PROCEEDINGS BOOK

ICNTAD CONFERENCE

INTERNATIONAL CONFERENCE ON NEW TRENDS IN ARCHITECTURE & INTERIOR DESIGN

11th International Conference on New Trends in Architecture and Interior Design 2025

ICNTAD CONFERENCE

INTERNATIONAL CONFERENCE ON NEW TRENDS IN ARCHITECTURE & INTERIOR DESIGN

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Res. Asst. Hatice Aşkın

Dear Colleagues,

I am honored to invite and send you this call for papers on behalf of the Congress Organization Board of the "11th International Conference on New Trends in Architecture and Interior Design (11th ICNTAD'25)", to be held in Bologna, Italy, between April 25-27, 2025.

The conference will focus on a broad range of topics related to new trends in architecture and design. The conference organizers call for papers and presentation proposals that are relevant to the conference themes. Given the conference's theme, papers with any of the following or related subjects would be appropriate for presentation:

Criticism of sustainability/unsustainability
The architecture of philosophy/architecture without philosophy
Professional settlement of interior architecture
Human contact to space with furniture
Intangible skin of space: lighting design
Tangible skin of space: material
Ideology in architecture or architecture of ideology
Spaces without space: 3D design
The artistic value of space
Architecture without architect
Cultural codes / architecture
Post-COVID Architecture & Interior Design
Post-COVID Design Education Models
Spatial Reflections of Pandemics/Epidemics in History

The 11th International Conference on New Trends in Architecture and Interior Design Conference (11th ICNTAD'25), aims to bring together experts from several institutions, such as universities, administrative organizations, architects, engineers and designers, within the framework of conference topics of building, architecture, interior design, product, material, etc. High-level academicians, professionals and design students from around the world will explore the intersection of design, architecture and best practices with leaders from the design profession. We also positively encourage the participation of early-career scholars and postgraduate researchers.

We eagerly anticipate your presence at our congress, scheduled for April 25–27, 2025, with the aim of achieving a successful scientific congress and leaving a lasting impression on your memory.

Regards

Prof. Dr. Burçin Cem ARABACIOĞLU

Conference Chair

ICNTAD CONFERENCE
INTERNATIONAL CONFERENCE ON NEW TRENDS IN ARCHITECTURE & INTERIOR DESIGN

CONFERENCE VENUE

ZAN HOTEL EUROPA BOLOGNA, ITALY

25 APRIL 2025 FRIDAY

PARIS MEETING ROOM

Welcome Speech / 09:40 – 10:00
Prof. Dr. Burcin Cem ARABACIOGLU / Conference Chair
Mimar Sinan Fine Arts University, Istanbul, Turkiye

E - Keynote (ONLINE) Speech / 10:00 – 10:40
Juhani Pallasmaa
Speech Title: Interplay of The Esthetical and the Ethical

TEA & COFFEE BREAK 10:40 – 11:00

SESSION A (11:00 – 12:40)
SESSION CHAIR: Assoc. Prof. Dr. Feride Pınar ARABACIOGLU
PARIS MEETING ROOM

11:00 – 11:20
PAPER TITLE : Reflections on Design Education Models: Outdoor Spatial Approach
AUTHOR(S) : Jorge T. RIBEIRO - **Susana ROSADO**

11:20 – 11:40
PAPER TITLE : Investigating the Analogic Aspects in Vernacular Architectural Heritage: Cases of Türkiye (the Eastern Black Sea Region) and Malaysia
AUTHOR(S) :Ömer Faruk BAYRAM - **Burcu SALGIN**

11:40 – 12:00
PAPER TITLE : Ideology in Architecture or Architecture of Ideology: How Political and Territorial Changes Conducted Maks Fabiani's Architectural Legacy to Half a Century of Anonymity
AUTHOR(S) :**Lucija PERKO**

12:00 – 12:20
PAPER TITLE : Zero CO_2 and Energy Plus Buildings: The Conversion of EMU Faculty of Architecture Building to a Zero CO_2 Building by Considering Solar Energy to Achieve Carbon Neutrality
AUTHOR(S) : **Harun SEVİNÇ**

12:20 – 12:40
PAPER TITLE : Quantifying Biophilic Design: Daylight and Circadian Rhythm in Office Interiors
AUTHOR(S) : **İdil BAKIR KÜÇÜKKAYA** - Deniz HASIRCI

LUNCH BREAK 12:40 – 13:20

SESSION B (13:20 – 15:20)

SESSION CHAIR: Prof. Dr. Burcin Cem ARABACIOGLU

PARIS MEETING ROOM

13:20 – 13:40
PAPER TITLE : Innovative Pedagogical Approaches to Kindergarten Architecture: Evaluating Design Features in Italian School Buildings
AUTHOR(S) :**Laura CORMIO** - Nisa Nur GÖKSEL - Maura MENGONI - Ann PETERMANS - Ruth STEVENS

13:40 – 14:00
PAPER TITLE : The Interplay of Architecture and Ideology in Türkiye's Republican and Contemporary Eras
AUTHOR(S): **Efsun EKENYAZICI GÜNEY** - Hande TULUM OKUR

14:00 – 14:20
PAPER TITLE : Flexible Interior Design in Symmetrical Housing Block Typologies: Co-Living Approach
AUTHOR(S) :**Nisa Nur GÖKSEL** - Burçin Cem ARABACIOĞLU

14:20 – 14:40
PAPER TITLE : Evaluating the Publicness of Public Spaces: A Literature Review And A Critical Perspective
AUTHOR(S) :Yasemin KÜTÜK - **Feride Pınar ARABACIOĞLU**

14:40 – 15:00
PAPER TITLE : Ways of Seeing Urban Space: City Exploration With Photos Taken by Visually Impaired People
AUTHOR(S) : **Didem KAN**

15:00 – 15:20
PAPER TITLE : Reconstructing First-Year Design Education: Integrating Collaborative Installations and Portfolio Exercises in the Post-Pandemic Era

AUTHOR(S) :**Ali ASLANKAN**

26 April 2025 Saturday

SESSION C (10:00 – 11:20)
SESSION CHAIR: Assoc. Prof. Dr. Didem TUNCEL
PARIS MEETING ROOM

10:00 – 10:20
PAPER TITLE : A Psychogeographic Exploration of the Body-Space Relationship Through Urban Boundaries
AUTHOR(S) : Aslı YÜCEL

10:20 – 10:40
PAPER TITLE : Memorials of Pandemics: Places of Gratitude and Remembrance for Healthcare Workers of COVID-19
AUTHOR(S) : Senem MÜŞTAK SEVİNDİK

10:40 – 11:00
PAPER TITLE : From Technotopias to a Futuristic Spatial Design Concept: Capsule Living in the Hospitality Industry
AUTHOR(S) :Eren CAN - **Didem TUNCEL**

11:00 – 11:20
PAPER TITLE : Evaluation of Daylight Performance in Double-Skin Facade Systems for Buildings
AUTHOR(S) :Hilal GÜNAY

TEA & COFFEE BREAK 11:20 – 11:40

Keynote Speech / 11:40 – 12:20
Yiorgis Yerolymbos
Speech Title: Architecture and Photography: Gradually Articulating a Personal Vocabulary

LUNCH BREAK 12:20 – 13:00

SESSION D (13:00 – 14:20)

SESSION CHAIR: Prof. Dr. Füsun SEÇER KARIPTAŞ

PARIS MEETING ROOM

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PAPER TITLE : "Living My Home": How Interior Design Can Enhance a Sense of Home for People with Dementia
AUTHOR(S) :**Natsumi WADA** - Silvia Maria GRAMEGNA - Alessandro BIAMONTI

13:20 – 13:40
PAPER TITLE : The Evolution of the Concept of Shelter – An Assessment of Sustainable Micro-Living Spaces
AUTHOR(S) :**Füsun Seçer KARİPTAŞ** - Fatma Ceyda GÜNEY YÜKSEL - Fatih KARİPTAŞ - Selcem BAYIR AYDIN

13:40 – 14:00
PAPER TITLE : About Historical Place–Visitor Interaction with Online Comments: Trabzon Memiş Ağa Mansion
AUTHOR(S) :İrem BEKAR - **Gizem SEYMEN**

14:00 – 14:20
PAPER TITLE : Illuminance Testing of Embroidered Lighting Fixtures Made from Recycled Fibers in Different Usage Scenarios
AUTHOR(S) :**Yang FU-TZU** - Yang SHING-RU

TEA & COFFEE BREAK 14:20 – 14:40

End of the day

27 April 2025 Sunday

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SESSION CHAIR: Prof. Dr. Evren Burak ENGİNÖZ
PARIS MEETING ROOM

10:00 – 10:20
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AUTHOR(S) :**Mariateresa CAMPOLONGO**

10:20 – 10:40
PAPER TITLE : From Crisis to Connectivity: COVID-19 Impact on Awareness of Smart Applications According to Education Level and Age Groups
AUTHOR(S) : **Gülnar BAYRAMOĞLU BARMAN**

10:40 – 11:00
PAPER TITLE : A Comparative Study on Spatial Qualities in Post-Disaster Temporary Settlements in Yalova and Malatya Cities
AUTHOR(S) : **Evren Burak ENGİNÖZ** - A. Merve SARIN TOPALOĞLU

11:00 – 11:20
PAPER TITLE : The Promise and Peril of Sustainable Architecture: Learning from Successes and Failures
AUTHOR(S) : **Aliye Rahşan KARABETÇA**

11:20 – 11:40
PAPER TITLE : An Analysis of Green Building Certified Housing Projects in Izmir for Maintaining Resilience and Sustainability
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LUNCH BREAK 12:00 – 13:00

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PARIS MEETING ROOM

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AUTHOR(S) :**Mahdi ALIZADEH** - Clara PIMENTA DO VALE - Anastasiia KHOLOPOVA

13:20 – 13:40
PAPER TITLE : Reading Migration Spaces as In-Between Spaces in Urban Contexts Through the Concepts of Place and Otherness
AUTHOR(S) :Zeynep KOCOGLU UYSAL - **Cigdem POLATOGLU SERTER**

13:40 – 14:00
PAPER TITLE : Evaluation of Energy Parameters in Traditional Erzurum Houses: "Yellow Mansion House"
AUTHOR(S) :**Ebru PEKGOZ** - Haydar PEKGOZ - Emrah TURKYILMAZ

14:00 – 14:20
PAPER TITLE : Understanding the Violence of Space in the Berlin Jewish Museum
AUTHOR(S) :Gizem Nur ŞAN - **Çiğdem POLATOĞLU SERTER**

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PAPER TITLE : Time, Memory and Experience in the Crafting of Architectural Space: Two Examples, Fernando Távora and Ernesto Nathan Rogers
AUTHOR(S) :**Mahdi ALIZADEH** - Clara PIMENTA DO VALE - Anastasiia KHOLOPOVA

14:40 – 15:00
PAPER TITLE : An Architectural Landmark in Central Asia Through the Lens of Soft Power as a New Trend:‘‘Bibi Khanum Mosque’’
AUTHOR(S) : **Tuba FAZLIAGAOGLU** - Şerife ULAÇ - Elif ÖZDOĞLAR

11TH INTERNATIONAL CONFERENCE ON NEW TRENDS IN ARCHITECTURE AND INTERIOR DESIGN 2025

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RECONSTRUCTING FIRST-YEAR DESIGN EDUCATION: INTEGRATING COLLABORATIVE INSTALLATIONS AND PORTFOLIO EXERCISES IN THE POST-PANDEMIC ERA

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Abstract
Design education operates at the intersection of art, technology, and science, requiring an interdisciplinary approach. The first year of design education is a critical transition, introducing students to a global design language with new concepts and principles. The pandemic's shift to online education disrupted traditional design studio practices, replacing collective, hands-on learning with independent exploration in home environments. This transition fostered new skills and perspectives but also introduced challenges in student engagement and adaptation. In response, this paper proposes a restructured first-year design education model that integrates collaborative installation projects with portfolio exercises aiming to bridge a revealed gap, cultivate the pedagogical benefits of both perspectives, and foster interdisciplinary learning. The curriculum offers a shared foundation for architecture, interior architecture, visual communication design, industrial design, and textile and fashion design, gradually transitioning into discipline-specific objectives by the end of the academic year. Drawing on insights from over 1390 first-year students, the study demonstrates how this model addresses the evolving needs of post-pandemic design education by combining the advantages of two distinctive design practices. For this paper, each semester is treated as a distinct case and analysed through group project submissions and portfolios, assessing the effectiveness of objective delivery. This analysis is further supported by verbal and written student feedback on the strengths and challenges they encountered in both assignments. Implemented over five years (2020–2024) at the Faculty of Fine Arts and Design, Izmir University of Economics, Turkey, the findings demonstrate the effectiveness of this approach in enhancing collaboration, adaptability, and reflective practice, while preparing students for diverse design fields.
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Key Words: integrated design education, first-year design studio, post-pandemic, interdisciplinary, design teaching

1. Introduction

Training cognitive competence in design thinking is fundamental in the design studio [5-6]. In this environment, novice students' learning behaviors are best understood through close collaboration with design tutors and the clear presentation of teaching material. In project-based design education, students tackle various projects—often defined by tutors to fulfill specific annual learning outcomes. These projects, whether individual or collective, offer opportunities for students to apply previously acquired knowledge [7]. While students' cognitive skills and understanding develop over time, tutors adjust their instructional strategies according to the students' experience. For example, first-year students typically receive carefully structured exercises and extensive supervision, whereas senior students are expected to engage in independent inquiry through semester-long projects. Early in the program, tutors might explain and reiterate each stage of the design process in detail, whereas later, they allow for greater autonomy.

Active physical and intellectual participation is essential in any studio work. While tutors can set the context, organize materials, and guide both individual and group activities [11], the success of learning ultimately depends on student engagement. In problem-based learning a core element of project-based design education—students are encouraged to explore alternative approaches, critically analyze contexts, articulate concepts, study precedents, connect different references, evaluate interdisciplinary criteria, and integrate domain knowledge. An additional strategy involves framing this knowledge as interconnected networks [9]. Regardless of the tutor's expertise or the richness of content, the learning outcome is determined by the depth of student engagement.

Each exercise is designed with a specific objective that students must eventually grasp. Although the goal is for students to experience and understand key components of the design process, individual interpretations will vary. Unlocking these conceptual insights requires a carefully structured series of exercises that provide opportunities to enhance self-awareness [4]. Biggs [3] criticizes approaches that require students to infer the tutor's intended objectives, which can lead to demotivation if those objectives remain elusive. His concept of "constructive alignment" advocates for a coherent network in which learning activities are directly linked to clear curricular objectives, effective teaching methods, and outcome assessments [2]. This framework promotes learning-by-doing, positioning students as active participants rather than passive recipients [8]. In this light, the design studio serves as an environment that stimulates cognitive activity, revealing students' potential, highlighting

the challenges they face, and marking the points at which discoveries occur. Throughout this process, students remain interconnected with multiple groups, ensuring a dynamic learning experience within the design studio.

Control and supervision are typically more pronounced in first-year studios than in later years. Considering individual cognitive styles [1], Roberts [10] argues that students with analytical thinking preferences thrive under clear frameworks and constraints in the first year, whereas others benefit from more open-ended approaches as they advance. Given the need for sensitivity when working with novice design students, the pandemic started an era of mandatory remote teaching, fundamentally altering conventional instructional strategies and student learning behaviors [12].

