICONARP.2025.348

Figure 10. Sheet work of student number 1 including all his/her works Personal archive, 2021

During the transition to online education, students initially experienced difficulties in adapting to digital tools such as SketchUp,

Photoshop and digital drafting software, particularly due to limited prior experience and unequal access to equipment. Classroom observations indicated that these difficulties decreased significantly after weekly tool-based demonstrations, one-to-one feedback sessions, and the flexibility to combine hand drawing with digital refinements. These strategies played a critical role in sustaining students' adaptation and ensuring continuity in the design process.

The mixed-methods research design combines the strengths of both approaches while allowing their weaknesses to balance each other (Hammersley, 1996). As emphasized in the methodological literature, mixed methods, which bring together different research traditions, have the potential to generate more advanced knowledge than single (mono-method) designs could provide (Maxcy, 2003).

The findings of this case demonstrate that with clearly defined parameters, continuous instructor feedback, and structured digital tools, design studio pedagogy can successfully maintain its interactive and creative nature even in online settings. This highlights the potential of distance and hybrid learning as sustainable alternatives rather than temporary crisis solutions.

CONCLUSIONS AND RECOMMENDATIONS

This study demonstrates that the Interior Design I course can be effectively adapted to an online studio format without compromising its conceptual, iterative, and creative structure. The parameter-based framework developed throughout the semester provided a systematic way to monitor design development and evaluate student performance under distance education conditions, contributing to current discussions on flexible and hybrid studio pedagogies.

Findings indicate that students were able to sustain design learning outcomes, transform abstract ideas into spatial proposals, and maintain creativity despite limited physical interaction. The Tiny House design problem strengthened the relevance of the studio by grounding the assignments in real and contemporary issues, including both the Covid-19 pandemic and the 6 February 2023 earthquakes. This context encouraged students to develop socially responsive approaches and to explore compact and adaptable spatial solutions applicable to emergency housing and temporary shelters.

Based on these results, the study suggests several strategies for improving future design studios: developing hybrid models that integrate both hand drawing and digital tools, strengthening technical infrastructure, increasing student–student and student–instructor interaction, and expanding the use of accessible digital platforms.

The study also presents certain limitations inherent to the distance education process. Unequal access to computers, drawing tablets, and stable internet connections occasionally disrupted participation and slowed progress. The inability to manually intervene in students' models during three-dimensional studies reduced the immediacy of feedback

DOI:10.15320/ICONARP.2025.348

compared to face-to-face studios. Some students, especially those living in crowded household environments, experienced difficulties in maintaining concentration and motivation.

Despite these challenges, an optional online exhibition was organized at the end of the semester (Artsteps, 2025). All projects were displayed in a digital format, and participating students received certificates from the Department of Interior Architecture and Environmental Design. This final event served as a motivating closure to the semester and reinforced students' sense of achievement during an otherwise restrictive period.

Beyond the specific findings, the parameter-based framework developed in the study provides a practical and scalable model for institutions seeking to reorganize studio courses during crisis periods or planned hybrid instruction. The framework's reliance on structured weekly feedback, accessible digital platforms, and clearly defined evaluation parameters makes it adaptable for programs with varying resources. At a broader level, the study highlights the value of integrating flexible hybrid studio models into long-term curricular planning to strengthen institutional resilience. From a societal perspective, the Tiny House scenario demonstrates how design studios can promote awareness of adaptable and sustainable spatial solutions—an issue of particular importance for countries frequently impacted by natural disasters.

Overall, the experience indicates that well-structured distance education can offer valuable flexibility for design disciplines and provides insights for the development of resilient and adaptable studio models in future crisis contexts.

REFERENCES

Artsteps. (2025). Interior Design I Digital Exhibition. Retrieved November 12, 2025, from https://www.artsteps.com/view/6037bafcd305c037da5460bc

Buldan, E. (2021). Situated Learning in Online Architectural Studio Education. Journal of Design Studio, 3(1), 59-70. https://doi.org/10.46474/jds.930642

Cihanger Medeiros Ribeiro, D., (2022). Teaching basic design online during the Covid-19 pandemic: An evaluation of the conventional and innovative pedagogies. Megaron, 17(4), 589–601.

Council of Higher Education, (2020). COVID-19 information note. https://www.saglik.gov.tr/TR,80604/bakan-koca-turkiyenin-kovid-19la-1-yillik-mucadele-surecini-degerlendirdi.html

Creswell, J. W. (2021). Karma yöntem araştırmalarına giriş (M. Sözbilir, Trans.). Pegem Akademi.

Daniel, S. J., (2020). Education and the COVID-19 pandemic. Prospects, 49, 91–96. https://doi.org/10.1007/s11125-020-09464-3

Ergün, M. (2015). Eğitim felsefesi. Pegem Yayınları.

Hacettepe Üniversitesi. (2025). İç mimarlık ve çevre tasarımı bölümü bilgi paketi. Retrieved March 8, 2025, form https://bilsis.hacettepe.edu.tr/oibs/bologna/index.aspx

Hammersley, M. (1996). The relationship between qualitative and quantitative research: Paradigm loyalty versus methodological eclecticism. In J. T. E.

Richardson (Ed.), Handbook of qualitative research methods for psychology and the social sciences (pp. 159-174), British Psychological Society Books.

Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020). The difference between emergency remote teaching and online learning. Educause Review. https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning

Holden, G., & Garner, S. (2005, September 14-15). E-learning in the development of design skills and knowledge. Paper presented at the Designs on eLearning Conference, London, UK.

Karip, E. (2020). COVID-19: Okulların kapatılması ve sonrası. Retrieved March 8, 2025, from https://tedmem.org/yazilar-detay/covid-19-okullarin-kapatilmasi-ve-sonrasi

Maxcy, S. J. (2003), Pragmatic threads in mixed methods research in the social sciences: the search for multiple modes of inquiry and the end of the philosophy of formalism. In A. Tashakkori, and C. Teddlie, (Eds.), Handbook of mixed methods in social and behavioral science (pp. 51-89) Sage.

Öztürk, A. (2016). Tasarım eğitiminde yeni yaklaşımlar: Çevrimiçi tamamen uzaktan eğitim. Eğitim ve Öğretim Araştırmaları Dergisi, 5(2), 120–135.

Soygeniş, S. (2006). Mimarlık düşünmek düşlemek. YEM Yayınları.

Su C-Y. & Guo Y., (2021). Factors impacting university students' online learning experiences during the COVID-19 epidemic. Journal of Computer Assisted Learning, 37, 1578–1590. https://doi.org/10.1111/jcal.12555

Süner-Pla-Cerdà, S., Öztürk, E. ve Ünlü, C.E., (2025). Towards an integrative model of blended design studios: A multiple case study across architecture, design and planning education. Education and Information Technologies, 30 , 2005–2039. https://doi.org/10.1007/s10639-024-12873-y

Şuta, O. (2022). Covid 19 Pandemisi ile değişen mimari tasarım eğitiminde öğrenci deneyimleri. Kent Akademisi, 15(4), 1547-1574. https://doi.org/10.35674/kent.1129614

Tafahomi, R. (2022). Educational behavior of the students in the design studios during the pandemic time. International Journal of Social Sciences and Education Research, 8(4), 352-362. https://doi.org/10.24289/ijsser.1164545

Tarakçı Eren, E., Yılmaz, S. & Düzenli, T. (2023). The attitudes of landscape architecture students towards distance and face-to-face education methods and the effects of the two education methods on academic achievement in the project course. International Journal of Technology and Design Education, 33, 1221–1241. https://doi.org/10.1007/s10798-022-09771-0

UNESCO. (2020). COVID-19 educational disruption and response. https://en.unesco.org/covid19/educationresponse

Yamamoto, G. T., & Altun, D. (2020). Coronavirüs ve çevrimiçi (online) eğitimin önlenemeyen yükselişi. Journal of University Research, 3(1), 25–34. https://doi.org/10.26701/uad.711110

Yang, M. Y., You, M., & Chen, F. C. (2005). Competencies and qualifications for industrial design jobs: implications for design practice, education, and student career guidance. Design Studies, 26(2), 155–189.

Yıldırım, T., Özen, A., & İnan, N. (2010). Uzaktan mimari tasarım eğitiminde internet teknolojilerinin kullanımı. Bilişim Teknolojileri Dergisi, 1(2), 37-45.

Youtube. (2025). Tiny House Exhibition (Video). Retrieved November 12, 2025, from https://youtu.be/PPpF7hBZps4

DOI:10.15320/ICONARP.2025.348

Resume

Emine Esen GENÇAYDIN was working as a Lecturer in department of Interior Architecture and Environmental Design, Faculty of Fine Arts, Hacettepe University at the time this article was reviewed. After completing her undergraduate education at the same institution in 1992, she completed her Master's Thesis in Interior Architecture entitled The First National Architectural Period, Its Approach to Spatial Problems and Its Impact in 1996, and then her Proficiency in Arts Thesis entitled An Approach to the Design of Housing Spaces and Furnishing Elements for Wheelchair-Disabled People in Turkey in 2002, also at the same institution. Her academic areas of interest include Universal Design, Architectural History, Interior Design, Urban Improvement and Transformation, and Distance Education.

Esra ORHAN YILMAZ completed her undergraduate studies at Akdeniz University (2012) and her master's and PhD in Interior Architecture and Environmental Design at Hacettepe University. She is currently employed at Artvin Çoruh University. Her research focuses on the topics of space and user experience, daily life and media, space, culture and users well-being.

ICONARP
International Journal of Architecture and Planning
Received: 01.05.2025 Accepted: 20.12.2025
Volume 13, Issue 2/ Published: 31.12.2025
Research Article DOI: 10.15320/ICONARP.2025.349 E- ISSN:2147-9380

A Dramatistic Pentad-Based Conceptual Model Proposal for the Perception of Architectural Space

Merve Karaoğlu Can*
Zeynep Fatma Niğdeli**

Abstract

The architectural object is a rhetorical experience producer that communicates with its user as a meaningful and multifaceted social construct. In this context, architecture should fundamentally be regarded as a matter of communication and discourse. In order to seek and ensure communication in architecture, it is essential to focus on language, and in order to talk about the existence of language, it is essential to focus on symbols, signs and indicators. Therefore, this study examines the perception of the architectural object at the intersection of rhetoric and architecture by associating Kenneth Burke's discussions on symbols with the symbolic aspect of all buildings environments. The originality of the study lies in its interdisciplinary approach to Burke's method of analysis, providing a systematic reading practice for architectural objects. The absence of any other research in the literature that adapts Burke's pentads to different inputs of the architectural object highlights the novelty of the proposed conceptual model. The pentadic-based conceptual model developed within the study, along with its application to the Kolumba Museum, specifically interprets the architectural object through Burke's dramatistic pentad -act, agent, scene, agency, and purpose- to facilitate the interpretation of the symbolic meanings embedded in the architectural object and to contribute to the formation of individual judgments. Thus, a neo-critical understanding that considers the entire network of relationships constituting the architectural object can be made possible. Furthermore, the study highlights the adaptability of Kenneth Burke's dramatistic pentads for analyzing the multifaceted nature of architectural objects. By allowing flexible interpretations through different pentadic ratios, the proposed model provides a systematic framework that accommodates diverse perspectives. This approach enables researchers to explore the relationship between architecture and its symbolic meanings in a structured yet open-ended manner. Ultimately, the study contributes to architectural discourse by encouraging subjective readings that acknowledge the dynamic interaction between the built environment and its users.

Keywords: *Architecture, dramatistic pentad, Kenneth Burke, Kolumba Museum, rhetoric.*

*Department of Interior Architecture, Kütahya Dumlupınar University, Kütahya, Türkiye
Email: merve.karaoglu@dpu.edu.tr/ mervekaraoglucan@gmail.com

** Department of Interior Architecture, Selçuk University, Konya, Türkiye
Email: zeynep.nigdeli@selcuk.edu.tr

To cite this article: Karaoğlu Can, M., & Niğdeli, Z. F. (2025). A Dramatistic Pentad-Based Conceptual Model Proposal for the Perception of Architectural Space. *ICONARP International Journal of Architecture and Planning,* 13 (2), 873-897. DOI: 10.15320/ICONARP.2025.349

INTRODUCTION

An architectural object, apart from being a mere space that can meet people's needs, is a symbolic production designed to create the sociocultural, political, economic, psychological and ideological data of the society within its own imagination. Gutenschwager (1996); emphasizes that the intentions that constitute architecture are embodied in the building or complex of buildings that act as a social work, and that all architectural objects, no matter how grand or modest, have this symbolic aspect. The ability of the subject, who will be the user of such a production, to have an interactive experience depends on their ability to read and perceive the multi-layered discourse. For this reason, it can be said that architecture structurally includes communication and that the message that the designer wants to convey while constructing the space will communicate with the addressee through the architectural language-sign system. On the other hand, according to Hattenhauer (1984), communication not only conveys the meaning and function of architecture, but also communicates rhetorically by influencing behavior and encouraging use of architecture. In other words, the architectural object is a persuasive phenomenon, a rhetoric; therefore, being evaluated as a rhetorical-communicative work also allows it to be analyzed as a language.

The cognitive/textual language established by the architectural object by images loaded with symbolic meanings conveys the meanings that enable the space to be constructed in the mind and remains in the memory even when the space is not experienced or seen (Arslan & Uludağ, 2020). In this context, the study focuses on reading the discourse of the network of relationships that constitutes the architectural object, both internally and externally, in other words, an a "whole". The hypothesis of the study is that in the processes of interpreting and experiencing the architectural space and transferring this experience, one-way (biased) transfer of architecture-space-subject relations is dominant, and this is a reductionist approach towards the multiple layers of meaning carried by the architectural space. The basis of the idea put forward is that the reproduction of information in space can only be achieved by reading holistic relationships. That's why, it is thought that by going beyond the ordinary and including the readings of the architectural space in a multifaceted interpretation, analysis-relationship process can enrich critical understanding. In this context, the study can be considered as a new attempt to interpret the narrative of the architectural space on communication-relationship-symbol, fed by the authors knowledge and experiences gained from the first author's observations during the visit to the Kolumba Museum. Thus, it is aimed to present a concrete-methodological study to ensure semantic continuity in the perception of architectural space, and to open for discussion whether a different perspective based on a holistic interpretation process can contribute to the process of questioning and interpreting architectural space.

DOI: 10.15320/ICONARP.2025.349

Rhetorical studies are generally structured to focus on the texts in which the discourse is produced, the target audience as the audience of the rhetoric, and the speaker as the producer of the discourse (Shearer, 2004; Rountree&Rountree, 2015; Tobin et al., 2014; Simonson, 2010; Durmuş & Gür, 2017; Schraufnagel, 2021). On the other hand, studies examining the relationship between rhetoric, art, design, architecture, and interior design tend to focus on textual messages or modes of representation (Dickinson et al., 2005; Bowie, 2015; Toros, 2020; Hawhee & Poole, 2019; Gürer & Yücel, 2005; Gutenschwager, 1996; Hattenhauer, 1984). Among these studies, Sonja K. Foss's (1982) work titled *Rhetoric and the Visual Image: A Resource Unit*, in which Foss comes up the argument that rhetoric can help us understand how visual images are processed and how they affect society, stands out. In this study, which aims to assist instructors of rhetoric in the generation and development of methods of teaching this rhetoric of the visual image, Foss illustrates how the concepts of three rhetorical theorists can be used to analyze three visual images in order to illustrate the application of contemporary rhetorical theory to visual phenomena: I. A. Richards' ideas to analyze Joan Miro's Blue II; Kenneth Burke's concepts to analyze a Burger King restaurant; and Richard Weaver's concepts to analyze the oceanfront strip in Virginia Beach, Virginia. However, like other evaluation articles, this study, too, organizes its perspective not according to the architectural object and space, but according to rhetoric. Although a limited number of studies have applied Burke's dramatistic pentad to built environments -such as Guise's (2013) analysis of Disney's Main Street, U.S.A., which interprets themed commercial space as a persuasive cultural narrative, and Ivanainen's (2015) examination of Astana's monumental architecture as a state-constructed instrument of nation-building- these works predominantly conceptualize architecture at the urban and symbolic scale. Yet, none of them adapts the pentad to the distinct internal inputs of the architectural object or engages with the phenomenological dimension of spatial experience and user interaction. This conceptual gap requires reconsidering how persuasion operates within architectural discourse and spatial perception. Therefore, the present study differs in proposing a pentadic reading model grounded in the architectural object itself, aiming to reveal its symbolic structure through an integrated, experience-based analytical framework.