With the full resumption of face-to-face teaching, our focus shifts to enriching in-studio, hands-on experiences while incorporating valuable lessons learned from remote teaching during the pandemic. For first-year design students, returning to the physical studio is a prime opportunity to rebuild foundational skills and rekindle the sense of community that had been missing. It is essential first to understand the diminished opportunities and emerging challenges experienced during obligatory distant education. One significant issue was the inability to engage in a physical studio environment, which fundamentally altered the studio culture for novice design students. To address these challenges, we are strengthening studio culture by emphasizing collaborative projects (strength of face-to-face environment) and hybrid presentations (experimented during the pandemic) that blend in-person and remote experiences. Students are required to form groups that include at least one member from each department. They collaborate to document the entire design process, culminating in full-scale (1:1) models and a presentation board. Throughout the project, students evaluate both their peers' performances and the final submission, with their assessments collected by instructors. This process also highlights which learning outcomes of the assignment were successfully delivered to students, identifying discrepancies and alignments when compared to design tutors' assessments. Additionally, students submit written self-evaluations as part of their individual portfolios, along with peer assessments at the end of the semester. All collected data is compiled into a class folder for comparative analysis within the semester and across multiple semesters. This approach reconnects students and tutors with the creative energy of shared studio spaces, balances traditional hands-on skills with digital fluency, and encourages active participation in real-time design tasks.

2. Challenges of obliged remote teaching in the first-year design studio

2.1 Inability to stay present / attention deficit / distraction

If we narrow down distance education to design disciplines and then to design studios, we can identify the difference between the obligatory and voluntary benefits of physical space for the novice design student. Here are a few questions that would arise via the experience of remote education models: What are the physical, social, and psychological effects of being in the studio versus not being there? Can a student's seemingly obligatory attention during class, due to being physically present under the design tutor's observation, truly mean they are listening or understanding? One of the emerging experiences was the fact that students preferred not to attend classes if the camera was open and they were being recorded; even if they did, they struggled to stay focused. Through the Panopto recordings, we observed comments such as "I have a baby brother at home and constantly crying, so I need to mute myself and close the camera." Another student added "I have to attend at the kitchen, so I cannot open my camera." The accessibility of the course content and written or visual materials online led students to procrastinate on fulfilling their academic responsibilities. By not turning on their cameras during class, students were allowed to engage in other activities at home or elsewhere simultaneously. Being outside the classroom removed the discipline and rules imposed by the physical space. Several students reported spending time in their gardens, stating that they struggled to concentrate indoors due to the lack of a proper study space. How can we determine the correlation between the contributions a motivated and an unmotivated student receives from a physical studio at the university versus working from home? Does class size matter? How does the design tutor's observation of 10 students in a small group differ from observing 80 or 130 students in the same class? In distance education, which factors directly or indirectly influence class engagement, knowledge transfer, and the learning process?

In practical courses, where students cannot work with materials in a workshop environment, detailed preparation and more visual examples and verbal explanations are required compared to face-to-face education to convey the subject effectively. Visual examples and verbal explanations were traditionally presented during feedback sessions, where students could collectively follow along. During the pandemic, even panels have been reduced to 1-on-1 critiques on opposite sides of a screen. Have opportunities increased, or have the disadvantages outweigh the advantages? What habits have changed?

The correct understanding of what is being taught cannot be assessed until students complete their project submissions. These submissions are only as effective as the working environments and resources students have at home, if they are at home at all. In various cases, many students reported staying at their grandparents' homes due to ongoing illnesses or similar issues, with little to no access to study materials. How can we assess how much of the teaching is retained, the student's performance, and whether the student self-consciously understands why they are doing what they are doing? Furthermore, projects initially generate excitement but, like many fleeting interests in the digital age, students' enthusiasm for them fades quickly as they start to complain about being bored because of the continuous "revisions" of any given assignment. At the early stages, students frequently expressed frustration, asking, *"Are we going to study insects again for the next exercise?"* This indicated their boredom with the current content, which required them to analyse a selected insect's formal and visual properties as a composition. Additionally, as the separation between home and school time disappears, the novice design students seem

unable to approach their projects and classes in a planned manner. While students previously lost time commuting to and from school, how can we determine whether this saved time has had a positive correlation with productivity? Many students claimed to prefer staying at home at the start of the class since it takes time to arrive at the school whereas others preferred to be with friends in the physical studio.

2.2. Lack of interaction during class

Unlike face-to-face education, the mediums (tools) used in distance learning make instant feedback nearly impossible. Students mostly listen to classes with their cameras off, and particularly with microphones off (to avoid technical issues like echo), making it impossible for instructors to observe students' reactions in real-time. Whether the subject is understood is checked mainly through targeted questions. The design tutor-student interaction has been minimized, and if the class size is large, it's almost impossible. Student-student interaction has also significantly decreased in distance education. The rate at which students contribute to each other's projects during class hours is far lower compared to face-to-face education. Projects are shared with the entire class for everyone to see, but it's unclear whether students who missed the live class watch the recordings or pay attention to feedback given to others. Reviewing the recordings, there is also a statistics page that provides instructors with data on when, who, and how frequently students rewatched them. The results indicate minimal engagement, with students primarily revisiting recordings only before major submissions. Additionally, less than ten percent of students actively utilized the recordings for every exercise.

Additionally, in distance education, material recommendations/sharing and the social interactions essential for creative production are almost nonexistent. Most of the time, during post-submission feedback, one student may listen to another's process during the class hours. As a result, students miss out on the immediate interactions and discoveries that occur in the design studios. Similarly, group projects, where students learn many skills through collaboration, sharing ideas, shopping for materials together, or dividing responsibilities—have also disappeared.

2.3. Loss of collaborative design challenges

All the exercises have a set of objectives with an expected hierarchy of importance. Earlier exercises in the first semester aim to introduce properties of elements for use in any design project and aim to teach how to give definition to any element to define, control and manipulate. However, these exercises have other purposes, for the students to meet and communicate with each other, learn how to read and understand an assignment, and even to become familiar with the studio environment including the instructors. They provide a ground for the instructors to use basic design terminologies and allow the students to hear them in their relevant context for the first time.

In the second traditional semester, students work on collaborative design projects that encourage teamwork and introduce problem-solving principles. Guided group critiques—where peers constructively evaluate each other's work—help build confidence and promote shared learning. At the end of the academic year, students from all five disciplines come together to organize an exhibition showcasing departmental studies and projects. They install their work across the faculty grounds, creating a festive atmosphere that boosts enthusiasm and self-esteem, and reminds them that designing is a joyful pursuit, see Fig 1. However, during the pandemic, these collaborative assignments were suspended. With lockdowns and social distancing in place, students had to work from home within their immediate environments, with limited resources and without the benefit of collective study experiences. They were also unable to participate in a festival-like, year-end exhibition. As a practical alternative, design tutors replaced the exhibition with an individual year-end portfolio assignment—a change that, despite its merits, could not fully capture the rich, interactive experience of a shared event.

Fig. 1. Year End Exhibition, 2018 and 2019 (pre-Covid era)

2.4 Statistics of enrollment and completion rates in the design studio

The results of full-online, hybrid and face-to-face semesters demonstrate the students' behavior and drop-out rates during these periods, see table 1.

Table 1. Student enrollment and statistics of pass/fail types

Spring 2020 (face-to-face>online)	Pass	NA	FD/FF	Total	Departments
Section 1	52	7	4	63	IAED
Section 2	65	4	3	72	ARCH
Section 3	19	1	0	20	VCD
Section 4	32	2	0	34	ID
Section 5	20	1	1	22	FD
TOTAL	**188**	**15**	**8**	**211**	
NA ratio		7%			
Spring 2021 (Covid-online)	Pass	NA	FD/FF	Total	Departments
Section 1	74	20	6	100	IAED
Section 2	40	17	9	66	ARCH
Section 3	13	12	2	27	VCD
Section 4	32	5	3	40	ID
Section 5	17	5	0	22	FD
TOTAL	**176**	**59**	**20**	**255**	
NA ratio		23.1%			
Spring 2022 (Covid-hybrid)	Pass	NA	FD/FF	Total	Departments
Section 1	63	22	11	96	IAED
Section 2	58	12	6	76	ARCH
Section 3	27	20	8	55	VCD
Section 4	50	3	4	57	ID
Section 5	14	5	3	22	FD
TOTAL	**212**	**62**	**32**	**306**	
NA ratio		20,2%			
Spring 2023 (earthquake-online)	Pass	NA	FD/FF	Total	Departments
Section 1	53	15	14	82	IAED
Section 2	42	16	11	69	ARCH
Section 3	29	17	8	54	VCD
Section 4	43	9	8	60	ID
Section 5	15	3	3	21	FD
TOTAL	**182**	**60**	**44**	**286**	
NA ratio		20,9%			
Spring 2024 (face-to-face)	Pass	NA	FD/FF	Total	Departments
Section 1	83	11	15	109	IAED
Section 2	74	7	8	89	ARCH
Section 3	37	8	3	48	VCD
Section 4	47	4	2	53	ID
Section 5	32	3	0	35	FD
TOTAL	**273**	**33**	**28**	**334**	
NA ratio		9,8%			

During the Fall semester of the design studio, students participated in face-to-face education for the first four weeks, after which, in mid-March, the course transitioned to online education. As the Faculty of Fine Arts and Design (FFAD), all projects and materials were adapted to the online system within a week, ensuring the semester was completed successfully due to the rapport and familiarity established with the students. These students graduated in June 2023.

The restrictions imposed during the COVID-19 era had a negative impact on students starting university for the first time or those transitioning from preparatory classes in the Fall semester of 2021. Factors such as being deprived of the campus experience, living outside of İzmir, being subject to curfews for those aged 18, limited access to materials and supplies in their regions, having siblings also engaged in education, and sharing a single computer contributed to these challenges. Many students either chose to defer their registration or faced academic insufficiency due to absenteeism. Whether these behaviors were consistent across all courses can be verified through their transcripts. However, since the design studio course is an 8 ECTS practice class, it was significantly affected by these conditions. These students graduated in June 2024.

In the Spring 2021 "Online" semester, students who deferred registration or deliberately abandoned studio classes due to absenteeism returned in Spring 2022 due to the "Hybrid" system, leading to an increase in student numbers. While students demonstrated near-full participation on face-to-face class days, participation dropped significantly on online days, resulting in a rise in "not attending" (NA) grades. Similarly, feedback from upper-level classes indicated a substantial drop in attendance on online days. Changes in student behavior between the beginning and end of the semester can be observed in their project submissions and their transcript grade entries. While initial assignments were submitted, many students ceased submissions as the semester progressed and did not even object to their grades or absenteeism records. This suggests that the high number

of NA grades can be interpreted as a deliberate action influenced by the conditions of the semester. These students are expected to graduate in June 2025.

Students who began their first semester face-to-face were, like the rest of the country, physically and psychologically affected by the 2023 Kahramanmaraş earthquake. Approximately 25–30% of the students resided outside İzmir, with some having one or more relatives in the affected areas. To ensure equal opportunities for all students, the Spring semester was conducted online. Constant communication was maintained with students, considering material limitations and their psychological well-being. Many students expressed fears related to the earthquake and its recurrence, indicating difficulties in psychological adaptation. When comparing the high numbers of NA and FD/FF grades with the Spring 2020 semester (when students completed their first semester face-to-face), it is evident that the earthquake's devastating impact contributed to the increase in failure rates, as student psychology significantly affected their motivation.

By the Spring semester of 2024, absenteeism rates had returned to normal levels. For example, of the 11 NA students in the IAED department, 6 enrolled at the university between 2019–2021. In the Architecture department, 4 out of 7 NA students belonged to the 2020 cohort. This suggests that a portion of the student population accumulated over the years. Approximately half of the NA students stem from the COVID-19 era, as reflected in the population exceeding the expected 270 students and reaching 334. The consistent absenteeism of students from earlier periods may have been caused by different factors. However, the students who had accumulated over the past three years seem to have successfully completed the semester this year, indicating some relief.

3. "Back to face-to-face"

During the 2023–24 academic year, the fall semester proceeded as usual. Although a few exercises were removed for remote learning previously, those adaptations will not be discussed in this paper. However, in the 2024 spring semester, we resumed traditional design studio sessions with a class-wide collaborative installation project—our first full return to face-to-face teaching in a long time for the spring semester. Students were divided into small groups and tasked with addressing a new design challenge focused on human scale, material manipulation, 1:1 construction, and real-life contextual integration, essentially their first group project in the studio, see Fig 2 and Fig 3.

Fig. 2. 1:1 scale installation, all group work.

Fig. 3. Presentation Boards, all group work.

Working with the theme of this year's chosen classical music, students engaged in collective discussions and brainstorming sessions to generate design ideas. They experimented with materials such as cardboard, wooden sticks, wires, and fabric. With over 330 students working together on the same floor, the project became a visually and conceptually unified installation that showcased the combined effort of the entire class, fostering a strong sense of shared achievement. While the collaborative installation has returned to the curriculum, we, as design tutors with seven years of experience with the novice design students, decided to reinstate the digital portfolio exercise from the pandemic era in place of the traditional year-end exhibition. Although the exhibition offered a festive environment, the portfolio exercise emerged as an engaging teaching strategy that effectively captured student motivation and self-awareness.

Fig. 4. Portfolio pages, individual work, ID.

Fig. 5. Portfolio pages, individual work, IAED.

This portfolio exercise introduced students to the process of documenting and reflecting on their design work while encouraging them to explore visual storytelling, layout design, and self-presentation—especially relevant for those in industrial design, textile and fashion design, and visual communication design. Students curated content by gathering sketches, diagrams, photographs, prototypes, and other materials collected throughout the semester. They were encouraged to structure their portfolios as narratives of their design journey rather than as purely informational documents, highlighting their learning processes, challenges, and growth. Basic principles of layout, typography, and composition formed the core of this approach, providing students with essential tools to define and organize their work. Throughout the process, students shared draft portfolios with peers for feedback, reinforcing the benefits of a collective studio environment and peer assessment for self-validation. Ultimately, each student submitted a fully digital portfolio in PDF format to their respective department for review and grading by design tutors, see Fig 4 and Fig 5. Students' written feedback on the semester and their personal experiences were documented through their portfolio submissions, providing self-evaluations from their own perspectives:

"This exercise was fun to do because I liked selecting and presenting the glass on the board and in the video as well, with this exercise I felt like I'm almost advertising the glass but also showcasing its use of design which I really liked. The 2D Composition by far I think one of the biggest challenges of this exercise for me."

"I spent countless nights just for the models and boards, but I think it was worth it because I not only learned a lot of things about the material but also how I should organize my schedule better."

"So far, I think this lesson had its difficulties and conveniences, first we had to do it online due to the 2023 earthquake that shook Izmir, we also had to provide materials and environment to work at home which was a little challenging but not impossible. To begin with, I really liked that the process part 2 was all about our domain: Industrial Design. I really liked and learned very important aspects about being a designer but also, I learned crucial things for my profession: new materials, design decisions, 3D designing, analyzing an Industrial Object etc. All these of course made things more complex but made me develop new skills."

"The research I did for this course, the techniques I learned in this course, and the construction stages greatly improved my design perspective. It was a difficult and intense process, but it was very beneficial for healing and development."

"Overall, these exercises have been instrumental in shaping my designer skills and reinforcing my passion for the discipline. I look forward to applying the skills and insights gained from these exercises to future design endeavors."

"According to me this semester hasn't been really easy because just when I thought that I was getting used to the studio system and the plan we had to go online and do our works and projects at home I have understood that being in the studio is a lot useful for me and it teaches me a lot more because I have the opportunity to work with my classmates and my professors."

By combining these two distinctive curricular elements, we have unified the benefits of both studio-based learning and digital engagement, yielding significant pedagogical advantages for students and offering valuable, constructive feedback for design tutors.

4. Conclusion

Collaborative installation projects create a space where students learn to communicate, negotiate, and solve problems together. Working in groups not only encourages the exchange of ideas but also helps develop the interpersonal skills essential for future studio settings. By contributing individual parts to a larger whole, students understand how their efforts combine to form a unified design—mirroring real-life projects and professional design environments. Experimenting materials at a 1:1 scale deepens their grasp of material properties and spatial relationships, while also bringing together students from all design disciplines, including those from fashion and visual communication design who might otherwise feel isolated. Ultimately, building an installation together fosters community, forging bonds and friendships that instill a strong sense of belonging.

Meanwhile, the portfolio design exercise emphasizes reflection and self-assessment. Documenting their work encourages students to examine their creative process, identify their strengths, and begin articulating their own design philosophies. Observing the evolution of their skills over time gives them a sense of accomplishment and motivates continuous improvement. After spending a year mostly in mixed groups, students come to see that creating a portfolio is a crucial skill for communicating ideas in any design discipline.

Throughout these processes, design tutors serve as facilitators and mentors, cultivating an environment where students can progress comfortably while maintaining a friendly and cohesive design practice. By fostering interdisciplinary thinking and teamwork within the studio, students become part of a supportive, creative community that enhances their connection to both the institution and their department. Hands-on exercises build confidence with tools, materials, and fundamental design principles accumulated over the academic year. Most importantly, this blend of activities nurtures a genuine love for design, reminding students that design is meant to be enjoyable, an insight that sparks lasting passion in the field.

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THE PROMISE AND PERIL OF SUSTAINABLE ARCHITECTURE: LEARNING FROM SUCCESSES AND FAILURES

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Abstract
Sustainability in architecture has become a major focus in recent decades due to the urgent need to address global warming, which refers to climate change, resource depletion, and environmental degradation. While sustainability enjoys widespread support, it has also attracted considerable criticism. These critiques emphasise issues related to its definitions, implementation, unintended consequences, and potential contradictions. The study examines some of the key criticisms of sustainability in architecture, drawing on examples and the sustainability values of green buildings as presented by prestigious institutions and organisations. It incorporates information from diverse sources and focuses on the successes and failures of buildings designed using green building approaches. The aim is to foster a fundamental understanding of sustainability in architecture, which lacks a definitive meaning and can vary among different stakeholders. While sustainability in architecture may hold promise, it also conceals potential pitfalls. The paper suggests that sustainability is not merely a concept to be employed for aesthetic purposes—this could be perilous—but rather one that emphasises efficiency, essential for fulfilling its promises. For instance, many buildings designed according to sustainability principles are not evaluated for their weekly or yearly efficiency outcomes. The world requires living spaces that contribute positively while avoiding harm. Ken Yeang states in his book Ecodesign that sustainability is not a fixed condition but a diverse range of interrelated issues, working together synergistically like cells maintaining optimal body temperature [1]. This synergy must not be disrupted; if so, a breakdown occurs in interrelated issues.
The paper assesses two prominent examples, with results supplemented by recommended improvements. Its methodology relies on a thorough literature review, analytical research, and an examination of an example pertinent to the critique of sustainability in architecture. The expected outcomes summarise the overall evaluation of sustainable design in architecture, analysing both its positive and negative aspects. Not every building is designed to contribute to the environment, often due to ineffective so-called sustainable design. In conclusion, the paper states that the criticism of sustainability in architecture arises from the general conditions of the world, given its current situation, and that architecture significantly impacts this situation.

Key Words: Sustainability, unsustainability, green building, architecture, greenwashing

1. Introduction

The research aims to critically examine the challenges, failures, and successes of sustainability in architecture. It highlights issues such as greenwashing, an overemphasis on technology, embodied carbon, economic and social inequities, and the gap between certification and actual performance. Additionally, the study explores potential solutions and best practices, offering a beacon of hope for achieving sustainable architectural designs. The research covers various aspects of sustainability in architecture, including critiques of sustainability, examining vague standards and the failures of certification systems, common pitfalls, and highlighting the over-reliance on high-tech solutions. It includes case studies analysing One Central Park and BedZED to understand real-world impacts and explores future directions suggesting passive design, resilient architecture, local adaptation, and more. The text adopts a qualitative research approach, utilising literature reviews, case studies, critical analysis, and a comparative method that contrasts successful and flawed implementations to identify key lessons. This comprehensive examination aims to inform architects, policymakers, and stakeholders about the realities of sustainable architecture and provide guidance for future improvements.

Sustainability in architecture has emerged as a dominant discourse in recent decades, propelled by the urgent need to tackle climate change, resource depletion, and environmental concerns regarding degradation. While sustainability enjoys broad support, it has also faced substantial criticism. These critiques underscore concerns regarding its definitions, implementation, unintended and unpredictable consequences, and potential contradictions. These contradictions include greenwashing, lax standards and energy codes, irrelevant material choices, and embodied carbon. For instance, according to the World Green Building Council's report "Sustainable Buildings for Everyone, Everywhere", only 62 out of the 194 countries possess building energy codes [2]. The question arises: "How many of these 62 countries utilise these energy codes appropriately?" or "How many of these countries monitor or enforce energy codes in buildings?" Conversely, as this fosters a robust green building market, the Global Green Buildings Market Report prepared by Market Research Future (MRFR), a global market research company, identifies North America, Europe, and Asia Pacific as the three principal regions comprising the green buildings market (Fig.1) [3].

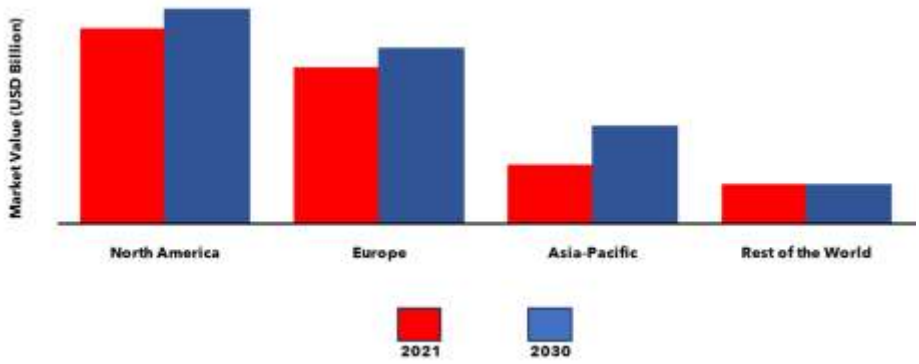

Fig 1. Green building market shared by the regions, 2021 [3].

Figure 1 illustrates the current (2021) and projected (2030) percentages and market value in USD billion [3]. This substantial market may not experience parallel growth towards achieving the targeted sustainability goals. The figure shows that the rest of the world has the smallest market share and is not expected to grow. Although developed countries experience the highest rates of building construction, the region identified as the rest of the world requires global support to augment this market share. This market includes green building materials, certification systems, energy codes, and various other sustainable initiatives. The green building market is a significant subject that necessitates comprehensive research and evaluation; it poses one of the challenges of sustainability in architecture. Every move made towards sustainability, considering the market, influences architectural practice. The results can be unpredictable. Numerous initiatives, research projects, and financial support available for sustainability in architecture, such as LEED or BREEAM, are inadequately reported in terms of global monitoring and actual outcomes. It is evident that the results of sustainability in architecture are not as impactful or positive as the initiatives being undertaken.

To understand how these green buildings function after receiving certification, it is important to review the post-occupancy evaluations (POEs) and measure the expectations these buildings fulfill. According to research conducted by Guy R. et al., these POEs are seldom carried out, published, or monitored [4]. The primary purpose of raising this issue is that both the certification and the subsequent use of the buildings must be certified and regulated to achieve sustainability in architecture. Aside from these certification systems, greenwashing, the lack of clear standards, embodied carbon, material choices, an overemphasis on technology, cultural intensity, economic and social inequities, the performance gap, and the relationship between short-term focus vs. long-term impact are other primary criticisms of sustainability in architecture that should not be underestimated.

2. Learning from Failures

It is important to learn from the failures we have experienced in sustainable architectural designs thus far. This process will never cease, but clarifying the triggers that lead to these mistakes is essential to minimising the harm. Sustainability in architecture has significantly improved; however, numerous failures highlight critical lessons for the future. A significant error is relying on high-tech solutions that break down or consume excessive energy. This could be avoided by considering passive strategies (maximising natural ventilation, daylighting, thermal mass, shading, and appropriate insulation) rather than adding technology [1]. The failures outlined below must be acknowledged, and actions should be implemented promptly to mitigate harm to the planet. The market should be reliable, and scientific monitoring and reporting must be undertaken immediately.

2.1 Vagueness and the absence of clear standards

One of the most significant criticisms of sustainability in architecture is the lack of a universally accepted definition. The term “sustainability” can signify various meanings to different stakeholders, leading to inconsistencies in its application. When sustainability in architecture is mentioned, green buildings and their certification process are the first concepts that come to mind. Green building certifications issued by certain globally recognised organisations aim to provide frameworks for sustainable practices, yet they are often criticised for being too rigid or for inadequately addressing regional and contextual differences. Another criticism is that some buildings which have obtained green building certification are not monitored or managed effectively after certification. This is basically related to the insufficiency of used standards. These standards and certifications shouldn’t be voluntary guidelines. According to a resource report prepared by Bill Baue in 2023, sustainability standards are sabotaging sustainability. Dilution of the guidelines or standards is accepted as the first step in the sabotage of sustainability. Bauer also indicates in his report that believing in the superficial analysis means that believing in 2023 would be the banner year for sustainable standards [5].

2.2. Greenwashing

This era is characterised by greenwashing, which is used to falsely promote projects and environments as ecologically friendly. The term greenwashing, coined by the environmentalist Jay Westerveld in 1986, stands in contrast to sustainable corporate practices. It refers to reframing, repackaging, or relabeling products, processes, or systems to make them appear environmentally friendly, ecological, or sustainable [6]. Greenwashing is a significant concern in sustainable architecture, occurring when developers or architects market buildings as environmentally friendly without offering meaningful environmental benefits. For instance, a building might incorporate renewable energy systems such as solar panels while neglecting other critical aspects, like reducing embodied carbon or enhancing the durability of materials.

Another common critique is the aestheticization of sustainability, which prioritizes features like green roofs or façade vegetation for their visual appeal rather than their functionality (Fig.2). Such practices can undermine public trust and obscure the real impact of sustainable design strategies.

Fig 2. A greenwashed façade wall (a) and a greenwashed roof (b) [7].

Greenwashing is not only done on walls and facades; it can be found in every part of the design. Materials, fake indoor planting, monitoring, or measuring systems are also included. This can be a very wide range of components and systems. These are marketing strategies intending to increase the value of the property rather than having concerns about sustainability and future environments. There are two reasons that companies are greenwashing their designs and or their products: to increase profits and to weaken the progress of restrictive regulations [6][7]. Many architects and entrepreneurs know that marketing related to sustainability can bring benefits and profits to the profession.

2.3. Overemphasis on technology

A recurring criticism of sustainable architecture is its reliance on high-tech solutions, which can be expensive and resource intensive. Advanced systems for energy efficiency, such as smart building technologies or complex HVAC systems, often have significant embodied energy and maintenance requirements. This technological focus may overshadow low-tech, passive design strategies that can achieve similar results with fewer resources.

2.4. Embodied carbon and material choices

While much attention is given to operational energy efficiency in sustainable architecture, the embodied carbon of building materials remains a critical yet under-addressed issue. Modern construction often relies on materials like concrete, steel, and glass, which have high carbon footprints during production and transportation.

Critics argue that the push for sustainability sometimes leads to paradoxical choices. For instance, demolishing and replacing existing buildings with "green" structures can result in higher net emissions compared to retrofitting older buildings to improve their energy efficiency.

2.5. Economic and social inequities

Sustainable architecture can inadvertently exacerbate economic and social inequalities. High costs associated with green technologies and certification systems often make sustainable buildings inaccessible to lower-income communities. The focus on cutting-edge designs can also prioritize urban and high-profile projects over rural or informal settlements, where the need for sustainable solutions is equally critical.

2.6. Cultural and contextual insensitivity

Sustainability in architecture is sometimes critiqued for failing to consider cultural and geographic diversity. Universal solutions, such as the widespread adoption of certain materials or technologies, may not align with local traditions, climates, or resource availability. All these buildings, constructed with very high standards of sustainable design approaches, are not easily affordable options, such as One Central Park in Australia. World-known architect Jean Nouvel's design caters solely to high-income users. However, there are millions of people who cannot afford a sustainable home or office. Although there are projects built with sustainable design approaches for low-income individuals, it is insufficient to meet the greater demand.

2.7. Performance gaps

Another common critique is the gap between a building's predicted and actual performance. Sustainable designs often rely on simulations and models to predict energy use, but real-world performance can differ significantly due to user behaviour, maintenance practices, or construction flaws. This disparity raises questions about the reliability of sustainability metrics and the accountability of architects and builders.

2.8. Short-term focus vs. long-term impact

Sustainability initiatives in architecture can sometimes prioritize short-term gains, such as achieving certification or reducing initial energy use, at the expense of long-term resilience and adaptability. Buildings designed for specific sustainability criteria may struggle to adapt to changing environmental conditions or evolving user needs, reducing their overall lifespan and sustainability.

The construction sector accounts for a significant portion of electricity consumption, raw material utilisation, and waste generation. Improving energy efficiency in the construction sector is regarded as a long-term process, given that buildings typically last 50 to 100 years [8]. There are buildings and communities designed with sustainability principles that have been approved through certain certification systems. However, some consequences of these designs have resulted in a lack of maintenance, excessive reliance on high-tech systems, and a negative impact on the green building market. Another issue arises as it is often difficult to find information about whether buildings meet the required sustainability standards or if there are complications in the design that lead to certain failures. Addressing these issues could significantly improve the situation.

3. Learning from Success

When sustainability is applied correctly in architecture, the results can be transformative. Because architecture has a considerable impact on the environment. There are key outcomes and benefits of well-executed sustainable designs, such as reduced operational costs due to energy efficiency. This must be improved because of the lack of standards and monitoring, reporting, and maintenance. Studying green buildings that function effectively can teach us valuable lessons about what truly makes sustainability successful in architecture. As mentioned above, passive design is the foundation of sustainability; the Edge, an office building in Amsterdam, and BedZED, an ecovillage in Wallington, London, can be studied as good examples (Fig.3) [9]. Even though these buildings are cited as good examples, they may face certain difficulties and may not be one hundred percent sustainable.

Fig. 3. Roof gardens of BedZED Ecovillage, Wallington, UK, [9]

3.1. Future perspectives in sustainable architecture

While sustainability in architecture is a crucial step towards minimising environmental impact, it does have its drawbacks. Issues such as greenwashing, high costs, unintended consequences, and performance gaps underscore areas that need improvement. Architects, engineers, designers, and policymakers must focus on practical, scientifically backed solutions rather than superficial eco-friendly designs.

Future sustainability efforts should prioritise long-term functionality, affordability, and genuine ecological impact over mere aesthetic appeal. This requires more effective regulatory policies, improved life-cycle assessments of materials, and enhanced transparency in sustainability certifications. By addressing these issues, sustainable architecture can fulfil its

promise of reducing environmental harm while remaining economically and socially viable. The net-zero building design, modular construction, biophilic design, and integration of natural intelligence into sustainable architectural design hold great potential for decreasing, eliminating, and ultimately zeroing energy consumption, carbon emissions, product waste, heat radiation, and other related impacts arising from various construction processes.

The following actions have high potential to increase sustainable architecture by allowing it to learn from successful designs [1], [10], [11], [12], [13].