In this regard, the process of persuasion is attributed to the structural realm. The outcome of this shift is not a persuasive text or representational strategy in the hands of the architect, but an architectural object that performs as a text before the viewer and generates its own field of existence. The originality of the study lies in its unique interpretation of the Kolumba Museum's architectural product and spatial experience, supported by a conceptual pattern model that extends Kenneth Burke's analytical framework.

THEORETICAL FRAMEWORK

Communication and Rhetoric

Language is the symbol system on which most of us rely for communicating with others on a daily basis and social life depends on our ability to use a wide range of symbol systems to communicate meanings to one another (Herrick, 2018). In his work *Principles of Literary Criticism*, English literary critic and rhetorician Ivor Armstrong Richards (2004), defines communication as the effect of one mind on its environment affecting another mind, and the formation of an experience in the other mind that is similar to the experience in the first mind and is partially caused by this experience. Therefore, the success of active and receptive communication depends on the extent to which similarities of past experiences can be benefited from. According to Buchanan (1985); communication is generally the way a speaker explores arguments and presents them with appropriate words and gestures to persuade an audience. In both definition structures, a transmitted-perceived message-meaning, speaker-listener, i.e. parties, and persuader-persuaded, affected experience-behavior-action come to the fore. Considering the subject's communication style and needs, it is inevitable that rhetoric, which focuses on the analysis of these structures, will become a research field for different disciplines.

In the historical development process, it is seen that rhetoric has become a tool that takes on a religious aspect to invite people to religion and to make religious education effective, and that has developed with a rational content to serve science-humanism and to comprehend the world (Kocabaş, 2019). The changes in the field of social sciences in the 20th century divided rhetoric, which existed in different forms and for different reasons, into two, being classical/old and new rhetoric. The foundations of the classical rhetoric tradition are based on different pragmatic and pedagogical approaches, such as the Sophists in Ancient Greece giving lessons in beautiful/correct speaking to citizens in return for money, Plato's theorization of rhetoric as the "art of deception" in a pejorative sense, Aristotle's theorization of rhetoric as the "ability to use the available means of persuasion" by pulling it to a neutral plane, and the adoption of rhetoric as an understanding of correct speaking techniques under the leadership of Cicero and Quantilianus (Ünlü, 2018). In the ancient world, rhetoric provided the basis for systematic forethought in all of the distinct forms of making in words: history, drama, poetry, political and legal speeches, prayers and religious sermons and the organization of thought in narrative and argument as well as the composition and arrangement of words in style. Yet rhetoric was not the art of words, but the art of thought and argument whose product found embodiment in words as a vehicle of presentation for Aristotle, the philosopher and rhetorician (Buchanan, 1995). Aristotle says that persuasion-rhetoric, which is an act of persuasion that occurs when someone tells someone something and is a rational act by nature, is of three kinds: the character of the speaker, perceived persuader

DOI: 10.15320/ICONARP.2025.349

credibility (i.e. ethos), the mindset or feelings of the listener, emotional appeal (i.e. pathos), and the speaker himself/herself, the totality of logical arguments, logical appeal (i.e. logos) (McCormack, 2014; Garver, 2017). Meyer explains the relationship between these types as follows; ethos addresses the listener and aims to attract their attention regarding a question, then exhibits logos regarding this issue, possibly supporting or opposing it, and the speaker concludes the process of exhibiting with pathos. Because it is necessary to appeal to the listener's body and heart, and if possible, target their passions, emotions and excitement (Köklüdağ, 2016). This process shows that Aristotle placed rhetoric into a system, and that, contrary to the ideas of his predecessors - especially his teacher Plato - he did not develop a counter-critical approach to rhetoric; he tried to attribute a constructive-useful-consistent feature to it.

On the other hand, the neo-modern Western rhetoric of the 20th century emerged by nourishing, redefining and reviving the classical tradition. There has been a shift from argument to language as the basis of influence, from the speaker to the discourse consumer's interpretations, from single-text explanations to the criticism of discourse bodies, from verbal understanding to the use of rhetoric as a symbol; the changes have spread to the criticism of rhetoric in all forms of discourse, from verbal to nonverbal to visual symbols and rituals (Campbell, 2006). James Herrick (2018) says that the definition of rhetoric should be expanded to include purposes other than persuasion, such as clarifying, awakening our sense of beauty and providing mutual understanding, and defines the art of rhetoric as “the systematic study and intentional practice of effective symbolic expression”. Here, effectiveness is measured by the person using the symbol achieving their goals. Therefore, success is achieved by establishing a connection between the rhetor's views and the audience's views; in other words, speakers, writers and designers take into account the values, experiences, beliefs and desires of the audience. On the other hand, rhetoric also has the power to shape thought. The symbolic framework of the listener can be changed through a skillfully crafted message; this means that ways of thinking, the direction of communities and patterns of action can also be changed (Herrick, 2018; Buchanan, 1985). While in the analysis of old rhetoric, speech, thought figures and rhetorical types come to the fore, in new rhetoric, in addition to these, context, addressee and logos are emphasized (Özer, 2006). This expansion of the meaning and scope of rhetoric also allows rhetorical researchers to diversify their fields of study. For new rhetoric researchers, any subject can be chosen as a field of study, from the rhetoric of social movements to the rhetoric produced by places, from public speeches to political campaigns (Ünlü, 2018). Websites, movies, videos, music, dance, furniture, automotive, clothing, and architecture can also be considered forms of rhetoric; because the symbols used are in constant change and the process of re-signification can turn them into rhetorical works.

Within the scope of these explanations, it can be said that the art of rhetoric is the construction of persuasive communication, while at the same time it is a systematic presentation aimed at examining these constructions. It is likely that the characteristics of the architectural object and space that produce multiple meanings and feed various readings can be included in the systematic presentation in the context of communication. Because architecture is also a system of rhetorical rules that convey the messages that viewers – users – expect, and (Hattenhauer, 1984), architects were trained to move clients and audiences through spatial and narrative gestures, persuade by a range of visual-verbal compositional techniques (Kirkbride, 2017). In order to place the subjective judgments that can be developed on the architectural object in a methodological framework, the approach of the study will be based on Burke's ideas, highlighting the identification of the new rhetoric with the subject.

Kenneth Burke and ‘s Dramatistic Pentad

Language is not a neutral tool used to describe an objective entity; the linguistic choices we make while speaking shape our perception, reveal our intentions, and therefore have a strategic dimension (Herrick, 2018). According to Kenneth Burke, who is considered a linguist, literary critic, sociologist, poet, philosopher, and rhetorical theorist due to his contributions to the fields in the 20th century, humans are symbol-using animals whereas language is a symbolic action (Burke, 1973). Symbols are linguistic representations of a pattern of experience and are tools for defining situations or establishing social relationships that facilitate human adaptation to their environment or a situation. As a person's knowledge increases, the connections established through thought in the universe of symbols also become stronger. For this reason, the symbolic action theory put forward by Burke centers on humans and focuses on human actions loaded with symbolic meanings that are directly mediated by language (Çebi, 2008). On the other hand, in Burkean thinking, communication has not only a symbolic dimension but also a rhetorical dimension. As Burke put it; “where there is meaning, there is persuasion, and where there is persuasion, there is rhetoric.” (Campbell, 2006). As can be understood from here, Burke does not reject the persuasion that is the basis of classical rhetoric, but instead builds the new rhetoric that he founded on the concept of “identification”, which he uses as an extension of the idea of persuasion (Karaaslan, 2022). Identification is the feeling of being related to a person, issue or organization (Jackson, 2013). Our first aim in confronting human situations that demand a symbolic response is to frame our response in such a fashion as to induce compliance from others. And the way that we seek to induce compliance is by trying to get others to identify with us and our view of things (McCarron, 2021). Rhetoric as identification builds social communities by enabling people divided by opposing interests to identify with each other. This is

DOI: 10.15320/ICONARP.2025.349

necessary because people are often against each other. Rhetoric becomes a socializing and moralizing process when individuals identify with those with whom they disagree (Zappen 2009). According to Burke, this process is a way to overcome the separation and alienation between people (Kocabaş, 2019). In his book, *A Grammar of Motives*, Burke constructs a synoptic method, independent of the universal history of human culture that can be used to analyze the rhetoric of the motives that construct human actions and how identification can be created between opposites. This method, which he calls "dramatism", includes assumptions about every judgment, advice or counsel, every view of natural or supernatural reality, every intention or expectation, motive or cause (Burke, 1969). Since Dramatism is a method of analysis and criticism of terminology on cycles or clusters of terms and their functions, the five concepts that Burke described as productive form the basis of the study: the dramatistic pentad: act, scene, agent, agency, purpose. Each concept basically seeks answers to five questions: *what was done (act)?, when or where it was done (scene: the environment in which the act took place, the extrinsic factors that determined it)?, who did it (agent: who did the act and under what subjective conditions)?, how he did it (agency: what instruments were used)? and why (purpose: ultimate motive or final cause)?* (Burke, 1989; Henderson, 2020). The starting point of Burkean thinking is "action", understood as a conscious and voluntary behavior that involves a purpose, an intention. Instead of highlighting one element, Burke, who understands that every element of the pentad has an influence on and conditions the others, offers the possibility to relate all the parts and to study them from a unified perspective, in an attempt to give them a more complete sense. Thus, by understanding every single element and the connection between them, "action may acquire its meaning" (Zurutuza-Muñoz, 2014).

The concepts in the pentad are arranged according to "ratio", which Burke suggests would be more useful when combined (Herrick, 2018). Each element in the pentad structure can be related to any other element; that relation is the ratio. For example, the essence of human motivation can be explained by establishing an action-purpose or agent-action ratio. In this way, the persuasion tools used by the speaker while organizing and structuring their message can be better understood. McCarron (2021) explains these ratios using the example of a messy room as follows;

> *"Imagine walking into a very tidy room that was untidy when you last visited it and asking why a recently messy room is now so clean. In other words, you are asking why someone decided to tidy up the room. You are, then, inquiring into motives: why did you clean this room? Now, one person might choose a scene-act ratio to explain the action in question based on the conditions of the scene: "I looked around me, saw the chaos in the room, and decided to put everything back where it belonged." This makes perfect sense, insofar as sometimes we actually*

say things such as, "This room is just asking to be cleaned." Alternatively, someone else might explain the act based on an agent act ratio: "Because I cannot tolerate disorder—I am, as you know, something of a neat freak—I decided to put everything away where it belongs." This also seems reasonable, for each of us probably knows someone who has a low tolerance for disorder and untidiness."

Briefly; explanations for action can be conveyed in different ways, by changing the source of the action. Burke expresses this relationship as "the ratios are principles of determination" (Gusfield, 1989 in Burke, 1989). The point to be noted is that even in cases where any of the pentad elements are highlighted, the motive and action are evaluated on the basis of five concepts.

In her book *Rhetorical Criticism: Exploration and Practice*, Foss explains the variety of methods that can be used for rhetorical criticism and literary practice, with sample analyses. In the 11th chapter of the book, she states that pentadic analysis can be carried out in a four-stage process, but the process can be terminated after the first two stages, if desired. These two stages are the following (Foss, 2018);

1. *selecting an artifact:* virtually any artifact is appropriate for a pentadic analysis; discursive and nondiscursive artifacts work equally well,
2. *analyzing the artifact:* in criticism in which the terms of the pentad are used as units of analysis, three operations should perform; (a) the first step in a pentadic analysis is to identify the five terms - agent, act, scene, purpose, and agency- in the artifact from the perspective of the rhetor. Identification of the five pentadic terms results in an overview of the perspective that the rhetor is taking on the situation; (b) applying the ratios of the terms to identify the dominant term -the most important term among the five terms and the one through which everything else happens. Identifying this term provides insight into what dimension of the situation the rhetor privileges or sees as most important. To discover the dominant pentadic element, the ratios, or pairings of two of the key terms, can help the critic. One term may not clearly emerge as the dominant term. Two terms may be equally dominant, or dominance can be spread equally among the five terms; (c) identifying motive from the dominant term. The dominant term can be used to identify the philosophical system to which it corresponds, and that system can give you ideas about a rhetor's motive. If the term act is featured in the pentad, the corresponding philosophy is realism; if scene, materialism; if agent, idealism; if agency, pragmatism; if purpose, mysticism.

In fact, it can be said that every individual who tries to understand and make sense of life by reading symbols is a natural theorist. For

DOI: 10.15320/ICONARP.2025.349

experienced rhetorical critics; although the productive process does not sometimes require method follow-up, the existence of such a systematized method can ensure that a disciplined, consistent and conscious process is carried out on the object of research in order to ensure effective communication. This study will develop its own reading practice by using and transforming the concepts and analysis methods given in this section.

MATERIAL AND METHOD

There are several studies that address text readings using Kenneth Burke's analysis model. The contents of some of these studies are as follows: Smudde (2004) explained that using Burke's tools of analysis - terms for order, identification, and the dramatic pentad - as a system can provide insight into the symbolic action of public relations and presented a methodology for how these tools can be applied to micro- and macro-level studies. Using Burke's (1969) dramatic pentad to analyse narratives of 22 women's birth experiences, Tobin (2014) et al. explored the lack of communication, connection and culturally competent care in the women's experiences and how this affected the care received, revealing a multitude of narratives of scene-agent and act-agency imbalance. The study by Rountree and Rountree (2015) examined the pentad, which they accepted as a model explaining the logical elements of action, within a pedagogical framework and revealed how educators can use the pentad to raise new generations of students as linguistically aware citizens. Shearer (2004) states that the pentad can be adapted to a scenario production process, thus making the process less prone to systematic errors and increasing quality, and so, contributing to literary studies. These research examples can be expanded across different disciplines. As a result of the literature review, studies on design–art criticism, museum and space rhetoric, as well as research addressing architectural and built-environment rhetoric (Hawhee & Poole, 2019; Bowie, 2015; Hasian & Wood, 2010; Dickinson et al., 2005; Guise, 2013; Ivanainen, 2015), were also found; however, no comprehensive study has been found in which pentads are adapted to different inputs of the architectural object. Therefore, it is thought that the study is original and will provide a new perspective for future studies.

The individual's own values, norms and criteria are valid in the formation of judgments about the architectural object. However, since it is not possible to know every thought, event and detail regarding the process of emergence of the same architectural object, it will be inevitable to present prejudiced views. For this reason, developing analytical approaches that enable an independent and unbiased understanding process with a broader perspective can contribute to a deepened examination. On the other hand, as Zurutuza Muñoz (2014) stated; the dramatic pentad is not a closed analysis method and does not give the essence of a speech, action or situation. It is an ambiguous tool

because it does not lead to a right or wrong reading of an action, it makes every result valid.

In this context, the study was based on two approaches: literature review and application-analysis. The literature review was conducted within the framework of rhetoric, dramatization, pentad concepts and contents. Pentad concepts allow the elements of symbolic action to be determined and relational analyses to be made with ratios. For this reason, it was deemed appropriate to transform and transfer the theoretical infrastructure in a way that would allow the subject/user to be addressed through the spatial experience, and to construct a conceptually based pattern model. The intellectual background of the model proposal is to define a versatile area of freedom for the individual who will read the architectural object. In order to perform pentadic analysis, the stages that Foss brought to the literature were followed; as a third stage, the model proposal was added to this analysis system. The equivalents of the stages in the previous section in this study are as follows (Figure 1):

Phase 1/ Selecting an artifact: The Kolumba Museum project by Peter Zumthor, who won the Pritzker Architecture Prize which brings an architect to the center of attention all over the world, is generally evaluated by the architectural public through the absence of symbols. However, the structure itself can also take its place in the world of symbols that Burke mentioned, with its location, the traces it contains and the reason for its existence. In this respect, the Kolumba Museum was chosen as the work to be analyzed, considering that it would contribute to the content of the study.

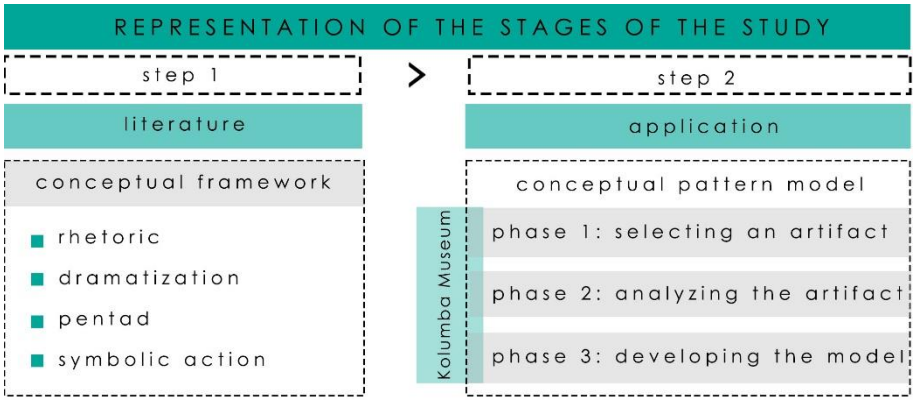


Figure 1. Methodology of the study (Created by the authors.)

Phase 2/ Analyzing the artifact: In his book *On Symbols and Society*, Burke (1989, pp. 135) presents the program of elements that constitute dramatism as following:

> *"for there to be an 'act', there must be an 'agent'. There must be a 'scene' in which the agent acts. To act in a scene, the agent must employ some means, or 'agency'. And it can be called an act in the full sense of the term only if it involves a 'purpose'."*

DOI: 10.15320/ICONARP.2025.349

In this whole; act, agent and scene are the key elements of interpretation, but in order to be understood, the other elements surrounding them must also be understood. The application of the dramatistic pentad to the study of architectural objects and spaces is discussed through the act of re-functioning within the scope of this study. In this case, the elements distributed by taking the act to the center are as follows:

Act: Re-functioning (saving a structure that is on the verge of extinction and offering it to public use)

Agent: Peter Zumthor (defining the architect and architectural understanding)

Scene: Kolumba Museum (description of structural features)

Agency: Kolumba Museum-Interior Space/Exhibition (revealing the relationships between temporary- permanent exhibitions and venues and visitors)

Purpose: Transmission and encouragement (providing information about the historical background of the building and encouraging museum visits)

Phase 3/ Developing the model: Burke's dramatic pentad is often visualized as a "star", representing a group of five "things" (Figure 2). The junction points within this star show the elements, and the lines that establish the connections show the relationship (ratio) between these elements.

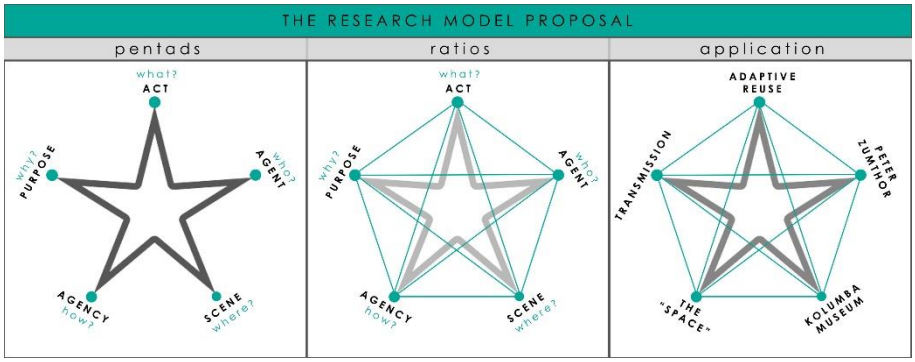


Figure 2. A dramatistic pentad-based conceptual star model proposal of the study (Created by the authors.)

It is important that this star shape is reproducible in the context of different relationships when considered as a set of patterns. For example; the pattern form produced by a researcher who wants to read the act and reason for existence of an architectural object through the relationship between these two will be different from the pattern form produced by emphasizing the work itself and its designer. Figure 2 shows an example of the appearance of the element(s) that the researchers examined in depth within the conceptual pattern model. On the other hand, it would also be possible to produce patterns in which none of the pentad elements are emphasized more than another. The point to be noted is that the elements cannot be independent of each other, several elements cannot exclude another element, all of them must work together more or less. Since the first sample analysis of the

conceptual pattern model presented within the scope of the study was made, a holistic analysis was made without highlighting any element.

PENTADIC READINGS FOR THE KOLUMBA MUSEUM

*Act: 'the memory'*_ Re-functioning the Kolumba

Even after centuries of war, cities create a new image with social life practices that reflect the spirit of the times. These urban images are affected by all the events recorded in the social memory; places, memories and experiences are shaped by being associated with that place. The temporal and spatial accumulations of togetherness create layers and reveal the continuous transformation of space. Traces of what happened in the past and what is happening now are mixed together, making a multidimensional reading practice possible. This process, in which the city participates with each of its elements, evokes a palimpsestic articulation. Palimpsest; is defined in Oxford Dictionary (n.d.) as: "an ancient document from which some or all of the original text has been removed and replaced by a new text" and "something that has many different layers of meaning or detail". The multi-layeredness emphasized in the definition, the possession of traces, the display of them and the state of being together with another newness, turns palimpsest into a metaphorical concept. In palimpsest spaces, the separation of layers or the perceptual equivalent of traces provide the user with information about the transformation of the space in different time periods, while their coexistence is the exact equivalent of the palimpsest space. For example, in a palimpsest text, which Tran (2011, as cited in Niğdeli and Sayıl Onaran, 2024) explains with the triple meaning situation, he states that the first meaning is the existence of the old work, the second meaning is another work placed on it, and the third meaning is another "new" holistic structure where these two come together. The potential of layers to reveal each other and to produce dynamic spaces as a result of continuity enables different meanings, contents and contexts to be carried within the same integrity. So, not only visible values in the physical dimension but also various symbolic meanings emerge and are loaded. Because space is a part of the act of producing, understanding, perceiving and remembering, and even a reference point, and is important in terms of the constructibility of the semantic-symbolic equivalent of social memory in the built environment. The re-functioning of these spaces in the context of museum spaces that preserve the concrete data of the past and convey its knowledge is important in terms of developing rhetorical behavior patterns and using these structures as symbols. This symbolic and at the same time actional relationship, in which the pentadic purpose is directly connected to the pentadic act, is made visible by returning the structural performance to the inert. In this respect, it becomes easier for a space that constructs a communication-based relationship model by taking into account the social needs of the society to meet expectations.

DOI: 10.15320/ICONARP.2025.349

Figure 3. Star model for *act* (Created by the authors, photographs by Merve Karaoğlu Can.)

In his book *Thinking Architecture*, Peter Zumthor (1998) describes a sensory-emotional-meaningful spatial experience beyond mere functionality: "The old and the new were balanced and harmonious. The new parts of the house did not seem to be saying *'I am new'*, but rather *'I am part of the new whole'*." The intellectual background of this discourse contains the content of the palimpsest in its re-functioning. On the other hand, the content is not only expressed by Peter Zumthor, but is also brought to the agenda by those who practice analyzing and explaining the semantic content of his works. In the announcement text prepared by Philip Urpsrung after Peter Zumthor won the Pritzker Architecture Prize, he stated that the Kolumba Museum offers viewers a palimpsest of layers of history and allows them to inscribe themselves in the narrative in order to become a part of the story (Ursprung, n.d.), which is an indication of the simultaneous experience created by the old-new temporal perception. In this context, Kolumba fulfills the action envisaged in terms of defining the space again and together with the qualitative characteristics of a different space -re-functioning-, producing new meanings by revealing the meaning of the existing -palimpsest-, and reminding the past with its structure that constantly produces meaning -memory- . In this state, the "thing" that Zumthor wants to create is included in social life not as a new-contemporary-additional part of a whole, but as a "new whole" represented with a deliberate new meaning (Figure 3).

***Agent: 'the architect'*_Peter Zumthor**

Born in Basel, Switzerland in 1943, Peter Zumthor lived a life that was, in his own words, "disobedient" (Spier, 2001), far from formalism and the motivation to stay on the agenda in service to the popular in Haldenstein. Having received many awards including the Carlsberg Architectural Prize (1998), the Pritzker Prize (2009) and the RIBA Royal Gold Medal (2013), Zumthor is distinguished from his contemporaries by the lack of characterization of his design approach. When ensuring and preserving this; referring to the local cultural heritage in every project, giving the necessary time for the architectural object to develop with belonging to the place, both to himself and to the work, and shaping the relationships through matter-material-atmosphere has been very influential.

It is clear from both the program of his works and his discourses that Zumthor attaches particular importance to process in his architecture.

In an interview with Steven Spier (2001), he describes the project's extension into the process as an inevitable part of the goal of creating atmosphere: “they have started to call me crazy or nuts or something, that I don’t know anything about building or timetables when the opposite is true. I insist on knowing something they have long forgotten or have never known: *that to do something well you need time… otherwise I cannot create an atmosphere*, so what good would it do me to do a building which wouldn’t have this atmosphere.” The process in question essentially makes the architectural object specific to its location and distances it from the general understanding, specific usage and typological connections and indicators. Zumthor produces new meanings each time, without adhering to routines; he uses matter with a practice that is known - but that goes beyond the known when used. Thus, the process considered during the construction phase is reflected in the life cycle of the building in different ways. The architectural object that creates different atmospheres at different times of the day becomes fluid and open to interpretation. So, each user can produce their own interpretation and participate in the meaning-making process within their own interpretation. Zumthor's interest in creating experiences and considering the needs for different sensory stimuli finds its counterpart in the limitless production of the space user. In this way, Zumthor's works gain uniqueness and timelessness.

Figure 4. Star model for *agent* (Created by the authors, photographs by Merve Karaoğlu Can.)

Zumthor's prioritization of experience can be evaluated in the context of his removal of the architectural object from the pattern of meaning. However, Zumthor (2006) says that meaning can only be mentioned when building materials manage to create special meanings that can be felt and perceived in that architectural object. Although the concrete qualities he wants to achieve require him to stay away from signs and symbols in the materials he uses or in the way he uses them, the architectural object eventually creates its symbolic value together with the individual with whom it enters into dialogue. As in Kolumba, the structure becomes another symbol in the whole, if not in parts: a symbol of sensory architecture, the tactile, locality, uniqueness, sacredness, history, etc. The atmospheric creation that Zumthor aims for also supports Kolumba's sacred origin and its mediation to transcendence on a rhetorical level. On the other hand, according to Zumthor (2006); a work can convey messages, but once the message is understood, curiosity fades and the question of the usefulness of the

DOI: 10.15320/ICONARP.2025.349

architectural object for practical life remains. Kolumba diversifies the messages it can convey with the symbolic meanings it creates, keeping curiosity alive. Thus, Zumthor successfully fulfills his duty as an agent in producing symbolic meaning (Figure 4).

***Scene: 'the building'*_Kolumba Museum**

The Archbishopric of Cologne has organized an architectural competition for a building that will house the ruins of the late Gothic church of St. Kolumba, which was destroyed during the bombardment in the World War, the octagonal "Madonna in the Ruins" chapel with stained glass windows and a marble altar, built in 1949 by the Cologne architect Gottfried Böhm on the site of the old church, the archaeological remains (Roman, Carolingian, Merovingian, Romanesque, Gothic) found during excavations in the 1970s, and the exhibition of its sacred art collection (Navarro Martinez, 2010). The "reflective museum" effect that was sought in the competition call can be clearly seen in the rules: an architecture that creates space but is moderate-simple-functional; in line with the reality and dignity of the existing; a natural environment; durable materials but minimal use of technology and the inclusion of all preserved parts in the design (Kolumba Art Museum, n.d.). Of the 166 accepted projects, Zumthor's reads the rules from an unconventional perspective. For example, the inclusion of ruins in the design does not manifest itself as restoration, but as a reinforcement of the reality of the existing as a structural component for a new whole. Zumthor's emphasis on matter-material-experience coincides with the importance given to material in Kolumba's architectural competition announcement. For this project, Zumthor worked with Danish ceramics company Petersen Tegl to develop a handmade brick that is thinner and longer than standard bricks. This material, known as "Kolumba bricks" and currently sold on the international market, is effective in reflecting the pure, honest character that Zumthor wanted to create, referencing the craft traditions of the place and presenting each component of the museum as part of a wider context.

The museum structure basically contains two functions, namely the "old-archaeological area" and the "new-exhibition space", in an integrated manner. Museum shops, cafes and restaurants, which became an indispensable part of museum structures and could be specialized as social reception spaces, as the changes in production-consumption balances in the 20th century brought museums into competition within the scope of the culture industry, are not included in Kolumba's spatial program. Instead of these spaces, a reading (resting-socializing) room is designed to remind of the spiritual and sacred origin. However, when this room is examined within the context of the relationship established with the city, it turns into an exhibition area because the spatial organization in the museum is arranged in a way that establishes a relationship with the historical structure of the city. Openings without any structural boundaries present the visitor with a frame of the city's

memory along the tour route. This does not only happen on the ground floor where the ruins are located. The inner -but outer- archaeological site, which makes one feel the coldness of war especially in the winter months, limits the relations thanks to Zumthor's special bricks. Here, the density of the space is captured in the convening of matter with light. The space, which is neither as bright as the new one nor as dark as to suggest that the old one has been forgotten, turns the church contours into a means of separation between the building and the outside. The character that establishes a dialogue, makes itself seen but keeps its distance is also seen in the separation of the polished bridge that provides the visitor's circulation from the archaeological site with the emphasis on material, color and lighting. Such contrasts are a feature of the box idea that Zumthor uses to create spatial patterns. Özel (2017) defines the box in the sense of Zumthor architecture as an "introverted space" that is separated from the larger space around it in a way that minimizes its relationship with it. Introversion requires isolating the box from its surroundings, surrounding it with another element and/or preventing direct access. The idea of reaching places not directly but by walking around them also determines the functions to be assigned to these boxes. In Kolumba, the primary and secondary functions of the exhibition and service spaces are the boxes, and the circulation areas surrounding them are the shell that controls the relationship of the box with the outside. This organization develops in a vertical-sequential manner along the two-story height of the archaeological site, while it becomes a horizontal-parallel expansion after two floors. In the expansion area, the boxes are rectangular, low, dimly lit "cabinettes" and square, spacious, bright "towers" (Özel, 2017). This way, a difference is made in the controlled intake of light into the spaces and in the relationship that the visitor can establish with the city on the upper floors. The experience that the visitor will have while moving between the spaces will differ at every level due to the effect of these components on the whole. Not following a purely chronological order also strengthens the experience.