- *Prioritising passive design:* maximising natural ventilation, daylighting, considering thermal mass, shading, and proper insulation.
- *A holistic approach to thinking (beyond 'green' features):* Instead of adding solar panels, energy demand can first be reduced through efficient envelopes and smart layouts.
- *Considering the local climate and culture in design:* Rather than applying uniform design features across various climates and regions, embrace site-specific designs that account for climate, geography, and cultural traditions. Principles of vernacular architecture, such as adobe in hot, arid areas or stilted structures in flood-prone zones, can be employed.
- *The resilience of the building: Durability and adaptability:* Durable materials and adaptive resilient spaces that evolve with changing needs. Modular designs can be expanded or repurposed over time instead of demolished [11].
- *Low-carbon and recyclable materials:* When possible, use sustainable, low-impact materials such as recycled, locally sourced, and renewable materials. The main mistake here is to use efficient but unsustainable materials with high embodied carbon, such as concrete [11].
- *Educating users and promoting sustainable behaviour:* One major problem in sustainable architecture is that users are not educated about how to use the building. Designs that guide sustainable behaviour, such as clear signage, intuitive layouts, and feedback systems, are needed. It is important to remember that the energy consumption of private households is considered 30% of global energy consumption, contributing significantly to CO2 emissions in domestic buildings [12].
- *Protection and restoration of natural ecosystems and biodiversity:* Designs that work with nature, not against it, integrate natural landscapes and habitats, and consider biophilic and biomimetic design approaches [13].
- *Enhanced policies integrating circular economy principles:* Advocacy and innovative business models are essential to boost financial governmental support, and green building certifications should be enhanced and made mandatory for all countries.

This list can be enlarged based on the research studies and the designs that have accomplished sustainability.

4. Case studies

4.1. One Central Park, Sydney, Australia

One Central Park in Sydney was designed by Ateliers Jean Nouvel and PTW Architects in 2014. The project comprises two towers and is adorned with a vertical landscape created in collaboration with landscape designer Patric Blanc, which covers 50% of the façade [14]. The heliostat is an innovative system that efficiently captures sunlight and directs it down to areas of the park shaded by the tower, ensuring that every corner benefits from natural light (Fig. 4). The heliostat has motorised mirrors that capture sunlight, and the same system becomes a kind of illuminating cantilever when it's night. There is a green infrastructure, which includes green roofs, living facades, water harvesting, trigen (as system that produces combined cooling, heating and power generation), recycling demolished materials, etc. [15]. Central Park is home to high-income users, which makes it a very expensive sustainable building.

Fig. 4. One Central Park Residential Apartments, showing heliostat on the higher tower [14].

One Central Park is the first residential tower to receive five Green Stars, a green building certification awarded by the Green Building Council of Australia. However, the building has faced several criticisms, including maintenance and safety concerns regarding the vertical gardens and water usage, particularly of reclaimed and treated sewage (black water), as well as greenwashing issues linked to green façades, where aesthetic enhancements may take precedence over sustainability. This situation raises questions about the implementation of such a system on this scale, which may be unprecedented, and casts doubts on its long-term feasibility and environmental impact [16]. On the other hand, the constant changes on the façades due to the varying seasons and plantings provide a connection between the community and nature, potentially helping to reduce radiation and reflection of sunlight. To understand all these issues, the building must be monitored and scientifically studied and reported.

4.2. BedZED Ecovillage Wallington, London, UK

Beddington Zero Energy Development (BedZED), located in the London Borough of Sutton, is the UK's first large-scale mixed-use sustainable community, completed in 2002. It serves as an inspiring model for zero-carbon homes worldwide, showcasing energy savings, reduced bills, plentiful green spaces, and a welcoming community atmosphere. The project utilises recycled local materials with high thermal mass alongside superior insulation and triple-glazing systems. It is essential to note that the houses are oriented according to local climate conditions, facing southwards to optimise solar gain, with 777 m² of solar panels harnessing renewable energy on-site (Fig.5). Unlike One Central Park, this community is designed horizontally and provides numerous open spaces for growing vegetation, thereby promoting social interaction. BedZED employs a passive design system that enables natural ventilation and heat gain, which is one of the major factors that this research study aims to emphasise. The number of this kind of buildings must be increased to truly impact on lowering the carbon emission and heat island effect.

Fig. 5. BedZED Community's house facades face southwards for maximum heat gain based on passive design [17].

Studies have shown that BedZED residents have a strong understanding of sustainability and ecology. The development also exhibits a significantly lower ecological footprint than the national average. As a result, it serves as a pioneering model for sustainable urban living, influencing eco-friendly construction and community design across the globe [17]. BedZED exemplifies a holistic approach to sustainable development, integrating energy efficiency, renewable energy, resource conservation, and community engagement to create a resilient and eco-conscious neighbourhood.

5. Comparison of the case studies

It is important to emphasise that the two selected projects are sustainable designs, despite both having their successes and failures. This comparison underscores the necessity of a balanced approach to sustainable architecture, which incorporates technological, innovative, and passive strategies while ensuring economic and social viability. The comparative table below highlights the successes and failures according to key sustainable principles.

Table 1. A comparative table shows successes and failures based on key sustainability principles. (Table prepared by the author) [14, 17, 20, 21, 22].

Criteria	One Central Park (Sydney, Australia)	BedZED Ecovillage (London, UK)
Design Philosophy	High-tech, luxury-focused sustainable architecture	Passive design, community-driven sustainability
Energy Efficiency	Trigeneration system (cooling, heating, and power)	Zero-energy target through passive design
Renewable Energy Use	Solar panels, but high-tech reliance increases embodied carbon	777 m2 solar panels, on-site renewable energy
Passive Design Features	Limited; heliostat system provides daylighting	Maximized; passive solar heating and natural cooling
Green Infrastructure	Vertical gardens, heliostat lighting system	Green roofs, community gardening, urban farming
Material Selection	Some recycled materials; high-tech features increase carbon footprint	Recycled and locally sourced materials
Embodied Carbon	High due to advanced technologies and materials	Low due to passive design and material choices
Certification & Standards	5-Star Green Star rating	First large-scale mixed—use zero-energy development
Water Management	Blackwater recycling, rainwater harvesting	Water—efficient appliances, rainwater collection
Maintenance Challenges	Expensive upkeep for vertical gardens and heliostat	Low maintenance due to durable materials
Social & Economic Impact	Exclusive, high-income residents; limited affordability	Affordable and promotes social equity
Community Engagement	Minimal; luxury residential complex	Strong; designed for social interaction
Greenwashing Concerns	Vertical gardens may be more aesthetic than functional	Genuine sustainability efforts
Climate Adaptation	Moderate; technology-dependent	High; adaptable to local climate
Post-Occupancy Performance	Limited monitoring, potential underperformance	Successful monitoring, low ecological footprint

On one hand, One Central Park has achieved innovative green infrastructure, advanced renewable energy systems, and high-profile sustainability certification; on the other, the building's high-tech reliance has increased embodied carbon and maintenance costs, raising concerns about greenwashing that prioritises aesthetics over function [14], [20], [21]. Regarding BedZED, the design adopts a holistic sustainability approach, demonstrates strong community integration, offers genuine passive design solutions, and maintains affordability. In contrast, this project incurs high initial investment costs and has limited scalability for dense urban areas [22].

As a result of the comparison, these two projects underscore several key takeaways, including prioritising passive design, affordability, community involvement, post-occupancy monitoring after certification, and the integration of future circular economy principles. The findings also highlight that green design is not an easy undertaking, considering the future outcomes and results after several decades of use.

Conclusion

The concept of sustainability, which aims to enhance the quality of life both now and in the future, has become a fundamental aspect of architectural design. Sustainable architectural design encompasses economic, social, and environmental factors, requiring effective design practices and energy use [18]. The most powerful and precise solution for humanity is to alter our modes of consumption and lifestyle [19]. Users and designers can begin with small steps to adopt a sustainable lifestyle, such as educating themselves, researching local sustainable initiatives, and collaborating with these initiatives. This collaboration may involve working with engineers, designers, and policymakers to promote sustainability in the local environment, as well as experimenting with new materials, construction methods, and adaptive reuse projects. Sustainability in architecture remains a crucial yet complex field influenced by economic, social, and environmental factors. While significant advancements have been made, numerous challenges continue to impede the achievement of sustainable goals. The contradictions within sustainability, such as greenwashing, a lack of clear standards, and an overemphasis on technology, highlight the need for a more rigorous, transparent, and accountable approach.

Key lessons learnt from past failures highlight the significance of integrating passive design strategies, prioritising local climate considerations, and ensuring that sustainability is not merely a market-driven concept but a deeply embedded principle in architectural practice. Numerous certified green buildings, such as One Central Park and BedZED Ecovillage, illustrate both the successes and pitfalls of sustainable design, underscoring the need for continuous monitoring, post-occupancy evaluations, and holistic sustainability approaches. Future efforts must concentrate on long-term functionality rather than superficial eco-friendly features. Regulatory policies should be strengthened to enforce sustainability measures effectively, with enhanced global standards extending beyond voluntary guidelines. Furthermore, affordability and accessibility must be prioritised to ensure that sustainable architecture benefits all communities rather than becoming an exclusive privilege for high-income users.

By learning from both the successes and shortcomings of past projects, sustainable architecture can evolve to meet environmental goals while upholding economic and social equity. This necessitates a shift towards genuine ecological impact, innovative material choices, and educating users to ensure that sustainability is not merely a theoretical concept but a tangible reality that positively influences the built environment for future generations.

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A PSYCHOGEOGRAPHIC EXPLORATION OF THE BODY-SPACE RELATIONSHIP THROUGH URBAN BOUNDARIES

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Abstract
The relationship between the body and space constitutes an important area of discussion in both theoretical and practical aspects of the discipline of architecture. Under Cartesian thought, acquiring knowledge through the senses was considered unreliable, and only objective knowledge was valued. With the 20th century and the rise of phenomenological understanding prioritizing experience, boundary-blurring approaches emerged in architecture. This study posits the hypothesis that the blurring of urban boundaries strengthens the interaction between the body and space, enhances the multisensory perceivability of space, and contributes to the enrichment of spatial experience. Accordingly, the aim is to analyze the effects of blurred boundaries on the body-space interaction through a psychogeographic reading, which is a series of discovery processes realized through the dérive—or unplanned walking—technique. In this psychogeographic experiment conducted in Beşiktaş/Istanbul, the effects of boundary conditions in the encounters between the body and urban space were analyzed using the concept maps, sketches, and photographs of the observer. The study observed that the blurring of inside-outside and public-private boundaries enhances body-space interaction by enabling a multisensory experience; elements like walls and billboards, as well as streets that either hinder walking due to vehicle traffic and narrow sidewalks, create a sharp sense of boundaries that prevent people from establishing a connection with the city. The findings illustrate that urban design interventions—such as creating transitional zones, integrating flexible public spaces, and employing adaptive architectural elements—can help cities to blur these divisions. By embracing digital innovations, tactical urbanism, and community-driven planning, the city can actively dissolve conventional spatial separations, transforming the urban fabric into a dynamic, interactive landscape. This research provides recommendations to architects, urban planners, and academics on urban approaches that blur boundaries while also offering a foundational study for urban dwellers to conduct their own psychogeographic explorations.
Key Words: *Boundary; body-space; urban experience; psychogeography; dérive*

1. Introduction

During the Renaissance, the transformation of the scholastic system of thought led to an understanding centered on the pursuit of absolute truth and definitive knowledge. Descartes' Cartesian philosophy created a scientific paradigm that deeply influenced subsequent centuries. Until the second half of the twentieth century, the prevailing notion was that knowledge could not be acquired through sensory perception, and only objective knowledge was considered valid. This understanding led to the perception of the body as independent of its physical context and to a vision-centered conception of space. This approach, which defines space through its objective, functional, and physical characteristics, also shaped modern architectural thought. The statement by Le Corbusier [1], a pioneer of modern architecture, "I exist in life only if I can see", underscores this vision-centric approach that prioritizes the sense of sight over other senses. The vision-centric spatial understanding that originated in Ancient Greece, accelerated during the Renaissance, and solidified in the twentieth century began undergoing transformations with the "death of modern architecture" [2] and the emergence of new frameworks for inquiry.

As concepts of technology and speed became integral to daily life, the proliferation of visual images and the weakening of individuals' physical connections to their surroundings increased the significance of approaches questioning the relationship between the body and space. Although the perceptual world of daily life may seem easily describable, it actually requires intense effort, time, and cultural accumulation to comprehend. Merleau-Ponty [3] emphasized the importance of bodily, sensory, and perceptual experiences in opposition to the hegemony of rationalism. Stating that "Man is not a mind which has a body, but a mind with a body", Merleau-Ponty [3] argued that the body connects humans to objects and the world, enabling them to grasp their reality. Similarly, Pallasmaa [4] proposed the approach of sensory architecture as an alternative to vision-centric perceptive. He stated [4], "The city and my body supplement and define each other. I dwell in the city, and the city dwells in me," emphasizing the continuous interaction between the body, its movements, and the environment, where the world and the self seamlessly transmit to and complete one another.

Heidegger's statement [5], "A boundary is not that at which something stops... but that from which something begins its presencing", suggested that boundaries are the points where something 'comes into being' and becomes meaningful. Space, perceived through the body and senses, is defined by its boundaries. Therefore, the boundaries of space have a fundamental impact on one's experience. As intersections of contrasts, boundaries can transform experience with their sharp or blurred characteristics. While contemporary architecture often seeks to blur boundaries, urban spaces increasingly embrace approaches that sharpen boundaries, producing enclosed spaces. This contradiction underscores the importance of interrogating the existence of boundaries in spatial experience. Focusing on the experience, this study conducts a qualitative analysis by examining the impact of urban boundaries on bodily movement and sensory interaction. After discussing the

discourse of some contemporary architects who experiment with blurring boundaries, the potentials of boundaries are questioned through a psychogeographic/walking-based experience in urban space. The findings showed that as the boundaries of space become blurred, the boundaries of the body also become blurred, while the sharpness of boundaries in urban space limits the experience.

This study consists of five sections: After the introduction, the second section provides a theoretical perspective on the blurring of boundaries through the literature, the third section explains the research design, the fourth section presents the case study and findings, and the final section offers a general discussion and conclusion.

2. Blurring Boundaries

To define a space, it is necessary to create boundaries; thus, space cannot be considered separately from boundaries. Boundary is a phenomenon that exists in natural or artificial, visible or invisible forms, positioned at the intersection of certain contrasts and regulating the relationships between them. Boundaries are some buffer zones that regulate the relationships between building-street-individual and allow transitions and interactions come to the urban stage through different approaches of designers. Interfaces formed through methods such as the shape of the building envelope, articulation of the facade, use of architectural elements, and application of technology hold great potential in enriching spatial experience.

In today's world, where architecture is in a state of rapid transformation, it is inevitable that the concept of the boundary is also part of this change. While the concept of the boundary might initially appear as a separating element or an obstacle in the mind, one must not overlook its unifying identity. A boundary can consist of points, lines, areas, or volumes. A wall, a staircase, or a fence can define a boundary [6]. Şentürer [7] described areas where differentiations, distinct patterns, and formations occur as “borderlines.” Due to their character that allows for dynamism and interactions, as well as their potential to become areas where problems leading to crises may arise, the potentials of borderlines need to be carefully evaluated. The sharp or blurred character of these boundaries directly influences an individual's spatial experience. Robert Venturi [8] stated in his book “*Complexity and Contradiction in Architecture”* that he prefers richness of meaning over clarity of meaning in architecture which can be seen as a form of 'blurring.'

According to Bernard Tschumi [9], space exists through the definition of its boundaries. A boundary emerges where there is transgression, and these transgressions create potentials as they bring dynamism to the experience. Tschumi's [9] statement, "There is no architecture without action, no architecture without event, no architecture without program," highlighted that architecture is not merely a static structure. It is shaped by human actions, events, and programs. In this context, the meaning and function of a space deepen through the actions that take place within it, the events these actions generate, and the programs implemented in the space. Tschumi expressed that architecture is not just the construction of physical structures but also a process concerning human interaction with space, the meaning of these interactions, and the dynamics they create (Figure 1a). From this perspective, architecture is not a passive entity but an active field of experience. The flexibility and diversity of events unfolding with the redefinition of boundaries in architecture create dynamism.