Figure 5. Star model for *scene* (Created by the authors, photographs by Merve Karaoğlu Can.)

What Zumthor did with the Kolumba structure was to give his architecture a poetic quality by taking it out of being a visual tool and opening it to multi-sensory use. Thus, a connection is established between the past and the future, the emotional and the physical world through the architectural object. On the other hand, the architectural

DOI: 10.15320/ICONARP.2025.349

object, as the scene where relationships will be understood and symbolically represented, brings a new perspective to the perception process by providing meaningful existential experiences to its user. It can be read within this perspective that Kolumba, in which Zumthor conveys everything as its existence requires, without using symbols that he thinks no one can read, becomes a scene the moment it communicates with the user (Figure 5).

***Agency: 'the space'*_Kolumba Exhibits'**

The entrance on the west side of Kolumba, which presents different layers together on a wide surface, is recessed. This situation ensures that the museum entrance is guiding and on point. In the hall that is reached after the reception desk and also overlooks the garden, a series of transitions surrounding the entire structure are felt. From the entrance, you first encounter a cramped and narrow space, then you move on to another spacious and wide space, and then you reach a limited and narrow space again. These transitions facilitate the creation of spatial distinctions in the museum and the inclusion of sensory sequences in a planned composition. When you look at the whole, you can see that each floor is differentiated by the effects of light and materials. The light inside the building increases and brightens as you go from the ground floor to the upper floors - just like providing spatial flow; natural light is always received from the side of the space, while artificial light is received from the ceiling (Appelt, 2012). By this, Kolumba's exhibition spaces constantly change the background provided to the works throughout the day with the sunlight received from the large window openings. Visitors remain in a dynamic formation at different times even on the same day. This unpredictable atmospheric environment, which changes depending on the movement of the sun, is obtained by evaluating the environmental character according to Pallasmaa (2021, 2016) and removes the effect of sharply focused vision. In the middle of the horizontal and vertical flow of the structure, the visitor encounters a room where the ceiling-wall-floor materials are completely black, where light is directed only to the work, meaning that spatial boundaries disappear. The room where the treasures of the old church were collected and which is positioned right on top of the old tower of the church is one of the main places that trigger tactile contact with the material. For these reasons, the dramatic differences sometimes provide the visitor with a tempo during the tour route, allowing him/her to immerse himself/herself in the exhibition, and sometimes slowing it down and surprising him/her. In fact, even if Zumthor did not design a directed movement in the context of museum rhetoric - especially on the upper floors - the spontaneous relationship between the work installations and the fluid structure of the building allows for this route. The visitor does not have to choose a direction in the space, does not have the feeling that there is an area he/she does not see, and does not have the uneasy feeling that something is missing. In

order to provide continuity to all these effects, the coincidental is left out and every detail and component is carefully considered.

Figure 6. Star model for *agency* (Created by the authors, photographs by Merve Karaoğlu Can.)

Exiting into well-lit spaces after cramped, narrow and dark spaces also metaphorically supports movement within the space. Because the liturgical objects displayed in the space refer to the location of the building - the church and its history, and repeatedly remind us of the core of the design. Zumthor's emphasis on the "trigger threshold" (Appelt, 2012) becomes evident at these points. Wun-Ming Wat (2014) interprets such thresholds encountered in his own Kolumba experience as the spiritual dimension of the architectural and physical boundary: "not merely physical difference, the crossing to something new, to a new lived condition". In other words, the architectural object -Kolumba- realizes what was put forward for the "purpose" -the transfer of sacred origin- by using spatial qualities. Thus, each work becomes a visible symbol with the support of the architectural object. The architectural object, which also affects the curatorial layout of the space, constructs the monadic existence of the artworks and strengthens the communication between them. In this way, the symbolic discourse gains continuity (Figure 6).

***Purpose: 'the transmission'*_History and Background**

The city of Cologne was almost completely destroyed in World War II and entered a period of post-war reconstruction. Alfaro Lera describes this process, which continues to this day, as "collective catharsis", "a slow national recovery". Although disagreements arise on how the intervention in the city's 2000-year-old history should be carried out, a logical and pragmatic stance is adopted in the form of paying attention to the specific conditions of each intervention, avoiding literal reconstruction, and recognizing memory as the subject of the project. So, the "new" architecture, in which the ruins are included, has a dual-function symbolic meaning, such as revealing the disasters of war and saving the values of the nation rising from the rubble and transferring them to the future (Alfaro Lera, 2013).

Cologne and Düsseldorf were rival cities in the post-war period, shaping contemporary art and hosting Europe's most innovative artists until Berlin in the 1990s. Düsseldorf, in particular, stands out with its art school, the Kunstakademie, and the Kunsthalle, where artists such as Gerhard Richter, Sigmar Polke and Joseph Beuys held exhibitions.

DOI: 10.15320/ICONARP.2025.349

However, events such as the relocation of some of the artists to Cologne, the establishment of Art Cologne, and the opening of the Ludwig Museum with donations of works changed the balance. The museum also houses the largest private collection of Pablo Picasso, rivaling the museums in Barcelona and Paris, the most comprehensive collection of early Russian avant-garde art outside of Russia, American and British Pop Art and contemporary German art (McConnell, 2020; Vasagar, 2001; Cook, 2017). On the other hand, Rudolf Schwarz, one of the important architects of the period and who played an active role in regaining the cultural and economic priority of Cologne between 1947-52, came up with the idea of creating a Via Sacra by establishing an urban connection between seven Romanesque churches for the architectural pilgrimage route. The project, which aimed to draw attention to the urban environment of the reconstructed sacred buildings that form the focal point of the city center but could not be realized until architectural historian Wolfgang Pehnt brought it to the agenda again in the 2000s, also highlights the religious importance of the city of Cologne.

Figure 7. Star model for *purpose* (Created by the authors, photographs by Merve Karaoğlu Can.)

The coexistence of secular culture and sacredness in the same urban atmosphere can also be seen in the integration of the St. Kolumba gothic church, which is estimated to date back to the 7th century and was completely destroyed in the World War, with the Diocesan Museum of the Archbishopric (Erzbischöfliches Diözesanmuseum), founded by the Christlicher Kunstverein in 1853. The temporal-cultural freeze created by connecting this sacred origin to the contemporary implies the dignity of what has already existed, while at the same time establishing a dialogic relationship. Currently, the church itself can be read as a symbol of the devastation of war, and its rebirth with art as a symbol of healing. At this point, it can be said that the aim for Cologne and Kolumba is to convey its historical background, to establish a balance between past-present-future, and to present both religious and contemporary art objects together so that they are viewed with respect by visitors. In this way, social memory can be activated and continuity can be given to an experiential visit activity with a dominant religious dimension. In this respect, Kolumba consciously embodies the symbolic meaning of the new architecture that Alfaro Lera speaks of (Figure 7).

CONCLUSION

Even if the architectural object is not built with symbolic elements in the foreground, the value and meaning carried by each layer reveals the symbolic importance and frames the building with this reality. In other words, the symbolic cannot remain silent, it produces an idea beyond intentions, with the support of intentions, it permeates the entire building. Despite these achievements, the architectural object is usually explained by its construction processes, historical background, technological elements, etc. However, what the architectural object tells, what associations it creates, what emotions the poetic elements that develop in different uses of the material reveal, etc. are among the elements that need to be included in a conscious reading. In this study, the idea that the dramatization pentads created by Kenneth Burke can form a basis for holistic readings of this multifaceted, affecting-being affected, dynamic structure of the architectural object is discussed.

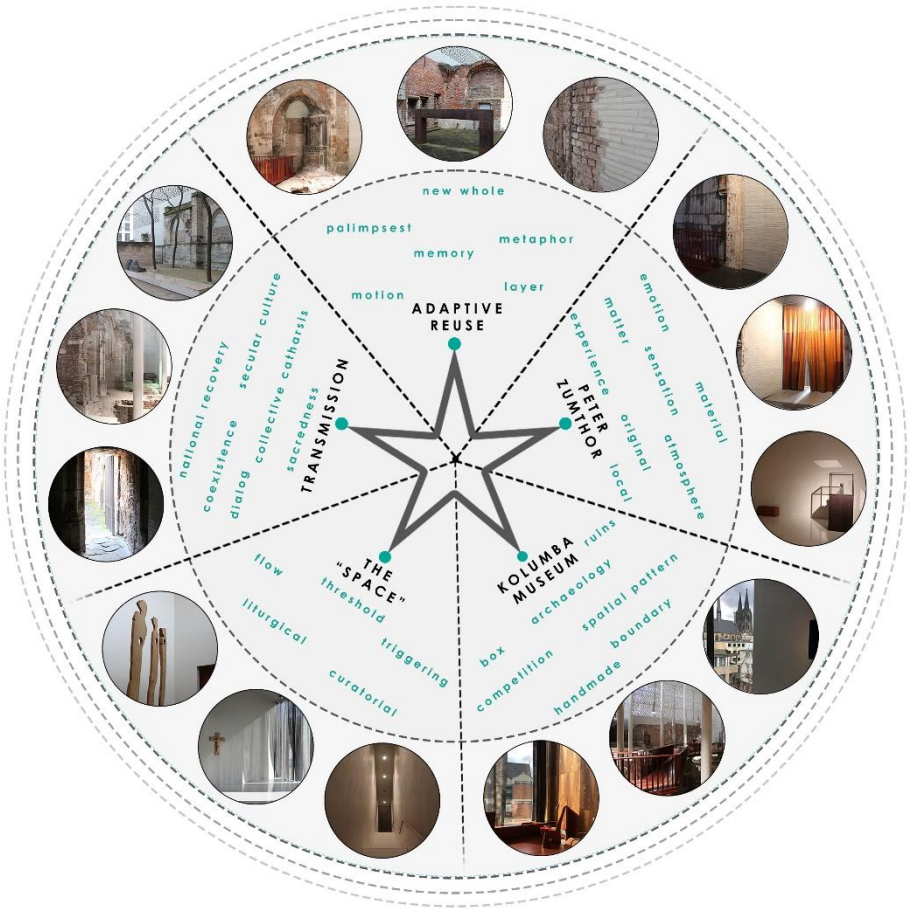


Figure 8. Star model for five terms of the dramatistic pentad with photographs of the architectural object as a whole (Created by the authors, photographs by Merve Karaoğlu Can.)

The conceptual pattern model presented in the study was created to ensure that the information belonging to all inputs that create an architectural object can be read clearly and to facilitate the emergence of symbolic meaning. Considering the fact that the architectural object can be interpreted in different ways by different disciplines and that certain criteria and definitive judgments cannot be put forward, it is clear that the model is open to discussion, changeable, transformable or

DOI: 10.15320/ICONARP.2025.349

falsifiable (Figure 8). On the other hand, the model can also be read by establishing a network of relationships through the pentads that are particularly emphasized. For example, a researcher who wants to analyze the interior space of an architectural object can choose which pentadic element he/she can relate their evaluations to and focus their work on this point. If one wants to delve deeper into the act-agency ratio, they can develop one of the many pentadic distributions in which he/she can discuss how the display elements can be arranged to encourage museum visit, the rhetorical features of the movement that the arrangement produces, and its effects:

Act: to facilitate and encourage intentional, conscious museum visits
Agent: architectural object
Scene: city, location, environmental relations
Agency: exhibition and content
Purpose: transmission of the historical background

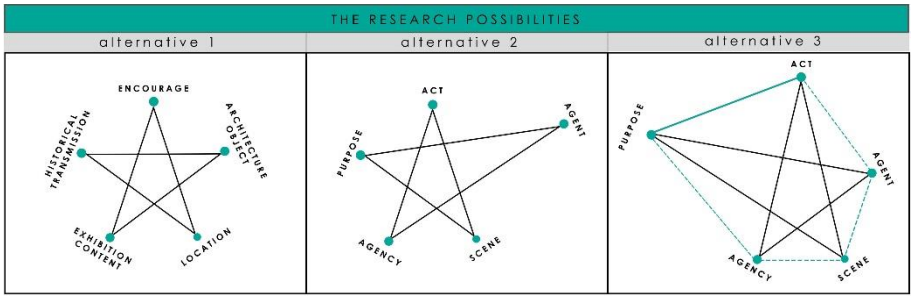


Figure 9. Possibilities to develop a star model for future studies (Created by the authors.)

In his book *A Grammar of Motives*, Burke describes ten ratios that represent networks of associations; scene-act, scene-agent, scene-agency, scene-purpose, act-purpose, act-agent, act-agency, agent-purpose, agent agency, and agency-purpose (Burke, 1969). The researcher can accept these rates as a guide or develop them further and produce new readings. The flexibility that the dramatistic pentad provides in understanding and giving meaning to the architectural object is the most exciting outcome of the study. Because as the researcher's mindset, position and approach changes, more than a single meaning or interpretation will emerge. In this study, the authors used the conceptual pattern model as a base, provided a new opening to the approaches used, first from the position of an interior architect-academic and then from the position of a user of the space, they tried to understand the architectural object that was trying to communicate with them, and at the end of this process they reached subjective judgments.

The study briefly offers three suggestions for future research (Figure 9); a) making readings within the framework of ratios without highlighting any pentad element, b) producing new distributions by changing the act without focusing on any ratio relationship and explaining the architectural object within this framework, and c) using

the model on different architectural objects by accepting the version presented by the authors as a sufficiently rich content.

The meaning of the architectural object emerges through its relationship with the subject. However, the subject is not independent of their knowledge, past experiences, belief systems, sensory-perceptual processes. Therefore, how architecture is perceived is directly related to how much this accumulation is nourished. For this reason, it is thought that the study will facilitate the presentation of a holistic accumulation within the framework of the model, thus supporting the development of subjective judgments that contribute to the production of different thoughts on the same building, a systematic structure on different buildings, and various perspectives.

REFERENCES

Alfaro Lera, J. A. (2013). La memoria del lugar: Kolumba Kunstmuseum. ZARCH (Zaragoza), 1, 306-319. https://papiro.unizar.es/ojs/index.php/zarch/article/view/9393/7953

Appelt, S. (2012, February 7). Peter Zumthor. Langsames Licht. Retrieved January 5, 2024, from http://www.langsameslicht.com/html/dt/gespraeche_3.html

Arslan, S., & Uludağ, Z. (2020). Dilde mekânı (yeniden) kurgulamak: Yer isimleri, kolektif bellek ve ideoloji. İdealkent, 31 (11), 1422-1455. https://doi.org/10.31198/idealkent.829867

Bowie, A. (2015, April 22-24). Exploring the rhetorical orientations of design trends: A Kenneth Burkean approach [Conference presentation]. 11th European Academy of Design Conference, Paris Descartes University Institute of Psychology, France.

Buchanan, R. (1985). Declaration by design: Rhetoric, argument, and demonstration in design practice. Design Issues, 2(1), 4-22. https://doi.org/10.2307/1511524

Buchanan, R. (1995). Rhetoric, humanism, and design. In Richard Buchanan and Victor Margolin (Eds.), Discovering design: Explorations in design studies (pp. 23-66). University of Chicago Press.

Burke, K. (1969). A grammar of motives. University of California Press.

Burke, K. (1973). The philosophy of literary form: Studies in symbolic action. University of California Press.

Burke, K. (with Joseph R. Gusfield). (1989). On symbols and society. The University of Chicago Press.