Toyo Ito [10] emphasized that flexible and fluid spaces are realized through the blurring of boundaries, referring to this approach as 'invisible architecture.' For conceptual and physical blurring to occur, as observed in his projects like *Sendai Mediatheque, Tower of Winds*, and *Egg of Winds*, he suggested that three options are necessary:

-Soft architecture that relates to its environment, capturing the sensitivity of elements like light, wind, and water, bridging the natural and artificial.

-Architecture that is adaptable to different functions, fluid, and capable of changing roles.

-Transparent and aiming for homogeneity in design [10] (Figure 1b).

Peter Eisenman [11] proposed the concept of "blurring/blurred-zone" as a response to rigid boundaries in architecture that impose certain molds on designers and users. This blurring is a conceptual approach, invisible and intangible, and he clarified that blurring boundaries does not aim to erase past meanings and create spaces devoid of meaning but to generate new meanings at the intersection of the old and the new. Through blurring, a new network of relationships emerges, where the state of being out of focus brings forth new potentials (Figure 1c).

According to Sou Fujimoto [12], space is created through relationships. Fujimoto indicated that placing a wall divides a space into 0 and 1 but underlined that this division should occur with rich transitions between 0 and 1. Addressing the boundary between inside-outside and public-private, the architect brings a fresh perspective to the relationship between dwelling and city, emphasizing that architecture cannot exist solely by thinking of either the inside or the outside but only by considering how they are interconnected (Figure 1d).

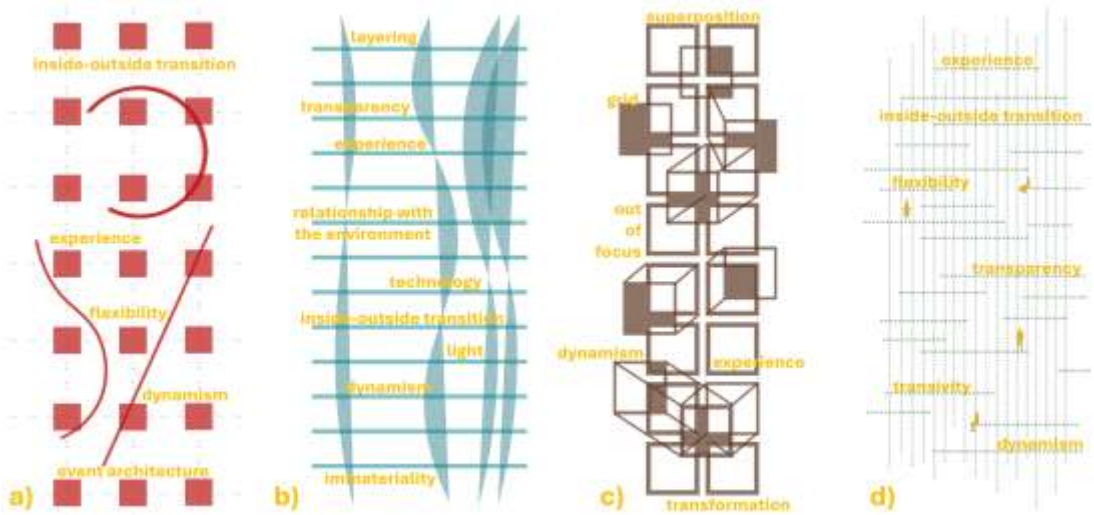

Figure 1. The diagrammatic expression of a) Tschumi, b) Ito, c) Eisenman, and d) Fujimoto's approaches to boundaries

3. Research Design

In qualitative research, reality is not a single, measurable entity but may vary depending on individuals' experiences. The researcher interacts with the subject of the study and can be considered the primary instrument of measurement. Qualitative analyses develop through the organization of collected data, its interpretation by the researcher, and its presentation supported by visual and verbal methods [13], [14]. Based on a qualitative approach, this study utilizes the method of psychogeography to observe how urban boundaries impact the individual's experience through their body and perceptions. As Debord asserted [15], “Psychogeography sets for itself the study of the precise laws and specific effects of the geographical environment, whether consciously organized or not, on the emotions and behavior of individuals”. This method investigates the effects of a space on the human mind, emotions, and behaviors beyond its physical characteristics. In other words, it reveals both conscious and unconscious relationships between space and the individual. Dérive, one of the fundamental technique of psychogeography, relies on noticing the effects of space on the individual while walking through the city [16]. In this research, a walking experience based on the dérive technique is carried out, as it encourages encountering boundaries in a random manner in the city. In this psychogeographic experiment conducted in the Beşiktaş/Istanbul, the effects of various boundary conditions on the observer's body are interpreted using various representational methods -conceptual maps, sketches, photographs-. The study provides a foundation for urban dwellers to carry out their own dérive exploration in the future. The stages of the research, consisting of 5 steps of a qualitative study [17], are shown in the diagram below (Figure 2).

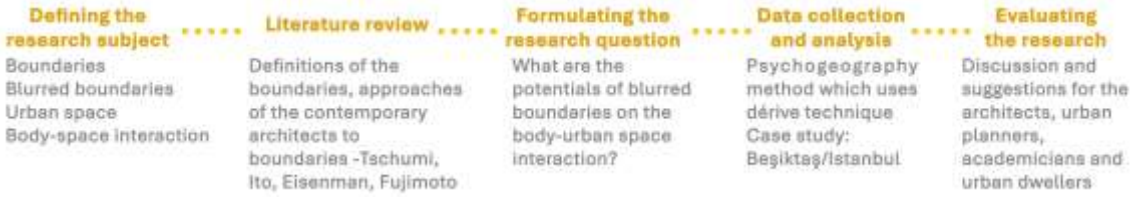

Figure 2. Diagram of the research design

4. Case Study

4.1. A Psychogeographic Exploration

The psychogeographic exploration conducted in the study consists of a two-hour dérive starting from the Beşiktaş Square bus stop (Table 1).

Table 1. A psychogeographic exploration on Beşiktaş through the observer's experience

Stepping off the bus and encountering the crowd, the dérive begins (Figure 3). The observer feels the need to move away from the bustling environment and enters a side street. She realizes that despite frequent visits to Beşiktaş, she had not entered this street for years, as she usually navigated the area with a purpose. The number of people decreases and the narrowing structure of the street suddenly evokes a sense of uncanny in the unfamiliar urban space. Quickly passing through a few relatively quiet narrow streets, she arrives at a familiar tea house under the trees. This semi-open/threshold space where locals gather helps dissipate the feeling of uncanny during a tea break.

After the break, the observer gets swept into the interior parts of the neighborhood along with the crowd at the first crossroads. Reaching Sinanpaşa Business Center (Figure 4.1), she enters the interior space elevated a few steps from the ground level. This lively and crowded space (Figure 4.2) features many shops arranged around a spiral staircase and a central atrium. The blurred boundaries of the shops spilling into the circulation areas encourage the observer to experience the clothing items through touching (Figure 4.3). The spatial arrangement allowing interaction between different levels, the shops spilling into the corridor and the constant flow of people, facilitate a multisensory perception by especially stimulating the senses of sight and hearing.

Following her exploration of the passage and exit through another door, the observer walks along a street lined with dining areas and commercial units, eventually reaching the Büyük Beşiktaş Bazaar (Figure 4.4). The bazaar consists of shops arranged around open voids and semi-open circulation areas. After taking a quick tour of the relatively deserted bazaar, she exits and walks along a street bordered on one side by advertisement panels and on the other by the opaque walls of a three-story building (Figure 4.5), feeling an urge to quickly reach the main road. Encountering vehicle traffic abruptly, her movement becomes confined to the sidewalks (Figure 4.6). Hesitating momentarily about which direction to take, she decides to walk north.

Due to the vehicle traffic, the pedestrians' pace on the sidewalk is faster than in the inner streets, reducing the duration of experiencing the ground floors. Unable to do more than quickly glance at the transparent facades of the commercial units, she turns off the main road onto Şair Leyla Street. Moving forward to the sounds of dice rolling during a game of backgammon and the background chatter, her path is interrupted by a queue of customers spilling out of a restaurant serving homemade food. Weaving through the crowd, the observer reaches a street that feels uncanny on one side due to construction site walls and the ruins behind them (Figure 4.7), while the smells from a pickle shop evoke hunger on the other side. At the crossroads at the end of the street, she deliberately avoids the direction with the smell of fish and turns left, encountering one of Beşiktaş's iconic landmarks, the Kartal Statue. Focusing on the statue, she notices that some of the buildings forming the circular perimeter around it are covered with massive billboards. This situation prevents her from spending more time there, as the billboards, significantly exceeding human scale, hinder sensory experience (Figure 4.8; Figure 4.9). There is no point in staying in a place where you can't see/feel beyond.

The observer continues walking uphill along a gently sloping street lined with semi-open eating areas under awnings on both sides. Not wanting to climb further, she turns onto Şehit Dursun Bakan Street. Despite being a narrow street, it is open to one-way vehicle traffic, and the eating areas spilling onto the sidewalks make walking difficult. Moving quickly, she reaches Ihlamurdere Street. The street's historic corner building, Beşiktaş Hamamı (Figure 4.10), piques curiosity, but its opaque exterior shell adorned with advertisements and graffiti prevents any meaningful experience of the structure.

Continuing along the narrowing and widening sidewalks, she keeps observing the ground-floor shops (Figure 4.11). Walking further north on this street than she had before, she feels tired but cannot find any public open seating areas to rest. As a result, she retraces her steps along the same route, noticing a semi-open space formed by the greenery connecting the awnings of two cafés on either side of the street (Figure 4.12), to keep in mind to come back here later. However, the buildings covered in billboards continue to create a negative perception (Figure 4.13).

After another round in Köyiçi, she descends to Beşiktaş Street, passing through the square in front of the Naval Museum (Figure 4.14). Due to the rain, the square is largely empty, and the arcade in front of the historic Naval Museum shelters city dwellers from the rain (Figure 4.15). Reaching the bus stop, she concludes her dérive experience.

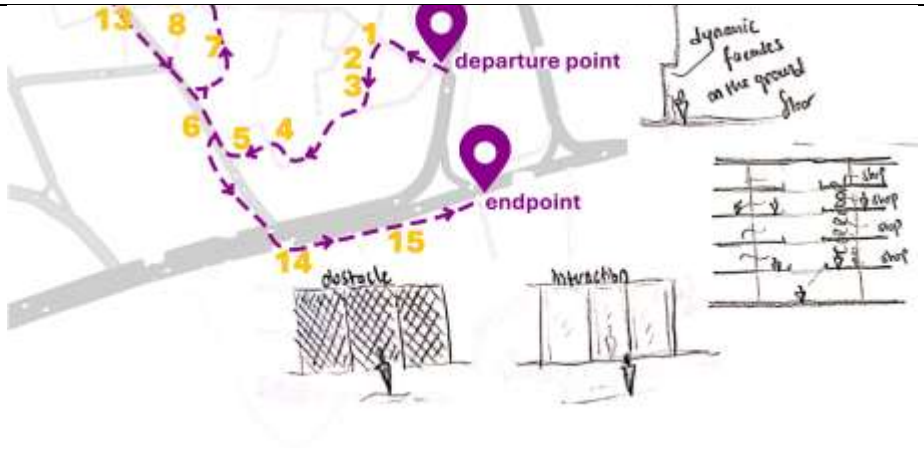

Figure 3. The route and notable situations during the dérive

Figure 4. Urban boundaries experienced during the dérive

4.2. Findings

The findings regarding the impact of urban boundaries encountered during the psychogeographic walk on the body-space interaction and spatial experience are listed below:

-The character of the boundaries in urban spaces has a direct impact on the urban dweller's experience. Specifically, boundary elements such as blind walls of buildings, oversized advertisement panels exceeding human scale, and construction site walls that completely block sensory interaction evoke a sense of uncanny in urban dwellers, discouraging them from spending time in the area.

-Since the Köyiçi area of Beşiktaş is a pedestrianized zone, there are no barriers posed by vehicles that restrict movement. However, on the roads surrounding the area, pedestrian movement is confined to sidewalks. Due to the constant flow of pedestrians on the sidewalks, the observer was compelled to increase her walking speed, significantly reducing the time available to experience the various shops at the ground level.

-Although Beşiktaş is a district by the sea, access points to the waterfront are limited. Interaction with the sea is only possible within the defined area between the ferry terminals. This limitation prevents the full utilization of the urban experience's potential.

-The design of the Beşiktaş Square serves as a flexible public space that functions as a meeting point, a venue for listening to music, and a waiting area during favorable weather conditions, emphasizing its importance in urban life.

-The fluid interior spaces of bazaars, which can be described as having blurred boundaries, enhance the interaction between the body, the senses, and the space.

-The square where the iconic Kartal Statue is located is often used as a meeting point. But, the oversized advertisement panels surrounding the buildings encircling the square create a negative boundary effect that prompts the observer to pass through the area quickly without lingering.

-The transformation of open spaces into semi-open, defined areas using elements like canopies and vegetation has created potential spaces where urban dwellers can come together and interact.

-Spatial movements such as outward extension or inward contraction achieved through transparency at the ground level are interpreted as approaches that blur boundaries, enriching the observer's experience.

5. Discussion and Conclusion

Stavrides [18] indicated that space is not merely a simple container that accommodates society but rather an element that shapes social practices. The ways in which urban dwellers interact with boundaries in urban space not only influence their own urban experience but also transform the uses of the space. Therefore, it should be interpreted as a dual and dynamic transformation process. The psychogeographic exploration conducted in Beşiktaş—using the dérive method as a primary qualitative research tool—has provided deep insights into the interplay between urban boundaries and body-space interactions. By observing how various physical elements influenced sensory experience, the study revealed that boundaries could be dynamic catalysts that can enrich urban encounters. These findings are directly tied to the methodological approach, where unstructured walking, real-time observation, and multimodal documentation (concept maps, sketches, and photographs) allowed for a embodied account of urban spatial dynamics.

The case study demonstrated that sharp boundaries—such as oversized advertisement panels, opaque building facades, and vehicular corridors—evoke a sense of disconnection and uncanny. The observer's experience of speeding up on narrow sidewalks due to vehicular traffic not only reduced the time available for sensory engagement but also curtailed the potential for spontaneous discovery. In contrast, spaces with blurred boundaries, like the semi-open tea house and bazaars, encouraged tactile interaction, and a more nuanced sensory experience. These empirical observations underscore that the permeability of boundaries can transform urban spaces into more interactive and inclusive environments.

For architects, the study's findings emphasize the need to rethink boundaries as tools for enhancing multisensory experiences rather than simply delineating space. Designers are encouraged to incorporate flexible facade treatments, translucent materials, and adaptive structural elements that enable a gradual transition between inside and outside. Digital design tools, such as Rhino coupled with Grasshopper, can simulate these transitional zones, allowing architects to model and test the impact of semi-transparent or shifting boundaries. Such tools not only support visual experimentation but also integrate sensory data—reflecting the observer's experience in Beşiktaş—thereby promoting designs that resonate on both functional and emotional levels. By using parametric design software to create spatial gradients, architects can effectively blur the sharp edges that traditionally compartmentalize urban environments, making room for more organic interactions.