Campbell, K. K. (2006). Modern rhetoric. In Thomas O. Sloane (Ed.), Encyclopedia of Rhetoric. Oxford University Press. Retrieved February 16, 2024 from http://www.oxford-rhetoric.com/entry?entry=t223.e161

Cook, W. (2017, November 29). Cultural powerplant: How Düsseldorf shaped contemporary art and electronic music. BBC Arts. https://www.bbc.co.uk/programmes/articles/4T11fKdS6K34jNSW20x5BsJ/cultural-powerplant-how-dusseldorf-shaped-contemporary-art-and-electronic-music. Accessed 20 May 2024.

Çebi, M. S. (2008). Sembolik/ Retoriksel bir eylem olarak dil'in anlam inşasındaki aracılık işlevi. Selçuk İletişim Dergisi, 5(2), 183-198. https://doi.org/10.18094/si.68153

DOI: 10.15320/ICONARP.2025.349

Dickinson, G., Ott, B. L., & Aoki, E. (2005). Memory and myth at the Buffalo Bill Museum. Western Journal of Communication, 69(2), 85-108. https://doi.org/10.1080/10570310500076684

Durmuş, S., & Gür, Ş. Ö. (2017). Mimarlığın metinsel temsilinde retorik inşa: Usûl-i Mi'mârî-i Osmanî. METU Journal of the Faculty of Architecture, 34(1), 107-131. https://doi.org/10.4305/METU.JFA.2016.2.12

Foss, S. K. (1982). Rhetoric and the visual ımage: A resource unit. Communication Education, 31, 55-66. https://doi.org/10.1080/03634528209384659

Foss, S. K. (2018). Rhetorical Criticism: Exploration and Practice. Waveland Press.

Garver, E. (2017). Aristotle's rhetoric in theory and practice. In Michael John MacDonald (Ed.), The Oxford handbook of rhetorical studies (pp. 133-141). Oxford University Press.

Guise, C. G. (2013). A nation in its prime: A pentadic study of Walt Disney World's Main Street, USA [Master of Arts Dissertation]. Liberty University. https://digitalcommons.liberty.edu/masters/256

Gutenschwager, G. (1996). Architecture in a changing world: The new rhetoric of form. Journal of Architectural Education, 49(4), 246-258. https://doi.org/10.2307/1425297.

Gürer, T. K., & Yücel, A. (2005). Bir paradigma olarak mimari temsilin incelenmesi. İTÜ Dergisi/A Mimarlık, Planlama, Tasarım, 4(1), 84-96. http://itudergi.itu.edu.tr/index.php/itudergisi_a/article/view/944

Hasian, M., & Wood, R. (2010). Critical museology, (post) colonial communication, and the gradual mastering of traumatic pasts at the Royal Museum for Central Africa (RMCA). Western Journal of Communication, 74 (2), 128-149. https://doi.org/10.1080/10570311003614484

Hattenhauer, D. (1984). The rhetoric of architecture: A semiotic approach. Communication Quarterly, 32(1), 71-77. https://doi.org/10.1080/01463378409369534

Hawhee, D., & Poole, M. (2019). Kenneth Burke at the MoMA: A viewer's theory. Quarterly Journal of Speech, 105(4), 418-440. https://doi.org/10.1080/00335630.2019.1657237

Henderson, G. (2020). Reading the signs with Kenneth Burke. UCD, 82, 60-80. https://doi.org/10.22455/2541-7894-2020-9-60-80

Herrick, J. A. (2018). The history and theory of rhetoric: An introduction. Routledge: New York.

Ivanainen, Z. V. (2015). Astana's architecture as a representation of the new Kazakhstan: Politikal reading of Astana's built environment [Master's Thesis]. University of Jyväskylä. https://jyx.jyu.fi/handle/123456789/46346

Jackson, C. (2013). The use of rhetoric in public relations: Kenneth Burke's theory of identification and consubstantiality [Master of Arts dissertation]. Kennesaw State University. Dissertations, Theses and Capstone Projects.

Karaaslan, S. (2022). Geç-kapitalizmin estetik araçları olarak reklam ve sanat: neolibralizmin söylem inşasında sanatın rolü üzerine bir analiz [Doctoral dissertation]. Ankara University.

Kirkbride, R. (2017). Rhetoric and architecture. In Michael John MacDonald (Ed.), The Oxford handbook of rhetorical studies (pp. 505-522). Oxford University Press.

Kocabaş, O. (2019). İletişim çalışmalarına retoriksel bir perspektif: Dramatizasyon kuramı ve Kenneth Burke. In Gülcan Şener & Serdar Yıldız

(Eds.), İletişim Araştırmalarında Farklı Bakış Açıları (pp. 295-317). Detay Yayıncılık.

Kolumba Art Museum of Archdiocese of Cologne Official Web Site, Retrieved January 7, 2024, from https://kolumba.de/?language=eng&cat_select=1&category=14&artikle=58&preview=

Köklüdağ, M. (2016). Retorik. Ondokuz Mayıs Üniversitesi İlahiyat Fakültesi Dergisi, 40, 202-206.

McCarron, G. (2021). Lecture 5: Kenneth Burke: Rhetoric in the sphere of motives. Scholarly and Research Communication, 12 (1), 1-32. https://src-online.ca/index.php/src/article/view/371/721

McConnell, N. (2020, May). Letter from Cologne and Neuss. Art Monthly, 436, 42-43. https://www.artmonthly.co.uk/magazine/site/issue/may-2020

McCormack, K. C. (2014). Ethos, pathos, and logos: The benefits of aristotelian rhetoric in the courtroom. Washington University Jurisprudence Review, 7(1), 131-155. https://openscholarship.wustl.edu/law_jurisprudence/vol7/iss1/9

Navarro Martinez, V. (2010). El Museo Kolumba: Elogio de la pieza ausente. Revista Proyecto, Progreso, Arquitectura, 1, 132-143. https://doi.org/10.12795/ppa.2010.i1.11

Niğdeli, Z. F., & Sayıl Onaran, B. (2024). Palimpsest mekânlar için analitik bir inceleme aracı önerisi: St. Pierre Han örneği. Sanat Yazıları, 50, 82-103. https://doi.org/10.61742/sanatyazilari.1378397

Oxford Learner's Dictionary (n.d.). Palimpsest. In oxfordlearnersdictionaries.com dictionary. Retrieved June 24, 2024, from https://www.oxfordlearnersdictionaries.com/definition/english/palimpsest?q=palimpsest

Özel, M. K. (2017). Zumthor mimarlığında kutu fikri. Mimarlık Dergisi, 398, 54-59.http://www.mimarlikdergisi.com/index.cfm?sayfa=mimarlik&DergiSayi=412.

Özer, S. (2006). Hadislerin anlaşılmasında bir yöntem olarak retorik analiz: Vadettikleri ve sınırlılıkları. Dinbilimleri Akademik Araştırma Dergisi, 6(2), 233-258. https://dergipark.org.tr/tr/pub/daad/issue/4511/62107

Pallasmaa, J.(2016). Tenin gözleri: mimarlık ve duyular (A. U. Kılıç, Trans.). Yapı-Endüstri Merkezi Yayınları.

Pallasmaa, J. (2021). Mekân, yer ve atmosfer: varlık deneyiminde çevre algısı. In M.Taha Tunç, Sümeyye Yıldız (Eds.), Mimarlar neden Bachelard okur? (pp. 129-156). Ketebe Yayınları.

Richards, I. A. (2004). Priciples of literary criticism. Routledge.

Rountree, C., & Rountree, J. (2015). Burke's pentad as a guide for symbol-using citizens. Studies in Philosophy and Education, 34(4), 349-362. https://doi.org/10.1007/s11217-014-9436-1

Schraufnagel, W. (2021). Expression and sympathy in Walter Pater, Oscar Wilde, and Kenneth Burke. Rhetoric Review, 40(1), 16-29. https://doi.org/10.1080/07350198.2020.1841457

Shearer, A. W. (2004). Applying Burke's dramatic pentad to scenarios. Futures, 36, 823-835. https://doi.org/10.1016/j.futures.2004.01.009

Simonson, P. (2010). The street of Laredo. Mercurian rhetoric and the Obama campaign. Western Journal of Communication, 74(1), 94-126. https://doi.org/10.1080/10570310903466045

Smudde, P. M. (2004). Implications on the practice and study of Kenneth Burke's idea of a "public relations counsel with a heart." Communication Quarterly, 52(4), 420 432. https://doi.org/10.1080/01463370409370210

DOI: 10.15320/ICONARP.2025.349

Spier, S. (2001). Place, authorship and the concrete: Three conversations with Peter Zumthor. arq: Architectural Research Quarterly, 5(1), 15-36.

Tobin, C., Murphy-Lawless, J., & Beck, C. T. (2014). Childbirth in exile: Asylum seeking women's experience of child birth in Ireland. Midwifery, 30(7), 831-838. https://doi.org/10.1016/j.midw.2013.07.012

Toros, S. (2020). Retorik, ikna ve tasarım jürisi. Yedi, 23, 11-20. https://doi.org/10.17484/yedi.598114

Ursprung, P. (n.d.). Peter Zumthor of Switzerland Becomes the 2009 Pritzker Architecture Prize Laureate. The Pritzker Architecture Prize Official Web Site. Retrieved February 10, 2024, from https://www.pritzkerprize.com/sites/default/files/inline-files/2009_PhilipUrpsrungEssay.pdf

Ünlü, Ç. Y. (2018). Retorikte alan temelli dönüş ve katılımcı eleştirel retorik. Moment: Hacettepe Üniversitesi İletişim Fakültesi Kültürel Çalışmalar Dergisi, 5(1), 57-78. https://doi.org/10.17572/mj2018.1.5778

Vasagar, J. (2001, October 20). Cologne Museum to get 774 Picassos. The Guardian. Retrieved May 20, 2024, from https://www.theguardian.com/world/2001/oct/26/arts.highereducation

Wun-Ming Wat, T. (2014). Moments of spiritual engagement in architecture: A search for awareness of life and architecture [Master of Arts dissertation]. University of Waterloo. UWSpace.

Zappen, J. P. (2009). Kenneth Burke on dialectical-rhetorical transcendence. Philosophy & Rhetoric, 42(3), 279–301. http://www.jstor.org/stable/25655358

Zumthor, P. (1998). Thinking architecture. Birkhäuser.

Zumthor, P. (2006). Architektur denken. Birkhäuser.

Zurutuza-Muñoz, C. (2014). Dramatistic theory: A Burkeian approach to the 2004 Madrid terrorist attaks. In Robert S. Fortner, P. Mark Fackler (Eds.), The Handbook of Media and Mass Communication Theory (pp. 154-171). Wiley Blackwell.

Resume

Merve Karaoğlu Can completed her master's degree at Mimar Sinan Fine Arts University in 2013 with a thesis on lighting and comfort conditions as components of the physical environment. She received her PhD from the same university with a dissertation on spatial quality in design museums. Since 2020, she has been working as an Assistant Professor at Kütahya Dumlupınar University, Faculty of Architecture, Department of Interior Architecture Her research focuses on museum architecture, spatial quality, exhibition spaces, and interior architectural design.

Zeynep Fatma Niğdeli completed her undergraduate studies at Hacettepe University, her master's degree at Mimar Sinan Fine Arts University, and her PhD in Interior Architecture at Hacettepe University in 2024. She is currently working at Selçuk University, focusing on interior design, palimpsest spaces, cultural memory, and spatial perception.

ICONARP
International Journal of Architecture and Planning
Received: 01.05.2025 Accepted: 02.12.2025
Volume 13, Issue 2/ Published: 31.12.2025
Research Article *DOI: 10.15320/ICONARP.2025.350 E- ISSN:2147-9380*
ICONARP

The Effect of Flat-Type and L-Type Checkout Counters on Customer's Perceptual and Functional Evaluations

Tolga Subaşi*
Kemal Yıldırım **
Menşure Kübra Müezzinoğlu ***

Abstract

This study aims to determine the effects of physical environmental factors in markets, which are an integral part of daily life, on perceptual and functional evaluations of participants. In this study, it is thought that physical environmental factors in supermarkets where flat-type and L-type checkout counters are used may positively or negatively affect customers' perceptual and functional evaluations. The research hypotheses focus on the correlations with the independent variables of checkout counter type, gender, and age. The Çağdaş Grocery Stores were selected as the research environment and an evaluation questionnaire on the environmental factors of the stores was applied to 200 customers who shopped at these stores. The questionnaire results show that the L-type checkout counter is found to be more aesthetic, inviting, organized, functional, and useful by customers compared to the flat-type counter. These results show that the design of the checkout counter plays a critical role in customer satisfaction and user experience. Therefore, it was concluded that the checkout counter type can be an important design criterion for improving the shopping experience in markets. This study undertaken emphasizes the critical role played for customer satisfaction and service quality in the retail sector area of operations and checkout counters and stresses the importance of design characteristics in this field. Enterprises can take steps to improve the shopping experience by revising their checkout counter preferences in accordance with the expectations and needs of customers.

Keywords: *Cash register, Checkout counter, Perception, Shopping decisions, Supermarket*

*Graduate School of Natural & Applied Sciences, Gazi University, Ankara, Türkiye
E-mail: tolga_subasi_@hotmail.com

**Department of Wood Products Industrial Engineering, Faculty of Technology, Gazi University, Ankara, Türkiye
E-mail: kemaly@gazi.edu.tr

***Department of Interior Architecture, Faculty of Architecture, Firat University, Elazığ, Türkiye *(Corresponding author)*
E-mail: mkmuezzinoglu@firat.edu.tr

To cite this article: Subaşi, T., Yıldırım, K., & Müezzinoğlu, M.K. (2025). The Effect of Flat-Type and L-Type Checkout Counters on Customer's Perceptual and Functional Evaluations. *ICONARP International Journal of Architecture and Planning,* 13(2), 898-916. DOI: 10.15320/ICONARP.2025.350

INTRODUCTION

Retailers, salespeople, and managers focus on a search for customer satisfaction due to the intensive competition experienced recently in the supermarket retail sector. This innovative approach started to question what the effects on the shopping decisions and behaviours of customers for the typical characteristics of the physical environmental elements would be, such as the product displays used in supermarkets and storage units, and checkout counters.

In this context, in a market where supermarket physical environmental factors are gradually becoming more competitive, the shopping decisions and behaviours of the consumers can be affected positively or negatively. These types of influences could be a significant guide for developing the new solution proposals for both supermarket retailers and for designers.

The shopping concept, especially together with the industrial revolution, experienced a transformation from open areas towards closed spaces (Grewal & Levy, 2007; Goić et al., 2021). Technological developments and the event of globalization changed in a radical manner the shopping experience and consumer expectations (Verhoef et al., 2021). The needs and demands of consumers shape the modern shopping process (Zahra & Anoraga, 2021). Store organizations and placement of products are important design elements that directly affect the shopping experiences of customers (Grewal & Roggeveen, 2020). Organizations within the store affect to a significant extent the motivations and behaviours of customers to shopping (Liu-Thompkins et al., 2022).

The customer concept is in the forefront as an important component of retail strategies. Internal customer satisfaction indirectly improves external customer service quality by increasing the effectiveness of processes within the enterprise (Smith, 2011; Bowen & Schneider, 2022). The internal satisfaction and motivation of customers directly influence the external customer experience (Smith, 2011; Gustafsson et al., 2024). To develop strategies for strengthening both the interior and exterior customer relations provides the opportunity for increases in the operational efficiencies of enterprises and improvements in customer experiences. Whereas external customer satisfaction can strengthen the market location of the enterprise and can provide a competitive advantage (Gustafsson et al., 2024). Consequently, retail enterprises should adopt an integral approach for optimizing both the internal and external customer relations.