Urban planners also have a critical role in reconfiguring the physical layout of cities based on these findings. The study indicated that rigid urban structures, such as heavy vehicular roads and delineated building facades can constrain pedestrian flow and limit sensory engagement. Planners should adopt policies that promote permeability in the urban fabric. This can be achieved through tactical urbanism interventions—like temporary pop-up parks, interactive street installations, and reconfigurable public spaces—that soften the transitions between different urban zones. The psychogeographic method used in this study highlights how even minor interventions, such as increasing sidewalk width or introducing semi-open seating areas, can significantly enhance the multisensory experience of city dwellers. Furthermore, the integration of Geographic Information Systems (GIS) and digital simulation platforms can help identify specific zones where strict boundaries disrupt pedestrian flow, thereby informing targeted, data-driven urban redesign initiatives.

Academicians and researchers are uniquely positioned to further explore the theoretical underpinnings and practical applications of blurred boundaries in urban settings. The study's reliance on psychogeography—specifically the dérive technique—provides a robust framework for investigating how individuals emotionally and physically interact with their

environment. Future research can expand on this approach by incorporating technologies such as augmented reality (AR) and virtual reality (VR) to simulate various boundary conditions in a controlled environment. Such experiments could quantitatively measure sensory responses and movement patterns, offering a more detailed understanding of how blurred boundaries affect human behavior. Additionally, combining traditional ethnographic methods with digital tracking and participatory mapping can yield a comprehensive dataset that bridges subjective experience with objective analysis. This interdisciplinary approach not only enriches academic discourse but also provides actionable insights for professionals in architecture and urban planning.

In practical terms, the recommendations emerging from this study advocate for a design philosophy that embraces ambiguity and fluidity. By blurring the distinctions between public and private, inside and outside, professionals can create environments that are not only aesthetically pleasing but also functionally responsive to the needs of their users. The creation of transitional spaces—where public thoroughfares slowly give way to more intimate, semi-private zones—can mitigate the negative effects observed in the study, such as the observer's discomfort near oversized billboards and construction walls. Instead, these zones can serve as buffers that enhance sensory integration and promote spontaneous social interactions.

In conclusion, the integration of psychogeographic methods with contemporary design practices reveals that the blurring of urban boundaries is both a theoretical and practical imperative. Architects should leverage advanced digital design tools to model fluid spatial transitions, urban planners must embrace tactical interventions to dissolve strict boundaries, and academicians are called upon to further validate these approaches through innovative, technology-enhanced research. By aligning methods and findings with actionable recommendations, professionals across disciplines can contribute to the creation of vibrant, inclusive, and sustainable urban environments—where the interplay between the body and space is celebrated and continuously redefined.

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WAYS OF SEEING URBAN SPACE: CITY EXPLORATION WITH PHOTOS TAKEN BY VISUALLY IMPAIRED PEOPLE

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Abstract

The body sees, hears, smells, feels and tastes. Well, if we remove the sense of sight from this experience, will the experience be incomplete? This study tries to understand and explain how visually impaired individuals relate to urban space and what the determinants of this relationship are. Photographs were used as a tool to explain this relationship. The late blind participant used the photograph as an expression of his/her relationship with the environment. At the same time, he/she described how he/she revealed the other dimensions and codes of the space and how he/she filled the spaces in the city through photography. In order to explain this with photographs, the late blind participants received photography training for 1 month before the study. İzmir Kemeraltı Bazaar was chosen as an urban context where the study is conducted and the daily life of bazaar was experienced. 7 late blind participants, who discovered the spaces on foot, tried to explain their tactical production in the urban space and their interaction with the space with their photographs. The late blind documented all the representations, including the events during the walk tour, frame by frame. At the same time, they narrated what tactical and creative elements were and in what situations they occurred during the walk through verbal descriptions. In the photographs taken by the late blinds, it is seen concretely how a visually impaired person separates from the place and society. At the end of this article, the question "How can a blind person take a picture?" has been moved away and the answer of the question “Why would a blind person want to take pictures?” has been found.

Key Words: Ways of seeing, photograph, visually impaired, urban space, sense

1. Introduction

Is space something that is only seen, experienced, and perceived through the eyes? In this study, which is based on this question, individuals with visual impairments provide the answer to an urban experience independent of the sense of sight. Through urban space photographs they have taken themselves, they establish a bridge with sighted individuals and share their urban experiences. In order to understand how visually impaired individuals read and experience urban spaces, two researchers, Henri Lefebvre and Michel de Certeau, will accompany us in this study. As mentioned in Lefebvre’s (1984) definition of space, space is alive, organic, and dynamic. Space surrounds its participant, moves with them, sees, hears, and feels with them. The reason for choosing urban space in this study is, as Över (2014) also states, urban spaces are living organisms that are perceived through seeing, smelling, hearing, and feeling. The fabric of the city, the walls creating a fullness effect, and the streets creating an emptiness effect, make up the urban environment. The filled-empty organization of the city creates physical boundaries for its participants and facilitates movement (Kan-Kilic and Dogan, 2017). The city is not just the space created by streets and walls; it is the bodies and actions of people that constitute city life. The actions and experiences that occur at every moment of the day create different energies (Synder, 2011).

The body is an integral part of our experiences, engaging in seeing, hearing, smelling, feeling, and tasting. But what happens if we remove the sense of sight from this experience? Does the experience become incomplete? Do the narratives constructed in urban writing become fragmented? To explore answers to these questions, Kan-Kilic and Dogan (2017), along with Kan-Kilic, Dogan, and Duarte (2020), conducted studies on the wayfinding strategies of visually impaired individuals, utilizing different urban contexts. They concluded that the urban context or environmental cues significantly influence the wayfinding strategies of visually impaired individuals. In other words, when the urban context or environmental cues change, the wayfinding strategies of visually impaired individuals also change. In Kan-Kilic and Dogan's (2017) study, it was observed that within the Kemeraltı Bazaar, visually impaired participants were more dependent on environmental cues, whereas in the İzmir Fair area, participants navigated based on their internal representations. The most significant finding from these studies is that removing the visual component from the lived urban experience does not render the experience incomplete. On the contrary, it was determined that, through the enhancement of other senses, a visually impaired individual becomes more aware of their body than a sighted person and actively participates in urban engagement. However, since the sense of sight is the fastest tool for gathering information about the environment, it was observed that sighted individuals might miss other dimensions of the space. For a visually impaired individual, hearing becomes equivalent to seeing and provides significant environmental cues.

As Över (2014) suggests, "normal" bodies experience urban spaces differently from "abnormal" bodies. She states, "normal and abnormal bodies produce different lives from the same space" (Över, 2014, p. 42). This implies that the design and organization of urban spaces are tailored for "normal" bodies, dictating where they can be, move, and reach. In this context, as Lefebvre (2016) notes, space serves as the city's integrative tool, yet it becomes a means of segregation and exclusion for individuals with disabilities. According to Lefebvre, the city is "the space where daily life is lived and the reflection of society in space" (Lefebvre, 2016, p. 174). He also states that the relationship between space and society is reciprocal; both produce

each other. Just as society produces space, space also produces identities and experiences (Işık, 1994). Here, I would like to emphasize that the term "abnormal" bodies is used solely because it is a quotation. The main issue is to develop a rights-based approach regardless of physical characteristics. In a rights-based approach and, of course, in social work, I would like to emphasize that individuals cannot be labeled as normal or abnormal.

According to De Certeau (2009), the place where we can experience the dynamic, organic, and variable nature of space is everyday life. This concept was initially developed by Lefebvre (1984) and later by De Certeau (1984). This study reveals the daily life practices of individuals with visual impairments, highlighting the ordinariness or the extraordinary aspects of these experiences. Lefebvre (2016) and De Certeau (2009) state that urban spaces host daily life experiences. However, as previously mentioned, urban spaces reject bodily diversity and difference, defining themselves through "normal" bodies (Imrie, 2011). In other words, urban spaces wish to decide who will have "normal" experiences within daily life. Lefebvre (2016) states that space is political; it is a battleground that both unites and separates differences, as much as it is a site of production. Thus, at the forefront of this struggle are disabled bodies. Within this battleground, they develop tactics to complete their unfinished sentences and rewrite the city. As Lefebvre (2016) suggests, the best way to understand the city is to view it as a text. But does a city have only one interpretation?

According to De Certeau (2009), tactics refer to the practices ordinary individuals employ to create alternative uses within any area of everyday life. He suggests that strategies, or as Certeau terms them, "preconceived arrangements," require urban users to engage in maneuvers, and all these maneuvering techniques collectively form tactics. De Certeau (2009) also notes that participants in the city, such as flâneurs, develop walking practices as they read the city. Flâneurs walk through city streets, observe, reflect, and become lost in the urban environment. Hall (1981) argues that cities have codes, and within these codes, meanings are concealed. Flâneurs uncover these meanings and, using a Certeauian expression, experience the city not from an overview but from within, as everyday users. Perception plays a crucial role in revealing the city's codes. As previously mentioned, a city does not have a single interpretation or perception. This study observes the tactics developed by individuals with visual impairments to uncover the hidden codes of the city.

Therefore, as Fırat (2009) also mentions, we need to address the struggle of "non-normative bodies" in urban spaces not through individual characteristics but as a matter of rights. One of the primary rights of individuals with disabilities is accessibility. Erten and Aktel (2020, p. 899) define the right to accessibility as "advocating for the environment to be adapted to their desires, needs, and abilities, rather than individuals with disabilities adapting to their environment." In short, the right to accessibility is explained as "ease of reaching goals" (Erten and Aktel, 2020, p. 900). The World Health Organization (WHO) defines accessibility as "the ability to reach, understand, or approach something or someone" (WHO, 2011, p. 170). Based on the right to accessibility, approaches such as barrier-free cities or accessible cities have been developed and discussed to meet the needs of all urban residents. This concept, not exclusive to individuals with disabilities, is defined by Erten and Aktel (2020, p. 906) as "making urban spaces and services suitable for use by disadvantaged groups in society, especially individuals with disabilities, and all citizens, within the framework of reasonable accommodation and universal design principles." Odabaşı-Uslu and Güneş (2017) believe that everyone in society has this right and strive to find answers to the question of how a city can be organized for everyone.

To ensure a city is accessible to all, certain concepts are essential. "Design for All" or "Universal Design" encompasses the criteria necessary for an accessible city. Consequently, in this context, the Convention on the Rights of Persons with Disabilities (CRPD) recognizes accessibility as a fundamental right, associating "universal design" with accessibility (Erten and Aktel, 2020). The primary goal of universal design is to "create products, services, and environments that respond to the needs of all individuals by considering diverse needs and abilities throughout the design process" (Erten and Aktel, 2020, p. 902). Approaching accessibility from a rights-based perspective, it becomes evident that this issue should not be viewed solely as an architectural design problem but as a matter of social awareness. Topics within this perspective can be discussed within the framework of "social services." As Fırat (2009) notes, all services that can be considered under the concept of "social services" are among the objectives of accessibility and universal design approaches. "Since the primary source in providing social services is human, the fundamental behaviors, perceptions, and movement characteristics of any individual in society are the primary sources" (Odabaşı-Uslu and Güneş, 2017, p. 33). Therefore, individuals with visual impairments attempt to convey their struggles within the city and their interactions with the environment through photographs they take. In this study, the concept of accessibility is discussed through the expression of the disabled body via photography, aiming to reduce prejudices by communicating in this manner with other members of society.

In daily life, individuals with visual impairments sometimes interpret the urban environment differently, evaluating its codes and meanings in unique ways. At other times, they develop entirely creative tactics, becoming the unseen heroes of everyday life. In this study, visually impaired urban participants, or flâneurs, engage in walking and exploration, generating thoughts during their journeys. They strive to understand and articulate how they relate to urban spaces and the factors influencing these relationships. To convey this connection, they utilize photography as a tool, effectively practicing street photography. Throughout their walks, they document events frame by frame, with each photograph serving as a testament to their experiences. This study highlights that visually impaired participants use photography as an expression of their relationship with their surroundings, capturing the city's dimensions and codes through their unique perspectives. By employing

photography, visually impaired individuals not only document their experiences but also challenge conventional perceptions of urban spaces, offering new narratives and fostering a deeper understanding of the city's multifaceted nature.

In the fluidity of daily life, moments that pass by are frozen and carried into the future through street photography. As Orhan (2020) notes, street photographers, guided by chance or decisive moments, uncover the city's codes as hidden or overt observers. Unlike documentary photography, where meaning is pre-constructed, in street photography, meaning emerges at the moment of capture (Orhan, 2020). The choice of street photography as a method aims to document and reflect the street lives resulting from the contributions of visually impaired individuals involved in urban production. It also seeks to read the visual codes of social and spatial change from the perspective of the visually impaired. Through these photographs, capturing these moments and carrying them into the future, a bridge can be established with sighted individuals. Therefore, this article is about the struggle of visually impaired individuals to liberate themselves and express themselves. With this article, sighted individuals attempt to discover the tactics of the visually impaired in their daily lives and understand their experiences through photographs.

According to De Certeau (2009), the ordinary person is defined as someone scattered everywhere, with thousands of them on the streets. Lefebvre (2016) suggests that the ordinary person seeks escape routes and different methods. While urban spaces have become battlegrounds even for these ordinary people, and they have had to develop tactics, the visually impaired individuals in this article resist spatial and social exclusion. As Lefebvre (2016) mentions, walking is the simplest and most effective means of experiencing the city. Even for such a simple act, the visually impaired must struggle; they document and materialize the sounds they hear, the scents they perceive, the wind and sun they feel, and the surfaces they touch through photography. They walk in the urban space not from a bird's-eye view but with full bodily participation.

2. Method

In this section, the daily life of İzmir's Kemeraltı Bazaar is explored. Seven participants, who later became visually impaired, attempted to convey their tactical productions in the urban space and their interactions with the environment through photographs. The visually impaired participants use photography as an expression of their relationship with their surroundings. They describe how they reveal other dimensions and codes of the space and how they fill the gaps within the city through photography. To achieve this, the participants received one month of photography training prior to the study. All representations of events during the walks were documented frame by frame by the visually impaired participants. Additionally, through verbal narratives, they shared the tactical and creative elements present during the walks and the circumstances under which they occurred. This urban experience was recorded by the researcher.

The selected urban space for the walking route is the Kemeraltı Bazaar in İzmir. Izmir's Kemeraltı Bazaar is a heterogeneous urban fabric that accommodates various types of users and their interactions. It serves as a valuable urban context for understanding how the adaptation process, defined as a tactic for "normal" bodies, manifests in "abnormal" bodies. Kemeraltı comprises a complex urban structure with streets of varying lengths and directions, lacking a clear street pattern. Its boundaries distinguish it from the rest of the city, connecting to other areas through specific entry points. Encircled by narrow streets lined with adjacent buildings, Kemeraltı possesses a unique urban identity that enhances the sense of enclosure.

As a whole, the urban characteristics of the area make walking a complex task not only for visually impaired individuals but also for sighted people. Prior to the study, the researcher visited a complex urban fabric like Kemeraltı Bazaar, identified the most prominent non-visual environmental cues, and designed a walking route accordingly. The primary criterion for determining the walking route was the inclusion of turning points with strong sensory references.

2.1. Participants

As shown in Table 1, seven participants (3 women and 4 men) who became visually impaired later in life volunteered for the walking study. Their ages ranged from 19 to 34, and at the time of the study, they were either students or employed. Due to the limitation of finding volunteer participants who became visually impaired later in life and also possess independent mobility skills, it was not possible to increase the sample size. Three of the participants have no perception of light and shadow. Additionally, all participants have independent walking abilities in both familiar and unfamiliar environments. All participants are familiar with the Kemeraltı area; however, they are not acquainted with the specific route selected by the researcher. The reason for selecting participants who became visually impaired later in life is that they retain visual information in their minds. For instance, they know what the sky or a tree looks like. This assist them in verbally conveying the content of the photographs they take.