The supermarkets located within large-scale shopping centres, which have become prevalent in recent years, have an area between 400-2500 m2 and the hypermarkets have an area of 2500 m2 and above. These retail shopping centres provide for the presentation of various needs under one roof that can meet broad consumer demands (Jones, 2021). Since modern consumers seek more choices and ease, large retail shopping centres present an ideal environment for meeting this demand (Grewal & Levy, 2007; Grewal & Roggeveen, 2020). The size and the

DOI: 10.15320/ICONARP.2025.350

diversity of shopping centres directly affect the increase in pleasure of consumers and the ability of retailers to be in the forefront in the competitive market (Verhoef et al., 2021). Understanding this process of transformation presents important data both theoretically and practically and directs the strategic decisions of retailers.

In this context, to know the effects on the perceptual and functional evaluations of customers by the in-store organizations and product placements and to optimize them is of critical importance. Research studies show that the organizations of the physical store have a characteristic effect on consumer satisfaction and loyalty (Yıldırım et al., 2014, 2015; Ameen et al., 2020; Flacandji et al., 2020; Gilboa et al., 2020; Krey et al., 2022). Planning in-store organizations and product placements in a detailed manner and optimizing them is of great importance for retail enterprises to provide for customer satisfaction and competitive advantage.

Theoretical Background and Hypothesis Development

Many research studies conducted in the retail sales field set forth that the physical environmental factors of stores have an important effect on the shopping decisions and behaviours of customers (Turley & Milliman, 2000; Kuuru et al., 2020; Hermes & Riedl, 2021; Mustikasari et al., 2021; Basu et al., 2022; Grewal & Roggeveen, 2020). Physical environmental factors primarily shape the shopping experience, and this directly affects the general perception of customers for the store. Baker (1986) separated the physical environmental factors into three main categories: surroundings, design, and social factors. In the study, the surroundings factors express the general atmosphere within the store; design factors state the organization and aesthetic characteristics of the store, whereas social factors express the interactions among the customers and employees. Especially in large retail enterprises, surroundings factors, such as illumination, warmth, odour, and music, and design factors, such as colour, placement order, and equipment element characteristics play a critical role in determining customer satisfaction (Yıldırım et al., 2014; Elmashhara & Soares, 2019; Pizam &Tasci, 2019; Krey et al., 2022; Breugelmans et al., 2023). These environmental factors can positively or negatively affect the shopping experience of customers. Consequently, the physical environmental elements of stores can be evaluated as an important tool in determining customer perceptions and behaviours (Turley & Milliman, 2000; Yıldırım et al., 2014, 2015; Elmashhara & Soares, 2019; Gilboa et al., 2020; Grewal & Roggeveen, 2020). The studies conducted show that the detailed analysis of physical environmental factors could be an important strategy in increasing customer pleasure and loyalty (Yıldırım et al., 2014; Grewal & Roggeveen, 2020). The internal space environmental components, such as cabinets with shelves, racks, counters, tables, and checkout counters in large stores form the general atmosphere of the store and play an important role in directly affecting customer experience (Turley & Milliman, 2000; Pizam & Tasci,

2019; Ameen et al., 2020). Of these, it can be thought that the checkout counter, by defining the functional plan of the supermarket, is one of the most important design components contributing to the interior design atmosphere. These checkout counters, due to their orienting the physical behaviour of the customer, can also have a significant effect on consumer behaviour. When checkout counters are treated from this aspect, they can define the relationship between customer and personnel. Furthermore, they can influence positively or negatively the environmental perceptions of customers. Additionally, the checkout counter represents and emphasizes the institutional identity of the company (Yıldırım et al., 2014). The literature shows that the design and functionality of checkout counters have a critical importance for customer pleasure.

Checkout counters in the retail sector can be designed and produced in different operational areas in suitable dimensions and shapes. The basic aim of these counters is for the cashier to undertake the procedures in a productive manner and to provide for easy and rapid service to customers. The checkout counter should have sufficient space during payment procedures for both money and credit card procedures and for realizing easily additional procedures, such as packaging, putting in plastic bags, returns, and exchanges (Yıldırım et al., 2014). The ergonomic solution in these areas could positively influence customer satisfaction. Thus, the final stage of the shopping experience of customers could be without problems. It is necessary to take into consideration ergonomic principles, such as the importance in the design of counters, frequency of use and turn, storage, and dimensions of the working plane for increasing customer pleasure and for obtaining competitive advantage (Zhang et al., 2023). Similarly, Grewal and Roggeveen (2020) reported that it is necessary to organize in the optimal manner the management of customer transportation to the store to meet the customer expectations and to provide for competitive advantage. These organizations do not only remain limited to increasing the speed and productivity of the payment process, at the same time, they can also improve the general shopping experience. Thus, the retail enterprises can increase customer loyalty and can obtain a stronger position in the competitive market conditions.

Checkout counters can be in various shapes. Usually, they are in flat, L, or U shapes. Different checkout counter shapes can be perceived differently by customers (Yıldırım et al., 2014). It was stated in some studies conducted that checkout counters that have a broad storage area and that provide for the placement in an organized and easy manner of products after shopping would be able to complete the payment process of customers at a more problem-free and pleasing level (Zhang et al., 2023; Yıldırım et al., 2014). In the study by Yıldırım et al. (2014) it was reported that customers evaluated flat cash registers as more positive compared to L- and U-shaped cash registers. These limited findings show that the shape of checkout counters could be effective on the cognitive and functional evaluations of customers.

DOI: 10.15320/ICONARP.2025.350

The literature treated above shows that the design characteristics of checkout counters could affect to a significant degree customer perception and ease of use. However, when the existing literature is considered, it is understood that this subject has remained at a limited level and that a need is felt for new design proposals supported by current information. Accordingly, this study focuses on determining the effects on the perceptual and functional evaluations of customers for two different checkout counters used in supermarkets and aims to present significant contributions to the literature and in conclusion, to reach new information for which a need is felt related to the checkout counters in the retail sector with the data obtained. The H1 and H2 research hypotheses constituted according to this aim have been given below:

H1: There are differences between the perceptual evaluations of customers for the flat and L-shaped checkout counters used in supermarkets.

H2: There are differences between the functional evaluations of customers for the flat and L-shaped checkout counters used in supermarkets.

The strategies for increasing customer satisfaction in the retail sector are directly related to the design and functionality of the store. In this context, to understand the effects on the ergonomic and functionality characteristics of checkout counters in supermarkets for the gender and age factors is of critical importance. This comprehension provides for the development of strategies for increasing customer satisfaction and provides the opportunity for personalization of the store organization according to customer segments. The research conducted on this subject has started to study in deeper detail the effects on customer satisfaction of the design and functionality of checkout counters. Especially, information is gradually increasing about how improvement of checkout counters ergonomically and functionally affects customer experience (Turley & Milliman, 2000; Yıldırım et al., 2014; Ayalp et al., 2016; Algarni et al., 2021).

In this context, engaging in more research, which contains perceptual and functional evaluations according to the customer characteristics for checkout counters in supermarkets, would provide significant contributions, both theoretically and practically. It is observed in the literature that studies are limited about the effects on design of checkout counters especially used in supermarkets and customer experience of the gender and age factors (Grohmann, 2009; Kolyesnikova et al., 2009; Yıldırım et al., 2014; Basu et al., 2022; Lee et al., 2023; Shamsi et al., 2023). However, current studies undertaken in recent years present important findings on this subject.

Gąsiorowska (2008) observed that females feel a greater interest in shopping compared to males, that they move slowly in stores, that they examine carefully the racks and shelves, that they evaluate the products, that they compare the prices, that they interact with personnel and others shopping, that they ask questions, that they test the products and finally

purchase the products. Furthermore, studies show that they also display differences according to gender in the perceptions of the benefits of symbolic brands. For example, males display a difference compared to females in the dimensions of brand individuality (Grohmann, 2009; Ghorbani et al., 2022). Lee et al. (2023) treated in a comprehensive manner the effects on in-store experience of these factors by studying in detail customer preferences based on gender and age. Furthermore, Shamsi et al. (2023) developed strategies for increasing customer satisfaction in supermarkets by researching how the store organizations and design components changed according to age groups. However, a few studies (Kolyesnikova et al., 2009; Basu et al., 2022; Wu et al., 2021; Yıldırım et al., 2014) treated how the physical environmental factors of a store change according to different customer sectors, but they did not study sufficiently how the perceptual and functional evaluations of checkout counters used in supermarkets could change according to customer characteristics, such as gender and age.

Research on the differences based on gender and age could improve customer experience by presenting customized solutions in the design of checkout counters in supermarkets. In this context, this study aims to present valuable information about optimizing the store design and improving customer experience. The findings obtained will assist in our understanding better the effects on customer satisfaction of the store organizations and design strategies in the retail sector. According to this aim, the H3 and H4 research hypotheses constituted have been given below:

H3: There are differences between the functional evaluations of female and male customers for checkout counters.

H4: There are differences between the functional evaluations of 18-35, 36-45, and 46-60 years of age group customers for checkout counters.

METHOD

Participants

All the participants in the research were university graduates, 51.5% of these were females and 48.5% were males; 46% were people between 18-35 years of age, 27% were between 36-45 years of age, and 27% were people between 46-60 years of age.

Questionnaire Design and Application

A total of 200 people residing in Ankara Province participated in this research. The questionnaire form designed to assess the research hypotheses was composed of two sections. The first section included the demographic information of the participants. Whereas the second section included questions for measuring the effects on perceptual and functional evaluations of customers for checkout counters used in supermarkets. Previous studies were utilized in the development of this questionnaire form (Yıldırım et al., 2014, 2015, 2019; Ayalp et al., 2016, 2017; Müezzinoğlu et al., 2020, 2021). The questionnaires, which were

DOI: 10.15320/ICONARP.2025.350

prepared for measuring the effects on the perceptual and functional evaluations of customers for checkout counters, were applied at the Çağdaş Grocery Stores during a period of one week in April 2023. It was applied face-to-face, and every questionnaire was completed in a period of approximately 15 minutes. The required ethical permissions for the questionnaires applied was first obtained from the Chairmanship of the Board of Directors of the Çağdaş Grocery Stores dated 02 December 2022 and subsequently from the Gazi University, Ethics Commission, No. 05 and dated 21 March 2023. The research data was analysed by using the IBM SPSS Statistics (version 22.0) programmed.

Research Environment

It was aimed in this research to determine the effects on the perceptual and functional evaluations of customers for checkout counters, which are a component of the design factors included within the physical environmental factors of commercial spaces. The visuals of two different checkout counters used with the objective of determining the effects on the perceptual and functional evaluations of customers of the physical environmental factors of the Çağdaş Grocery Stores, which were taken into the scope of the research, have been given in Figure 1. The opinions and evaluations of participants were gathered throughout the research to evaluate how checkout counters contributed to the customer experience. In this context, the determination of the effects on the perceptual and functional evaluations of customers for checkout counters will assist in making strategic decisions in the retail sector.

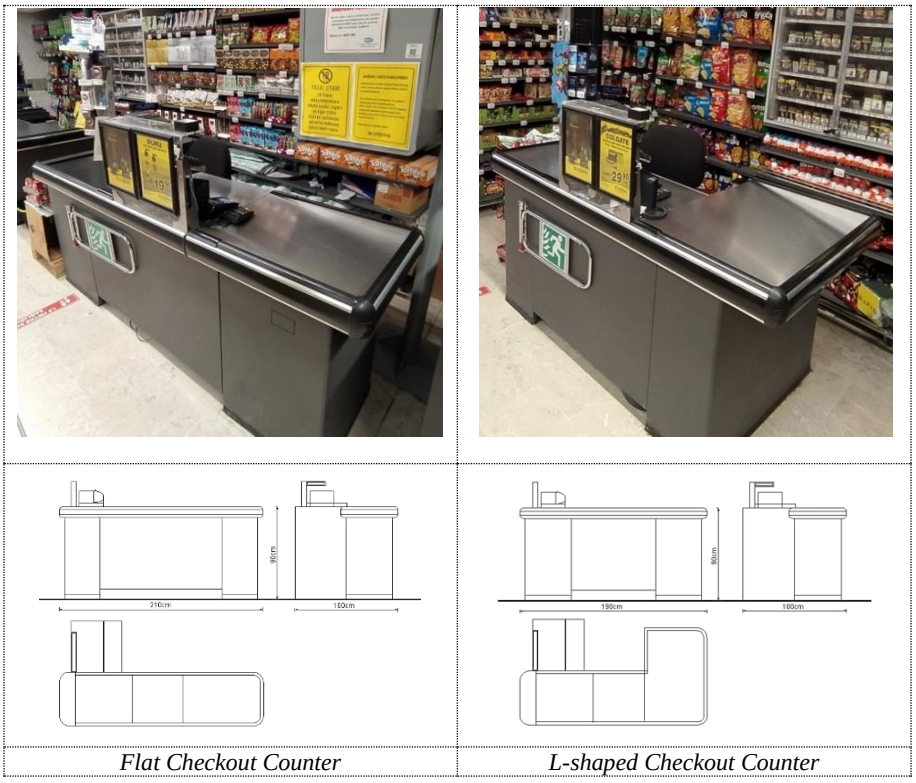


Figure 1. Checkout counters used in the research

Statistical Evaluation

The perceptual and functional evaluations for the shape of checkout counters by customers participating in the research were defined as dependent variables, whereas shape of checkout counter, gender, and age were defined as independent variables. The Cronbach's alpha test of reliability was performed on the data obtained from the questionnaires applied with the objective of assessing the hypotheses of the study. Subsequently, the percentage, average, and standard deviation values of the reliable data were analysed. The One-Way Analysis of Variance (ANOVA) was conducted for evaluation of whether the differences among the independent variables was statistically significant at the level of $p<0.05$. The data has been given graphically to compare with each other the average values found to be significant in ANOVA.

FINDINGS

Perceptual Evaluation Findings

In the research, the components used for measuring the effects on the perceptual evaluations of customers for the type of checkout counters used in supermarkets and the reliability of the scale were assessed with Cronbach's alpha. Accordingly, the reliability coefficient of the scale was calculated to be 0.834. In previous studies, it was stated that when the alpha reliability coefficient for the components constituting the dependent variable was over 70, it could be accepted as reliable (Amirrudin et al., 2021). This result shows that the data is reliable. The components used in the research and the reliability values of the scale have been given in detail in Table 1.

Table 1. The level of Cronbach's alpha reliability for the perceptual evaluation components.

Dependent Variables		Component Reliability	Scale Reliability
P1	The checkout counter looks better.	0.803	0.834
P2	The checkout counter looks more inviting.	0.792	
P3	The checkout counter looks more organised.	0.799	
P4	The checkout counter looks plainer.	0.854	
P5	The checkout counter looks more functional.	0.794	
P6	The checkout counter looks more useful.	0.792	

The questionnaire data related to the effects on the perceptual evaluations of customers for the flat and L-shaped checkout counters used in supermarkets in the research conducted were analysed with statistical methods and the average and standard deviation values and the ANOVA test result findings obtained have been given in Table 2.

DOI: 10.15320/ICONARP.2025.350

Table 2. The effect on the perceptual evaluations of customers of the type of checkout counter.