Table 1. Information of visually impaired participants in the Kemeraltı Bazaar walking tour

	Age	Gender	Job	Late blind	Shadow	Independent walking ability	Assitant device using ability	Route familiarity	Frequency of coming to the route
P.1	33	Male	worker	YES	NONE	YES	YES	YES	monthly
P.2	30	Female	worker	YES	LITTLE	YES	YES	YES	monthly
P.3	25	Female	student	YES	NONE	YES	YES	YES	8 per month
P.4	28	Male	worker	YES	LITTLE	YES	YES	YES	12 per month
P.5	34	Male	worker	YES	NONE	YES	YES	YES	monthly
P.6	25	Female	student	YES	NONE	YES	YES	YES	2 per month
P.7	19	Male	student	YES	LITTLE	YES	YES	YES	12 per month

2.2. Instruments

Prior to the study, participants signed a consent form prepared by the researcher. The form outlines the scope of the study and how the collected information is utilized. Additionally, pre-interview questions were posed to gather demographic information and assess their independent mobility skills and familiarity with the study area. During the walk, the researcher used a video recorder to document both the visually impaired participants' urban experiences and their verbal descriptions provided during the walk. Each participant brought their own digital camera. Before the study, the selected participants underwent one month of photography training, equipping them with the necessary skills to operate a digital camera.

2.3. Data Collection

This study comprises three phases. The first phase is the preparation stage, during which participants signed a consent form, received general information about the study, and were asked pre-interview questions. In the second phase, the researcher individually guided each participant along the selected route, from the starting point to the endpoint, introducing them to the path. The researcher ensured consistency by introducing the route with the same phrases to each participant. No video recordings were made during this phase, and participants did not take photographs. Subsequently, they returned to the starting point, and participants were asked to complete the route independently, during which they were expected to describe the environmental references that assisted them and photograph these references. During this phase, the researcher did not provide any verbal assistance while recording the participants' experiences on video. Participants photographed and verbally described elements of urban production and meanings that revealed the city's codes during the walk. Although specific routes were identified during the urban walk, over time, the walker incorporated personal preferences, creating their own path to understand and explore the city.

2.4. Data Analysis

In this study, non-visual environmental cues for photography encompass auditory, tactile, and olfactory elements. Consequently, it was decided to focus on the content of photographs by considering the senses of hearing, touch, and smell within the built environment. In this walking study, the camera serves as a tool to reveal auditory, tactile, and olfactory visuals, while also facilitating communication with sighted individuals. The photographs taken by visually impaired participants aim to visually uncover non-visual spatial qualities. Kaszynski (2016) supports this approach, emphasizing that context is crucial, and the meaning of an image can be revealed not only through the image itself but also by examining the language of the participants who captured it. After each photography session, all images were uploaded to a computer and printed. Subsequently, each image was paired with video recordings to understand the participant's feelings during the photograph's creation. The researcher then examined whether the visually impaired participant's thoughts during the photo-taking process aligned with the researcher's observations of the image.

3. Findings

As shown in Table 2, the photographs were classified based on auditory, tactile, and olfactory triggers. A total of seventy (70) photographs were taken: 26 emphasized auditory visuality (see Appendix-1), 24 emphasized tactile visuality (see Appendix-2), and 20 emphasized olfactory visuality (see Appendix-3). The distribution of these photographs among participants is as follows:

Table 2. Distribution of photographs taken by participants according to the environmental cues

PARTICIPANTS	Auditory Visuality	Tactile Visuality	Olfactory Visuality
P.1	5	4	2
P.2	2	3	4
P.3	3	3	4
P.4	5	5	7
P.5	4	3	2
P.6	4	3	0
P.7	3	3	1
TOTAL	26	24	20

In this study, rather than generalizing, individual differences have been highlighted. It is observed that the fourth participant (P.4) becomes an integral part of the sensory urban experience, perceiving the city with their entire body. In contrast, the sixth participant (P.6) completed their walk without establishing any environmental connection to scent. As previously mentioned, the body is an integral part of the lived experience, and the way each participant experiences this is documented through the photographs presented in Appendices A, B, and C.

3.1. Auditory Visuality

As noted in the study by Kan-Kilic and Dogan (2017), during wayfinding in Kemeraltı, the most commonly used environmental sensory input was sound (51%). This is likely due to the unique urban fabric of Kemeraltı, which offers numerous environmental cues, particularly auditory triggers. To explore how visually impaired participants perceive and feel these auditory cues in this urban area, let's examine some examples (see Table 3). All photographs related to auditory visuality can be found in Appendix A.

Table 3. Photographs and examples of verbal expressions related to auditory visuality

Participant	Photos and verbal descriptions	Photo shooting point
P.1	 "In this vast space, there is a gathering area right in front of me, it could be a bank, it could be seating, this is decisive for me, because this gathering area or building is always here, it is not temporary like people walking by"	
P.4	 "There is a huge opening on my right, the walls surrounding me on my right and left have suddenly been cut off on my right, the echo I receive has changed, the sound no longer bounces off me"	

P.6	 "There is an ATM on my right, I hear clicking sounds more than once when withdrawing money"	

3.2. Tactile Visuality

In their 2017 study, Kan-Kılıç and Doğan found that 43% of the sensory data used by blind individuals in Kemeraltı Bazaar were tactile. They included environmental cues such as air currents and sunlight that touch the skin, as well as textures of surfaces and walls detected by foot, hand, or cane. In this study, a classification was made based on the verbal descriptions provided by the blind participants who took the photographs, paying attention to these aspects. Table 4 presents some examples of tactile visuals captured by the participants. You can view all the photographs related to tactile visuality in Appendix 2.

Table 4. Photographs and examples of verbal expressions related to tactile visuality

Participant	Photos and verbal descriptions	Photo shooting point
P.2	 "There was an opening on my right side, the sun's heat started to come"	
P.4	 "I continue to follow the grate, when the road ends, it ends too"	

P.5	 "We entered the inn, we are now covered, our right and left sides are closed, the pressure on us has increased"	

3.3. Olfactory Visuality

In their 2017 study, Kan-Kılıç and Doğan found that 7% of the environmental cues used by blind individuals in Kemeraltı Bazaar were related to scent. However, one participant's heightened sensitivity to scents led them to capture visuals emphasizing olfactory cues, resulting in a number of scent-related photographs comparable to those focusing on auditory and tactile cues. Conversely, another participant did not mention any scent-related references, highlighting the diverse experiences of individuals perceiving the city through their bodies. Some examples of scent-related visuals are presented below (see Table 5). All photographs related to olfactory visuality are available in Appendix 3.

Table 5. Photographs and examples of verbal expressions related to olfactory visuality

Participant	Photos and verbal descriptions	Photo shooting point
P.1	 "I could smell the coffee even when I was further back because of the wind, but I don't trust the wind and the smell very much"	
P.2	 "Corn is sold here, but I can't take it as a determinant, it won't be here when I return, for example"	

P.4

"The smell of crispy, this place is an environmental reference for me, it is always here, it can guide me until it closes"

4. Discussion and Conclusion

In this study, the most significant finding is that spatial perception is not solely dependent on the sense of sight. As observed, individuals who are blind or visually impaired utilize all their senses to engage with their environment. In fact, as Pallasmaa (2005) emphasizes, for a person with spatial awareness, the eye is not the only organ that creates spatial experiences. Additionally, as Millar (2008) adds, in the worlds of individuals who are blind, each sense holds great importance and has become specialized; they also complement and overlap with each other.

In this study, photographs taken by visually impaired individuals were categorized into auditory, tactile, and olfactory visuality. It was observed that the most significant environmental reference for a visually impaired person is the sense of enclosure, which is facilitated by the walls and the spaces between them that form the city's structure. This filled and empty structure aids in the formation of echoes and the perception of changes in air currents, providing a sense of safety and orientation within the city. The physical boundaries created by buildings help visually impaired individuals navigate more securely, as they feel protected within these spaces. Conversely, open spaces can make them feel vulnerable and exposed. The boundaries of the city support the collection of environmental cues, enhancing spatial awareness. As such, auditory references are the most crucial environmental data used by visually impaired individuals to perceive space. However, it is essential that these auditory references are stable and specific to the location, rather than temporary or transient. Therefore, building walls and the spaces between them that create echoes are among the most important data for navigation.

Subsequently, the most important tactile environmental data for a visually impaired person walking in city streets are elements such as gratings on the ground, changes in the slope of the ground, variations in the texture of the pavement, air currents between buildings, or sunlight passing through gaps and touching the face. As mentioned, data that are specific to and unchanging in a space facilitate the walking action for a visually impaired person. As seen in the photographs, the grating on the ground accompanies the path, the spaces between city walls allow the perception of air and sunlight, and they assist along the way. However, odors are transient and unreliable; they come and go with the wind. If the odor is from a fixed establishment, such as a kebab shop or a coffeehouse, it can be used as a reference. However, if a street vendor is selling corn or a florist passes by, they cannot rely on these smells. Therefore, as understood from the photographs, the coffeehouse on the corner is the most reliable olfactory reference, or the kebab shop along the route. Otherwise, a corn vendor parked in the middle of the road is more of a hazard than a reference point. In other words, the selection of reference points (landmarks) differs between visually impaired individuals and sighted individuals. A coffeehouse that has been on the same corner for many years can become a strong reference point and a main symbol of the city for all people. It can be a visual landmark for sighted individuals and an olfactory landmark for visually impaired individuals. Spaces that are in the same place and have been preserved for many years also carry the identity and culture of the city. As long as such places exist, there is no need to create new designs to facilitate wayfinding. These reference points can help visually impaired individuals navigate in an urban environment and provide familiarity for all people.

In this study, it was observed that spatial perception is not solely dependent on the sense of sight. As seen, visually impaired individuals utilize all their senses to engage with their environment. In fact, as Pallasmaa (2005) emphasized, for a person with spatial awareness, the eye is not the only organ that creates spatial experiences. Additionally, as Millar (2008) added, each sense holds significant importance in the worlds of visually impaired individuals and has become specialized; they also complement and overlap with each other.

From the perspective of sighted individuals by examining the photographs taken by the visually impaired individual, we can understand the question: "How can a blind person take a photograph?" Perhaps the more pertinent question to ask here is: "Why would a visually impaired person want to take a photograph?"

An individual who is blind takes photographs because they wish to materialize and showcase their struggle and active resistance. They aim to reveal that bodies experiencing the city, without distinction, are engaged in the same struggle and to

highlight the integrative aspect of the city. They want to discuss how bodies, without distinction, produce the same space and how this space produces identities. They seek to communicate with those who can see and wish to do so in the manner known to them, that is, by constructing their sentences with visual content. They desire to complete their sense of incompleteness within the city through photography. They want to convey that there is not just one method of reading the city and that there are ways of seeing the city. As we have previously mentioned, the perception of the city is the most crucial factor in revealing the city's codes. In this way, an individual who is blind also wishes to share their experience through the photographs they take and express what is important to them. In doing so, they are right in the heart of the city, in the streets. They attempt to document and showcase the other dimensions of space, often capturing aspects that those who can see may overlook.

In this study, it is emphasized that urban designers and architects should consider space in a multidimensional and multisensory manner to achieve comprehensive design. Additionally, these considerations should be viewed as criteria for the aesthetics of an environment. It is hoped that this research will contribute to raising awareness among designers about the needs of visually impaired individuals and all other people in urban areas.

In the context of universal design, spatial arrangements should be made to ensure equal access to all areas of the city for everyone. The concept of an accessible or barrier-free city should be approached not only from an architectural design perspective but also with the aim of raising social awareness and sensitivity, working in conjunction with local policies. Considering the participants in this study, technological and urban solutions should be provided to support the independent movement of individuals, especially for those with visual impairments, enabling their mobility within urban spaces. For example, in collaboration with local authorities, attention should be paid to the continuity of tactile guide paths (yellow lines) for visually impaired individuals in all spaces (public areas/semi-public areas/indoor spaces), ensuring they are evaluated in a way that facilitates mobility. Standards should be developed for all tactile elements within the city, starting from urban furniture. Design standards should be established throughout the city, regardless of age, gender, or ability differences. Therefore, making a city suitable for all its residents is not only a design problem but also an awareness issue that is the responsibility of local governments and all members of society. In this sense, creating social awareness is the most important criterion.

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Appendix A. Photographs and examples of verbal expressions related to auditory visuality

Participant	Photos and verbal descriptions	Photo shooting point
P.1	"In this vast space, there is a gathering area right in front of me, it could be a bank, it could be seating, this is decisive for me, because this gathering area or building is always here, it is not temporary like people walking by"	
P.1	"But the space behind can't be a constraint for me, because the salesperson there will leave soon, or the people walking by will leave soon"	
P.1	"Despite the crowd of people, I can still see the street space on the left"	

P.1	 "Is there a vehicle coming towards me? Is it on the walking path? As long as it keeps coming, I'll keep taking pictures of it"	
P.1	 “There is a road intersection here, the sounds of vehicles mixing together tell me that I am not a priority”	
P.2	 "There is something that limits me on my right side, the echo of my cane has changed, but it is not like a wall, it is hollow"	

P.2	 “We are in a courtyard now, we are covered, the echoes of human voices are more intense, the sounds bounce off the surroundings and come to me”	
P.3	 “We are in the square, there are many different mixed voices, none of them are guiding for me and even scares me”	
P.3	 “I am in the courtyard, the vendors' voices are mixed up because I am in a closed area”	

P.3	 "I reached the courtyard of the mosque, there is an empty space on my left, I can hear the sound of water, so this must be the place where ablution is performed"	
P.4	 "There is a huge opening on my right, the walls surrounding me on my right and left have suddenly been cut off on my right, the echo I receive has changed, the sound no longer bounces off me"	
P.4	 "This is the building right across the gap, I don't know what building it is but it's quite tall, it's a very important demarcation for me, it makes me feel safe"	

P.4	 "There is a dense fullness on my right side, but it is not like a wall, it is not like the echo of the sound hitting the wall, it is something else"	
P.4	 "There was an opening on my left side, The echo of the cane changed again, the sound no longer hits anywhere"	
P.4	 "I hear the sound of plates and forks from my right, I think I am passing by a food and beverage place"	

P.5	 “The voices of the people in front of me guide me on the road, it will be useful if I walk without getting too far from them”	
P.5	 "I will walk straight along this road in front of me, I hear vehicle noises, but I think they will notice me"	
P.5	 “I came to the inner garden, the humming suddenly increased”	

P.5	 "The mosque is on my right, the human voices and density have increased"	
P.6	 "High walls like the building in front of me in the emptiness comfort me"	
P.6	 "There is an ATM on my right, I hear clicking sounds more than once when withdrawing money"	

P.6

"There is a recess inwards, the sounds have changed"

P.6

"There is a road going right and left in front of us, there is a high wall right in front of us"

P.7

"There is a very high building wall on my left, this is very useful for me, thanks to the echo I can follow this wall and go straight"

P.7	 "The echo coming from my left side has changed, I think it has gotten deeper here"	
P.7	 "This street is narrower, it started closing in on us, so the echo changed"	

Appendix B. Photographs and examples of verbal expressions related to tactile visuality

Participant	Photos and verbal descriptions	Photo shooting point
P.1	"The air current has changed, the wind coming from my front and back is now coming from my right side"	
P.1	"The air current has changed here too, I think there is a street"	
P.1	"I continue to follow the grate"	

P.1

"The grating is the most reliable reference for me along the way, because air flow, sun direction, smell, everything comes and goes, but things connected to the ground are always there, the slope of the ground or the texture of the ground is the most important reference for me"

P.2

"There was an opening on my right side, the sun's heat started to come"

P.2

"There is a big obstacle in my way, I feel pressure"

P.2	 “The air current on my right is the courtyard of the mosque, I want to go in and look outside”	
P.3	 “The stone structure continues to move to the right, so there is a street leading there”	
P.3	 "There is a street on my right but I will continue on the left. The wind started blowing from both the right and the left"	