Dependent Variables	Types of Checkout Counters						ANOVA Results		
	Flat		L-Shaped		Total				
	M[a]	SD	M	SD	M	SD	F	df	Sig.
P1	3.07	1.43	1.94	1.38	2.51	1.51	64.963	1	0.000*
P2	3.10	1.29	1.85	1.23	2.47	1.41	97.873	1	0.000*
P3	2.98	1.45	1.92	1.27	2.45	1.46	59.895	1	0.000*
P4	2.49	1.46	2.46	1.50	2.47	1.48	0.028	1	0.866[is]
P5	3.10	1.38	1.77	1.13	2.43	1.43	110.496	1	0.000*
P6	3.16	1.37	1.74	1.10	2.45	1.43	131.314	1	0.000*

*Note: *It is significant at the level of p<0.001. is: It is insignificant at the level of p<0.05.*
M: Average value, SD: Standard deviation, F: F value, df: Degree of freedom.
a: Variable averages have been listed from 1 to 5. 1: I definitely agree, 5: I definitely disagree.

The findings in Table 2 show that the flat and L-shaped checkout counters used in supermarkets have important effects on the perceptual evaluations of customers. According to the ANOVA test results, statistically significant differences were found for the others, excluding one component, at the level of p<0.05 among the perceptual evaluations of customers for both checkout counters.

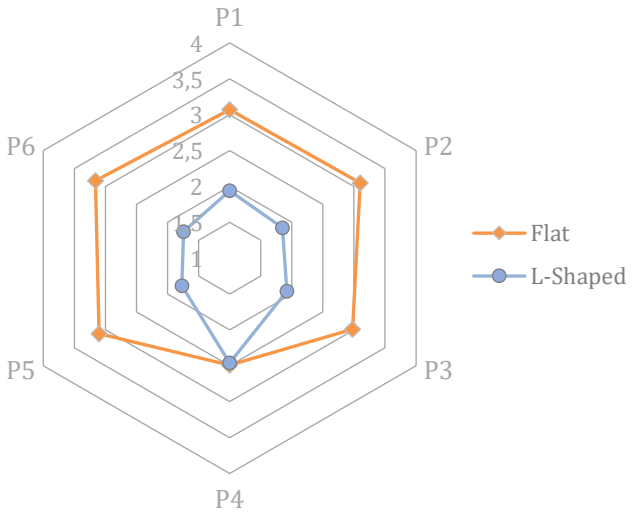


Figure 2. The effect on the perceptual evaluations of customers for the type of checkout counter

**Variable averages have been listed from 1 to 5. (1: I definitely agree, 5: I definitely disagree).*

In the graph given in Figure 2, it is observed that different values were received for the five components of both checkout counters: P1 (The checkout counter looks better.), P2 (The checkout counter looks more inviting.), P3 (The checkout counter looks more organized.), P5 (The checkout counter looks more functional.) and P6 (The checkout counter looks more useful.). However, it is observed that the P4 (The checkout counter looks plainer) component received values very close to each other. These results show that the L-shaped checkout counter was found to be more aesthetic, inviting, organized, functional, and useful compared to the flat-shaped checkout counter. The graph given shows that there are evident differences among the perceptual evaluations of customers for both checkout counters. These results support the H1 hypothesis set forth: There are differences between the perceptual evaluations of

customers for the flat-shaped and L-shaped checkout counters used in supermarkets.

Functional Evaluation Findings

The components used and the reliability of the scale were tested in the research with Cronbach's alpha to measure the effects on the functional evaluations of the customers for the shape of the checkout counters used in the supermarkets. Accordingly, the alpha reliability coefficient of the scale was calculated to be 0.849. In previous studies, it was stated that when the alpha reliability coefficient for the components constituting the dependent variable was over 70, it could be accepted as reliable (Amirrudin et al., 2021). This result shows that the data is reliable. The components used in the research and the reliability values of the scale have been given in detail in Table 3.

Table 3. The level of Cronbach's alpha reliability for the functional evaluation components.

Dependent Variables		Component Reliability	Scale Reliability
F1	The checkout counter is suitable for establishing communication with the cashier.	0.823	0.849
F2	The checkout counter is suitable for putting the products purchased in the shopping cart.	0.826	
F3	The dimensions and shape of the checkout counter are suitable for making rapid payment.	0.835	
F4	The checkout counter is suitable for passing and using shopping carts.	0.838	
F5	The checkout counter is suitable for placing what I have purchased in plastic bags.	0.825	
F6	The checkout counter is suitable for the display of sales promotion products.	0.824	
F7	The surface size of the checkout counter where products are placed is suitable.	0.824	

The questionnaire data related to the effects on the functional evaluations of customers for the flat and L-shaped checkout counters used in supermarkets in the research conducted were analysed with statistical methods and the average and standard deviation values and the ANOVA test result findings obtained have been given in Table 4.

Table 4. The effect on the functional evaluations of customers for the type of checkout counters.

Dependent Variable	Types of Checkout Counters						ANOVA Results		
	Flat		L-Shaped		Total				
	M[a]	SD	M	SD	M	SD	F	df	Sig.
F1	3.30	1.36	1.76	1.18	2.53	1.49	146.386	1	0.000*
F2	2.94	1.25	1.72	1.04	2.33	1.30	112.279	1	0.000*
F3	2.89	1.38	1.89	1.23	2.39	1.40	58.259	1	0.000*
F4	2.76	1.30	1.94	1.10	2.35	1.27	46.480	1	0.000*
F5	3.51	1.18	1.53	1.04	2.52	1.49	317.545	1	0.000*
F6	3.25	1.24	1.77	1.21	2.51	1.43	144.699	1	0.000*
F7	3.06	1.23	1.79	1.11	2.42	1.33	117.970	1	0.000*

*Note: *It is significant at the level of p<0.001.*
M: Average value, SD: Standard deviation, F: F value, df: Degree of freedom.
a: Variable averages have been listed from 1 to 5. 1: I definitely agree, 5: I definitely disagree.

The findings in Table 4 show that there are significant effects on the functional evaluations of customers for the flat and L-shaped checkout counters used in supermarkets. According to the ANOVA test results,

DOI: 10.15320/ICONARP.2025.350

significant differences were found statistically for all components at the level of $p<0.05$ between the functional evaluations of customers for both checkout counters. These results set forth a significant effect on functional characteristics, which were evaluated by customers for the type of checkout counter. The graphic statement of these results has been given in Figure 3.

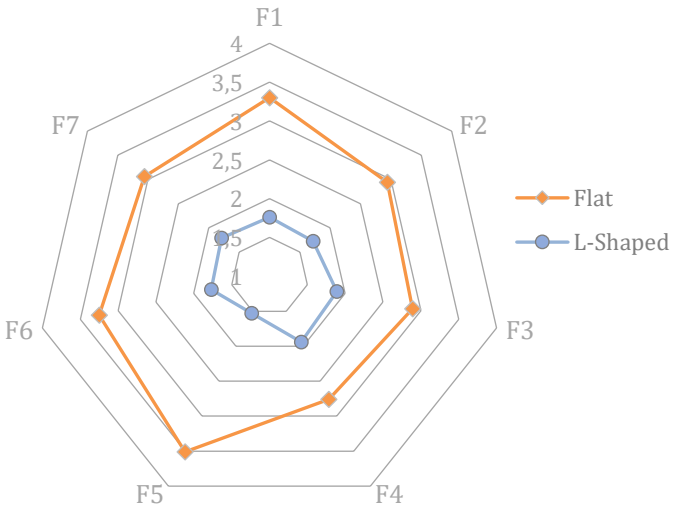


Figure 3. The effect on the functional evaluations of customers for the type of checkout counter

**Variable averages have been listed from 1 to 5. (1: I definitely agree, 5: I definitely disagree).*

In the graph given in Figure 3, it is observed that there are different values received for all the components for both checkout counters: F1 (The checkout counter is suitable for establishing communication with the cashier.), F2 (The checkout counter is suitable for putting the products purchased in the shopping cart.), F3 (The dimensions and shape of the checkout counter are suitable for making rapid payment.), F4 (The checkout counter is suitable for passing and using shopping carts.), F5 (The checkout counter is suitable for placing what I have purchased in plastic bags.), F6 (The checkout counter is suitable for the display of sales promotion products.), and F7 (The surface size of the checkout counter where products are placed is suitable.). These results set forth that the L-shaped checkout counter was evaluated more positively compared to the flat checkout counter from the aspect of functional characteristics, such as establishing communication with the cashier, placing the products purchased, making rapid payment, ease of passing and use, putting products in plastic bags and displaying sales promotion products. The graph given shows the evident differences between the functional evaluations of the customers for both checkout counters. These findings support the H2 hypothesis that sets forth There are differences between the functional evaluations of customers for the flat and L-shaped checkout counters used in supermarkets.

The average and standard deviation values and ANOVA test results including the functional evaluations for the checkout counters according to genders (female, male) of the customers has been given in Table 5.

Table 5. The effect of gender on the functional evaluations for checkout counters.

Dependent Variables	Gender						ANOVA Results		
	Female		Male		Total				
	M[a]	SD	M	SD	M	SD	F	df	Sig.
F1	3.29	1.36	3.31	1.37	3.30	1.36	0.013	1	0.909[is]
F2	2.96	1.22	2.92	1.28	2.94	1.25	0.042	1	0.837[is]
F3	2.99	1.39	2.80	1.38	2.89	1.38	0.976	1	0.324[is]
F4	2.68	1.33	2.83	1.26	2.76	1.30	0.709	1	0.401[is]
F5	3.52	1.30	3.50	1.07	3.51	1.18	0.004	1	0.950[is]
F6	3.04	1.36	3.44	1.09	3.25	1.24	5.176	1	0.024*
F7	2.81	1.30	3.28	1.12	3.06	1.23	7.455	1	0.007*

*Note: *It is significant at the level of p<0.05. is: It is insignificant at the level of p<0.05.*
M: Average value, SD: Standard deviation, F: F value, df: Degree of freedom.
a: Variable averages have been listed from 1 to 5. 1: I definitely agree, 5: I definitely disagree.

According to the findings in Table 5, statistically significant differences were found at the level of p<0.05 for the F6 and F7 components among the functional evaluations for checkout counters by female and male customers. These results have been given in a graph in Figure 4.

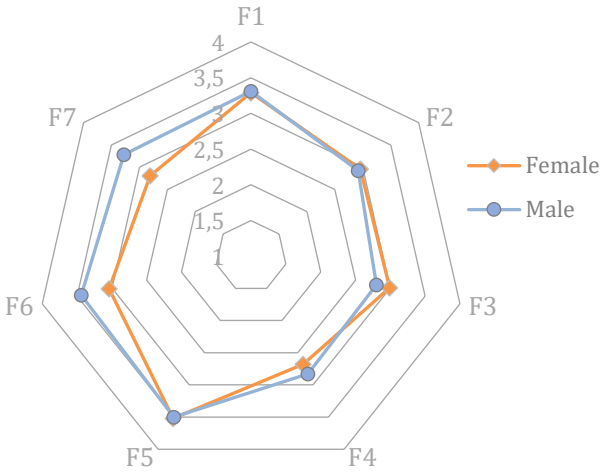


Figure 4. The effect of gender on the functional evaluations for checkout counters

**Variable averages have been listed from 1 to 5. (1: I definitely agree, 5: I definitely disagree).*

It is observed in the graph in Figure 4 that there are similarities in the functional evaluations for the checkout counters by female and male customers excluding the F6 and F7 components. Accordingly, in connection with 'displaying the sales promotion products' and 'the surface size where products are placed' at the checkout counters, males displayed a more negative approach compared to females. These results generally do not support the H3 hypothesis set forth, there are differences between the functional evaluations of female and male customers for checkout counters. However, it can be stated that there were significant differences for two components among the functional evaluations of customers with different genders.

The average, standard deviation, and the ANOVA test results of the data including the functional evaluations of the checkout counters according to the age (18-35, 36-45, 46-60) of the customers have been given in Table 6.

DOI: 10.15320/ICONARP.2025.350

Table 6. The effect of customers' age on the functional evaluations of checkout counters.

Dependent Variables	Age						ANOVA Results		
	18-35		36-45		46-60				
	M[a]	SD	M	SD	M	SD	F	df	Sig.
F1	3.14	1.42	3.44	1.34	3.43	1.28	1.158	2	0.316[is]
F2	2.76	1.29	2.80	1.23	3.39	1.11	4.969	2	0.008*
F3	2.65	1.34	2.96	1.48	3.22	1.31	3.047	2	0.050*
F4	2.39	1.22	2.83	1.36	3.31	1.16	9.499	2	0.000*
F5	3.55	1.26	3.50	1.26	3.44	0.96	0.148	2	0.862[is]
F6	3.05	1.24	3.30	1.34	3.52	1.09	2.475	2	0.087**
F7	2.93	1.22	3.00	1.32	3.31	1.13	1.714	2	0.183[is]

*Note: * It is significant at the levels of p<0.05 and ** p<0.10. is: It is insignificant at the level of p<0.05*
M: Average value, SD: Standard deviation, F: F value, df: Degree of freedom.
a: Variable averages have been listed from 1 to 5. 1: I definitely agree, 5: I definitely disagree.

According to the findings in Table 6, statistically significant differences were found at the levels of p<0.05 and p<0.10 for the F2, F3, F4, and F6 components among the functional evaluations for the checkout counters by customers in the 18-35, 36-45, and 46-60 years of age groups. However, a significant difference was not found for the F5 and F7 components. These results have been given as a graph in Figure 5.

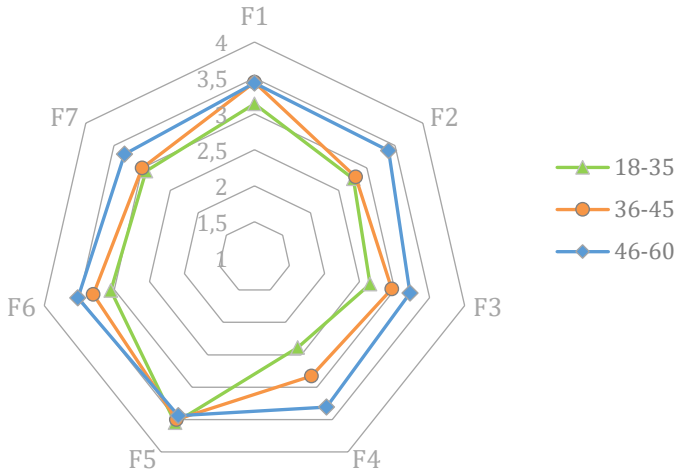


Figure 5. The effect of age on the functional evaluations for checkout counters

**Variable averages have been listed from 1 to 5. (1: I definitely agree, 5: I definitely disagree).*

It is observed in the graph given in Figure 5 that there are similarities in the evaluations excluding the F2, F3, F4, and F6 components in the functional evaluations for checkout counters by customers in the 18-35, 36-45, and 46-60 years of age groups. Accordingly, on the matters of 'putting the products purchased', 'making rapid payment', 'passing of shopping cart', and 'displaying sales promotion products' at the checkout counters, the customers in the 18-35 years of age group displayed a more negative approach compared to the customers in the 45-60 years of age group. These results support in general the H4 hypothesis set forth, there are differences between the functional evaluations of 18-35, 36-45, and 46-60 years of age group customers for checkout counters. This situation shows that age has an evident effect on the functional evaluations of checkout counters excluding the F5 component (putting the products purchased in plastic bags).

CONCLUSION AND DISCUSSION

In this research, the effects on the perceptual and functional evaluations of customers for the flat and L-shaped checkout counters used in supermarkets were investigated and the results obtained, and proposals have been listed in order below:

The first result shows that there are significant effects on the perceptual evaluations and it was determined that there were statistically significant differences among the perceptual evaluations of customers for both checkout counters for the P1 (The checkout counter looks better), P2 (The checkout counter looks more inviting), P3 (The checkout counter looks more organized), P5 (The checkout counter looks more looks more useful), and P6 (The checkout counter looks more useful) components (at the level of $p<0.001$). However, a significant difference was not determined for the P4 (The checkout counter looks plainer) component. These results show that the L-shaped checkout counter was found to be better, more inviting, more organized, more functional, and more useful compared to the flat checkout counter. Accordingly, the L-shaped checkout counter that would be preferred for supermarkets would be more suitable for being able to positively influence the perceptual evaluations of customers. This result did not support the findings of Yıldırım et al. (2014). This situation could stem from the differences in design characteristics of the wooden and lacquered cash desks used in the study by Yıldırım et al. (2014).

Another result shows that the flat and L-shaped checkout counters used in supermarkets had significant effects on the functional evaluations of customers. Accordingly, it was determined that there were statistically significant differences among the functional evaluations of the customers for both checkout counters for the F1 (The checkout counter is suitable for establishing communication with the cashier.), F2 (The checkout counter is suitable for putting the products purchased in the shopping cart.), F3 (The dimensions and shape of the checkout counter are suitable for making rapid payment.), F4 (The checkout counter is suitable for passing and using shopping carts.), F5 (The checkout counter is suitable for placing what I have purchased in plastic bags.), F6 (The checkout counter is suitable for the display of sales promotion products.), and F7 (The surface size of the checkout counter where products are placed is suitable.) components (at the level of $p<0.001$). These results set forth that the L-shaped checkout counter was evaluated more positively compared to the flat checkout counters from the aspect of functional characteristics, such as establishing communication with the cashier, putting the products purchased, making rapid payment, ease of passing and use, putting products in plastic bags, and displaying sales promotion products. Accordingly, the L-shaped checkout counter that would be preferred for supermarkets would be more suitable for being able to positively affect the functional evaluations of customers. This result did not support the findings of Yıldırım et al. (2014). This situation could

DOI: 10.15320/ICONARP.2025.350

stem from the differences in design characteristics of the wooden and lacquered cash desks used in the study by Yıldırım et al. (2014).

Another result is the statistically significant differences found by female and male customers at the level of $p<0.05$ for the F6 and F7 components among the functional evaluations for the checkout counters. It is observed that for the other five components, there were similarities in the evaluations of female and male customers. Accordingly, for the matters of 'displaying sales promotion products' and 'surface size where products are placed,' males displayed a more negative approach compared to females. It can be stated in this situation that there were significant differences for these two components between the functional evaluations of females and males. This result, excluding the two components, did not support the results found by Yıldırım et al. (2014), 'women displayed a more negative approach compared to males in the evaluations for spaces where flat, L-, and U-shaped cash desks were used.'

Finally, statistically significant differences were found in the functional evaluations for checkout counters by customers in the 18-35, 36-45, and 56-60 years of age groups for the F2, F3, F4, and F6 components at levels of $p<0.05$ and $p<0.10$. It is observed that there were similarities in the functional evaluations of customers for the other three components in the 18-35, 36-45, and 46-60 years of age groups. Accordingly, the customers in the 18-35 years of age group displayed a more negative approach compared to customers in the 46-60 years of age group on the matters of 'putting the products purchased', 'making rapid payment', 'passing shopping cart', and 'displaying sales promotion products.' This situation shows that age has an evident effect on the functional evaluations of checkout counters. These results support the study results conducted previously by Ikei & Miyazaki (2020), Coşgun et al. (2022), and Yıldırım et al. (2022) showing that spatial evaluations developed more negatively together with age. The findings show that the knowledge, experience, and observation acquired connected to age could pave the way to a more negative approach in spatial evaluations.

In summary, the results of this research show that there are significant differences among the perceptual and functional evaluations of customers using the flat and L-shaped checkout counters. These results show that the two different types of checkout counters used prevalently in recent years could affect positively or negatively the perceptual and functional evaluations of customers. Especially in supermarkets, by using the L-shaped checkout counters that have a broader product placing or storage surface would be a more realistic approach for increasing customer satisfaction and contributing to the potential of customers becoming permanent. Consequently, enterprises engaged in activities in the retail sector, by making use of results of this research, can present more effective and high-quality shopping experience for their customers by selecting the most suitable checkout counter type. This study undertaken emphasizes the critical role played for customer satisfaction and service quality in the retail sector area of operations and checkout

counters and stresses the importance of design characteristics in this field. It can be proposed that enterprises, by revising the checkout counter preferences in a manner suitable to the expectations and needs of customers, take steps that would improve shopping experience. These results obtained could guide retail enterprises in the development of customer-focused design strategies.

REFERENCES

Algarni, F. S., & Alkhaldi, H. A. (2021). Literature review of musculoskeletal disorders and their risk factors among supermarket cashiers. *Rehabilitation Science,* 6(2), 25–40. https://doi.org/10.11648/j.rs.20210602.12

Ameen, N., Tarhini, A., Shah, M., & Madichie, N. O. (2020). Going with the flow: Smart shopping malls and omnichannel retailing. *Journal of Services Marketing,* 35(3), 325–348. https://doi.org/10.1108/JSM-02-2020-0066

Amirrudin, M., Nasution, K., & Supahar, S. (2021). Effect of variability on Cronbach alpha reliability in research practice. *Jurnal Matematika, Statistika dan Komputasi,* 17(2), 223–230.

Ayalp, N., Yildirim, K., Bozdayi, M., & Cagatay, K. (2016). Consumers' evaluations of fitting rooms in retail clothing stores. *International Journal of Retail & Distribution Management,* 44(5), 524–539. https://doi.org/10.1108/IJRDM-06-2015-0085

Ayalp, N., Yıldırım, K., & Çağatay, K. (2017). Effect on users of the seating element types in cafés / restaurants. *Gazi University Journal of Science,* 30(4), 15–28.

Baker, J. (1986). The role of the environment in marketing services: The consumer perspective. In J. A. Cepeil et al. (Eds.), The services challenge: Integrating for competitive advantage (pp. 79–84). AMA.

Basu, R., Paul, J., & Singh, K. (2022). Visual merchandising and store atmospherics: An integrated review and future research directions. *Journal of Business Research,* 151, 397–408.

Breugelmans, E., Altenburg, L., Lehmkuhle, F., Krafft, M., Lamey, L., & Roggeveen, A. L. (2023). The future of physical stores: Creating reasons for customers to visit. *Journal of Retailing,* 99(4), 532–546.

Bowen, D. E., & Schneider, B. (2022). Service management strategic mindsets that create positive customer and employee experiences. In The Palgrave Handbook of Service Management (pp. 129–149). Springer International Publishing.

Coşgun, B., Yıldırım, K., & Hidayetoglu, M. L. (2022). Effect of wall covering materials on the perception of cafe environments. *Facilities,* 40(3/4), 214–232. https://doi.org/10.1108/F-07-2021-0060

Elmashhara, M. G., & Soares, A. M. (2019). Entertain me, I'll stay longer! The influence of types of entertainment on mall shoppers' emotions and behavior. *Journal of Consumer Marketing,* 37(1), 87–98.

Flacandji, M., & Krey, N. (2020). Remembering shopping experiences: The shopping experience memory scale. *Journal of Business Research,* 107, 279–289.

Gąsiorowska, A. (2008). Różnice indywidualne jako determinanty postaw wobec pieniędzy (Individual differences as determinants of money attitudes) [Doctoral dissertation, Uniwersytet Wroclawski Wydzial Nauk Historycynych, Pedagogicnych, Instytut Psychologii]. Munich Personal RePEc Archive (MPRA).

DOI: 10.15320/ICONARP.2025.350

Gilboa, S., Vilnai-Yavetz, I., Mitchell, V., Borges, A., Frimpong, K., & Belhsen, N. (2020). Mall experiences are not universal: The moderating roles of national culture and mall industry age. *Journal of Retailing and Consumer Services*, 57, 102210.

Grewal, D., & Levy, M. (2007). Retailing research: Past, present, and future. *Journal of Retailing*, 83(4), 447–464. https://doi.org/10.1016/j.jretai.2007.09.003

Grewal, D., & Roggeveen, A. L. (2020). Understanding retail experiences and customer journey management. *Journal of Retailing,* 96(1), 3–8. https://doi.org/10.1016/jretai.2020.02.002

Grohmann, B. (2009). Gender dimensions of brand personality. *Journal of Marketing Research,* 46(1), 105–119. https://doi.org/10.1509/jmkr.46.1.105

Goić, M., Levenier, C., & Montoya, R. (2021). Drivers of customer satisfaction in the grocery retail industry: A longitudinal analysis across store formats. *Journal of Retailing and Consumer Services,* 60, 102505.

Ghorbani, M., Karampela, M., & Tonner, A. (2022). Consumers' brand personality perceptions in a digital world: A systematic literature review and research agenda. *International Journal of Consumer Studies,* 46(5), 1960–1991.

Gustafsson, A., Caruelle, D., & Bowen, D. E. (2024). Customer experience (CX), employee experience (EX) and human experience (HX): Introductions, interactions and interdisciplinary implications. *Journal of Service Management,* 35(3), 333–356.

Hermes, A., & Riedl, R. (2021). Dimensions of retail customer experience and its outcomes: A literature review and directions for future research. In International Conference on Human-Computer Interaction (pp. 71-89). Cham: Springer International Publishing.

Ikei, H., & Miyazaki, Y. (2020). Positive physiological effects of touching sugi (Cryptomeria japonica) with the sole of the feet. *Journal of Wood Science,* 66(1), Article 29. https://doi.org/10.1186/s10086-020-01876-1

Jones, C. (2021). Reframing the intra-urban retail hierarchy. Cities, 109, 103037.

Krey, N., Picot-Coupey, K., & Cliquet, G. (2022). Shopping mall retailing: A bibliometric analysis and systematic assessment of Chebat's contributions. *Journal of Retailing and Consumer Services,* 64, 102702.

Kolyesnikova, N., Dodd, T. H. & Wilcox, J. B. (2009). Gender as a moderator of reciprocal consumer behavior. *Journal of Consumer Marketing,* 26(3), 200-213. https://doi.org/10.1108/07363760910954136

Kuuru, T. K., Litovuo, L., Aarikka-Stenroos, L., & Helander, N. (2020). Emotions in customer experience. In H. Lehtimäki, P. Uusikylä, & A. Smedlund (Eds.), Society as an interaction space (Vol. 22, pp.247-274). Springer. https://doi.org/10.1007/978-981-15-0069-5_12

Lee, W., Seo, Y., & Quan, L. (2023). Consumer behavior toward eco-friendly coffee shops: Moderating effect of demographic characteristics. *Journal of Foodservice Business Research,* 1-25. https://doi.org/10.1080/15378020.2023.2214059

Liu-Thompkins, Y., Khoshghadam, L., Shoushtari, A. A., & Zal, S. (2022). What drives retailer loyalty? A meta-analysis of the role of cognitive, affective, and social factors across five decades. *Journal of Retailing,* 98(1), 92-110.

Mustikasari, A., Krisnawati, M., Sutrisno, E. (2021). Customer experience and repurchase intention in multi-channel: Customer satisfaction as mediating variable. *The Journal of Industrial Distribution & Business,* 12(3), 7-19.

Müezzinoğlu, M. K., Hidayetoğlu, M. L., & Yıldırım, K. (2020). The effects of the wall colours used in educational spaces on the perceptual evaluations of students. *Megaron,* 15(1), 1-12. https://doi.org /10.14744/megaron.2020.87369

Müezzinoğlu, M. K., Hidayetoğlu, M. L., & Yıldırım, K. (2021). The effects of light colour temperatures on students' perceptual evaluations in design studios. *Colour Research and Application*, 46(5), 1006-1018. https://doi.org/10.1002/col.22654

Pizam, A., & Tasci, A. D. (2019). Experienscape: Expanding the concept of servicescape with a multi-stakeholder and multi-disciplinary approach. *International Journal of Hospitality Management,* 76, 25-37.

Shamsi, S., Khan, S., & Khan, M. A. (2023). Moderating effect of gender on service convenience and customer satisfaction: An empirical study of Indian e-retailers. *LBS Journal of Management & Research,* 21(1), 64-80. https://doi.org /10.1108/LBSJMR-07-2022-0038

Smith, A. (2011). Internal social marketing: lessons from the field of services marketing. In G. Hastings, K. Angus, & C. Bryant (Eds.), The Sage Handbook of Social Marketing (pp. 298-316). Sage. http://www.sagepub.com/books/Book234153

Turley, L. W., & Milliman, R. E. (2000). Atmospheric effects on shopping behavior: A review of the experimental evidence. *Journal of Business Research,* 49(2), 193-211. https://doi.org/10.1016/S0148-2963(99)00010-7

Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J. Q., Fabian, N., & Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research,* 122(4), 889-901. https://doi.org /10.1016/j.jbusres.2019.09.022

Yildirim, K., Ayalp, N., Aktas, G. G., & Hidayetoglu, M. L. (2014). Consumer perceptions and functional evaluations of cash desk types in the clothing retail context. International *Journal of Retail & Distribution Management,* 42(6), 542–552. https://doi.org/10.1108/IJRDM-03-2013-0056

Yildirim, K., Cagatay, K., & Hidayetoğlu, M. L. (2015). The effect of age, gender and education level on customer evaluations of retail furniture store atmospheric attributes. *International Journal of Retail & Distribution Management,* 43(8), 712–726. https://doi.org/10.1108/IJRDM-01-2013-0034

Yıldırım, K., Hidayetoğlu, M. L., Gökbulut, N., & Müezzinoğlu, M. K. (2019). Effects on students' perceptual evaluations of the wall colors used in design studios by the virtual reality method. *ICONARP International Journal of Architecture and Planning,* 7(1), 99–120. https://doi.org/10.15320/ICONARP.2019.68

Yıldırım, K., Hidayetoglu, M. L., & Unuvar, S. S. (2022). The effects of location and layout of offices on perceptual evaluations of users. *Facilities,* 40(1/2), 1–19. https://doi.org/10.1108/F-11-2020-0123

Zahra, D. R., & Anoraga, P. (2021). The influence of lifestyle, financial literacy, and social demographics on consumptive behavior. *The Journal of Asian Finance, Economics and Business,* 8(2), 1033-1041.

Zhang, X., Zhang, K., Li, S., & Koenitz, D. (2023). Effects of store fixture shape at retail checkout: Evidence from field and online studies. *Production and Operations Management,* 32(10), 3158–3173.

Wu, J., Song, S., & Whang, C. H. (2021). Personalizing 3D virtual fashion stores: Exploring modularity with a typology of atmospherics based on user input. *Information & Management,* 58(4), 103461, 1-10.with transparent insulation material. *Energy*. 174, 534-542.

DOI: 10.15320/ICONARP.2025.350

Resume

Tolga Subaşi graduated from a master's degree in the wood products industrial engineering at Gazi University in Ankara, Turkey. His research field consists of environmental psychology, spatial perception, color and material psychology.

Kemal Yıldırım, PhD, is presently employed as a Professor at the Gazi University in Ankara, Turkey. Prof. Yıldırım has written over 200 national and international scientific articles in the field of furniture and interior design. His research field consists of environmental psychology, design psychology, color psychology, spatial perception and interior space analysis.

Menşure Kübra Müezzinoğlu, PhD, is presently employed as an Associate Professor at Fırat University, Department of Interior Architecture in Elazığ, Turkey. She has published many academic articles / papers / book chapters on interior architecture, spatial perception, environmental psychology, use of color and light in spaces, interior architecture education, accessibility, universal design and inclusive design.