P.3

“The grating is also going to the right, and the air flow has changed, I realized there was a large gap”

P.4

“Ground texture varies”

P.4

"There is space on the right side, the sun is hitting my cheek"

P.4

“The wall on our right is finished, there is now a gap”

P.4

"I continue to follow the grate, when the road ends, it ends too"

P.4

"There is a deep void on my right, I think we have reached the mosque, a cool breeze is blowing"

P.5

"Grilles are the most reliable environmental clue, they accompany us along the way"

P.5

"The sun is hitting my face from directly in front of me, I keep

	going straight”	
P.5	 “We entered the inn, we are now covered, our right and left sides are closed, the pressure on us has increased”	
P.6	 “The temperature in this shop is very high, I think it is a jeweler, I know they always illuminate their windows with light”	
P.6	 “There is a junction to the right, a breeze has arrived”	

P.6	 "This is the mosque courtyard, when the breeze changed I saw that there was a rise, that is the pavement of the courtyard, when you pass it you reach the courtyard"	
P.7	 "Buildings are very important to me, the environmental reference I use the most is the walls of buildings, they taught us to walk by touching the walls at the school for the blind, so walls and buildings give me confidence"	
P.7	 "I passed a street on my right, I want to turn around and take a photo of that street. Because there was a draft"	

P.7	 “We have reached the courtyard of the mosque, the ground is different, there is a half-open cover over us”	

Appendix C. Photographs and examples of verbal expressions related to olfactory visuality

Participant	Photos and verbal descriptions	Photo shooting point
P.1	 "Wait a minute there is something here, boiled corn yes, but it is very dangerous for us to have it in the open, we can harm both ourselves and her, if I had not heard the seller's voice or smelled it, I would have hit it because it was in the open"	
P.1	 “I could smell the coffee even when I was further back because of the wind, but I don't trust the wind and the smell very much”	

P.2

"Corn is sold here, but I can't take it as a determinant, it won't be here when I return, for example"

P.2

"There is a coffee shop here, its smell is very dominant"

P.2

"I smell spices and cookies, I have to pass this shop and continue straight"

P.2

"There is a fisherman on the right, then there is a road to the right and left, and on the other side will be the Kızlar Ağası Inn"

P.3	 "The smell of fruit and the smell of doner kebab mixed together"	
P.3	 "There is a smell of corn here, but it will come from somewhere else soon, I can't trust it"	
P.3	 "There is a doner kebab smell, it is coming from the shop, the man is calling from inside, this shop is more reliable than the smell of corn"	

P.3

"I came to the coffee shop on the corner, I will pass by here and continue on my way"

P.4

"The smell of crispy, this place is an environmental reference for me, it is always here, it can guide me until it closes"

P.4

"The döner kebab restaurant and the smell of döner kebab are also very important to me, I will never forget their existence"

P.4

"The smell of coffee spreads. Being right in the corner and the strong smell of coffee and the sound of the coffee grinding machine are a perfect reference point for me"

P.4

"Bir önceki dönüşte kahve kokusu referanstı, bu dönüşte ise köfte kokusu"

P.4

"We came to the fishmonger's, I can smell it, I will cross to the other side and enter the inn"

P.4	 "As soon as we entered the inn, we started to smell soap"	
P.4	 "We approached the mosque, I remember the smell of kokoreç"	
P.5	 "I just passed by a corn vendor, I want to turn around and take a photo"	
P.5	 	

	"I found the coffee shop, I can smell the coffee, I'm turning around this corner"	
P.7	"I think I came to the coffee shop, although the smell of the coffee reached me before I arrived"	

AN ANALYSIS OF GREEN BUILDING CERTIFIED HOUSING PROJECTS IN IZMIR FOR MAINTAINING RESILIENCE AND SUSTAINABILITY

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Abstract
Nowadays, one of the leading factors causing climate change, which has become a global problem, is the urban environment where most of the world's population lives. Rapid and irregular urbanization has triggered global warming and climate change by creating environmental problems. Ensuring urban growth by damaging the natural environment has also caused cities to lose their sustainability by reducing their resilience against natural disasters. The long-term sustainability of cities requires the building stock to be environmentally, economically and socially sustainable.
This study aims to analyse the effectiveness of green building certification systems, which are used as tools for evaluating sustainability criteria in buildings, and to assess the sustainable qualities of certified projects.In this context, housing projects that are shown as sustainable examples in the city of Izmir, which are evaluated according to the criteria of resilient and sustainable city model, are analyzed. In the research, examples were selected among green building certified and candidate projects.
In the selection of housing projects, care was taken to ensure that they were of different heights and locations, and designed by different architects. In this way, the effects of the projects on the city and sustainability were analyzed by examining different perspectives. Within the scope of the research, 35th Street, Mistral Izmir and Soyak Mavişehir Optimus projects are analyzed within the framework of environmental, economic and social sustainability principles. In the first stage of the research, face-to-face interviews were conducted with architects at Izmir Metropolitan Municipality in order to get information about sustainable practices in Izmir. In the next stage, face-to-face interviews were conducted with the architects of 35th Street and Mistral Izmir projects. This study was prepared in line with the information obtained as a result of the interviews and the literature review.
Within the scope of the study, the sustainable features of the 35th Street Project evaluated under the BREEAM certification system and the Mistral İzmir and Soyak Mavişehir Optimus projects assessed under the LEED certification system were examined. It was found that the assumption that all certified projects fully encompass every component of sustainability is inaccurate. While environmental sustainability criteria are addressed in a concrete and measurable manner within certification frameworks, social and economic criteria tend to remain secondary, requiring long-term evaluation and more comprehensive analytical methods. Furthermore, the study revealed that in practice, the environmental dimension of sustainable design is often prioritised for promotional and marketing purposes, whereas the economic and social dimensions are not adequately integrated. Consequently, it has been concluded that more holistic and comprehensive approaches are necessary to enhance the effectiveness of green building certifications. As demonstrated in the case of İzmir, in order for cities to achieve sustainable development, buildings must not only minimise environmental impacts but also be designed through in-depth analyses that address economic and social aspects.
Key Words: *Resilient and Sustainable Architecture; Green Building Certification Systems; 35th Street Project; Mistral Project; Soyak Mavişehir Optimus Project*

1. Introduction:

The emergence of the climate crisis, which is being tackled worldwide as a global problem today, has a great impact on the environmental damage caused by cities. Irregular urbanization and dense population growth cause economic and social problems as well as environmental damages in cities. The concepts of “sustainability” and “resilience” have come to the fore in the studies carried out within the scope of reducing environmental damage, protecting resources and living spaces, and improving the conditions that threaten the health of living things. The fact that more than half of the world's population lives in cities has caused sustainable living strategies to focus on studies for cities. In this context, studies on resilient and sustainable city models in the face of adverse conditions have become widespread. In many countries, strategic solutions are being developed from the building scale to the city scale for the formation of cities that have the ability to show resilience against risks and provide continuity by developing economically, socially and environmentally in order to reduce the destruction of nature, excessive use of resources, environmental pollution, climate crisis and to leave livable areas for future generations. One of the most important factors in resilient and sustainable urban formation is the sustainable quality of buildings [1].
This article aims to investigate the impact and adequacy of green building certification systems in the formation of sustainable cities and seeks to answer the following questions: Are green building certification systems, which are used as evaluation tools within the scope of sustainable architectural design, sufficient in terms of sustainable building criteria? Are the green building certified projects selected as case studies in İzmir truly sustainable? Is every certified project sustainable in ecological, economic, and social terms? What is the significance of sustainable architectural design within the model of resilient and sustainable urbanisation?
The article highlights the importance of sustainable architectural design in the formation of resilient and sustainable urbanization and emphasizes the need for buildings to meet environmental, economic and social sustainability criteria. At the same time, it questions which qualities of sustainable architecture are carried on by green building certified projects, which is

one of the sustainable architectural design evaluation criteria. Within the scope of the study, housing projects that are considered as sustainable examples for the city of Izmir are analyzed. In the research, a selection was made among the projects that were evaluated as sustainable, entitled or nominated to receive green building certification systems.

As part of the study, interviews conducted with architects working at the İzmir Metropolitan Municipality highlighted the importance of improving the existing building stock and ensuring that newly constructed buildings are environmentally, economically, and socially sustainable within the scope of urban-scale sustainable action plans planned and implemented for İzmir. Based on the premise that the sustainability of cities and the improvement of living environments can only be achieved through the sustainability of buildings, the research examined the 35th Street, Mistral İzmir, and Soyak Mavişehir Optimus projects within the framework of environmental, economic, and social sustainability principles. While selecting the housing projects, attention was paid to the fact that the buildings were of different heights and in different locations, as well as being designed by different architects. In this way, different perspectives can be evaluated and the effects of different projects on the city and sustainability can be analyzed. In the first phase of the study, face-to-face interviews were conducted with the architects of Izmir Metropolitan Municipality in order to learn about sustainable practices at urban and architectural scales in Izmir. During the interview, information was obtained about the sustainable projects realized and planned to be realized under the leadership of Izmir Metropolitan Municipality. This information contributed to the study. In the next stage, face-to-face interviews were conducted with MSc Architect Mehmet Kütükçüoğlu, who was involved in the design of the 35th Street project and MSc Architect Bora Şahbazoğlu, who was involved in the design of the Mistral İzmir project. During the interview, the reasons for defining the projects as sustainable were asked. Design decisions, systems used in the projects, environmentalist approaches considered during the design and implementation phases, etc. details were discussed. The opinions of architects were asked about the application processes for green building certification systems, which have become widespread in recent years, and the contribution of certification systems to sustainable projects.Interviews with architects were useful for obtaining information about the projects.This study was prepared in line with the information obtained as a result of the interviews with the municipality and architects and the literature review.

2. Resilience and Sustainability in Cities

The concept of sustainability is mostly rooted in biology and ecology. The concept of sustainability in cities is mainly addressed in the context of controlling the use of resources, damage to the natural environment and waste production. Urban sustainability is more human and economy-oriented with the approach of ensuring the economic, social and environmental development of cities and transferring them in a way that future generations can also benefit. The concept of resilience, on the other hand, draws its source from disciplines such as ecology, engineering, anthropology and psychology. The concept of resilience in cities is used in reducing the risks of natural disasters, the ability to combat climate change, humanitarian aid and urban planning [2].

Nowadays, cities are the settlements where most of the world's population lives. The fact that population density has exceeded the carrying capacity of cities has brought along global-scale problems caused by cities. For this reason, cities need to be resilient against natural disasters, economic crises, epidemics, climate change, social problems, in short, against all unexpected events, and they need to be able to adapt to events and return to their previous state. For these reasons, the concept of “resilient city” has been on the agenda in recent years [3].

While urban resilience is defined as the ability to survive against sudden and non-linear dynamics, urban sustainability is the ability to maintain this state of resilience and transfer it to future generations. A resilient city may not be sustainable, but for a city to be sustainable, it must also be resilient. Sustainable cities are able to overcome disasters, economic crises, climate change, epidemics, etc., develop resilience, adapt and have the capacity to tackle future challenges. In addition to the ability to be resilient to risks and shocks, sustainable urbanization can be mentioned if resources are protected and sustained [4].

3. The Importance of Architectural Design in Resilient and Sustainable Urbanization Model

In order to talk about the resilience and sustainability of a city, the existing building stock must first be examined. The rapid rise of the construction industry, especially after the Industrial Revolution, has led to an increase in the number of non-resilient and non-sustainable building stock, which has emerged with the logic of rapid production in a short time, without paying attention to basic architectural design criteria. When we consider the dense and irregular construction in many cities, the damage to buildings during unexpected situations such as natural disasters can bring urban life to a standstill. A building designed to be truly sustainable will directly support urban sustainability, as it will fulfill all the criteria of environmental, economic and social sustainability. Buildings that can withstand disasters, global warming, climate change, in short, all possible risks, as well as resource conservation and energy efficiency without damaging the natural environment, are of great importance in the model of resilient and sustainable urbanization [5].

In order to ensure the sustainability of a city, it is necessary to first increase its resilience, and at this stage, measures should be taken to ensure that the buildings are resilient and sustainable. In this process, architectural design and therefore architects have a great impact on environmental formation. For this reason, it is very important for sustainable development that a building is designed in harmony with nature, in the most efficient way in terms of energy and resource use, is resistant to urban problems, and provides social and economic benefits [1].

Green building certification systems have been established by some countries in order to reduce the effects of environmental damage of buildings and to support the development of sustainability [6].

3. 1. Evaluation of Green Building Certification Systems

Across the world, efforts are being made to reduce the environmental impacts of buildings in order to reduce problems such as global warming, climate change, environmental pollution, energy and natural resource consumption. Some countries have established their own green building certification systems to support the development of sustainable buildings. "Green building certification systems are defined as a kind of rating system that tries to provide a measurable reference in objectively and concretely revealing the environmental impacts of building-based projects and revealing their sensitivity in protecting natural resources" [7].

Certification systems aim to define green buildings and develop methods in building design by establishing measurement standards to ensure sustainability. Green building certificates “aim to transform the building market by recognizing environmental leadership in the building sector, encouraging green competition, and increasing consumer awareness of the benefits of green building” [8]. While creating certification systems, each country has created evaluation criteria according to its own climate, environment and living conditions [9]. When the certification system prepared for the conditions of one country is used by another country with different climate and environmental conditions, the same level of efficiency may not be achieved. For this reason, developing a certification system method in accordance with the standards appropriate to the characteristics of each country will ensure the healthiest results.

Green building certification systems are widely used around the world and differ according to the country, year, certification criteria and scoring levels. In Table 1, the main features of these systems are analyzed comparatively. Each of the certification criteria carries a certain point value and the buildings are scored according to their compliance with these criteria. The points collected are categorized according to certification levels; buildings below the threshold values cannot be certified.

Score calculations are carried out based on the items under the criteria headings determined in the certification systems and may vary according to the type of building. For example, in LEED certification, the “sustainable sites” criterion is evaluated over 26 points in the new construction category and 28 points in the core and shell category. The point values in Table 1 are presented for illustration purposes.

Table 1. Green Building Certification Systems [10-11-12-13-14], [URL-1].

Assessment System	Country	Year	Certificate Criteria	Certificate Levels
BREEAM	United Kingdom	1990	Management (12 points), Energy (19 points), Water (6 points), Transport (8 points), Health and Wellbeing (15 points), Waste (7.5 points), Materials (12.5 points), Land Use and Ecology (10 points), Pollution (10 points), Innovation (10 points)	Pass (30-45 points), Good (45-55 points), Very good (55-70 points), Excellent (70-85 points) Outstanding (85 points and above)
LEED	United States of America	1998	Sustainable Sites (28 points), Water Efficiency (10 points), Energy and Atmosphere (37 points), Materials and Resources (13 points), Indoor Environmental Quality (12 points), Innovation (6 points), Regional Priority (4 points),	Certified (40-49 points), Silver Certified (50-59 points), Gold Certified (60-79 points), Platinum Certified (80 points and above)
CASBEE	Japan	2004	Indoor Environment, Quality of Service, Outdoor Environment on Site, Energy, Resources and Materials, Environment Outside the Site	S (Superior), A (Very good), B+ (Good), B- (Slightly poor), C (Poor)
DGNB	Germany	2009	Ecological Quality (22.5%), Economic Quality (22.5%), Sociocultural and Functional Quality (22.5%), Technical Quality (22.5%), Process Quality (10%), Location Quality	Bronze Certified (35%-49%), Silver Certified (50%-64%), Gold Certified (65%-79%), Platinum Certified (80% and above)
Green Star	Australia	2003	Energy (18 points), Materials (18 points), Indoor Environmental Quality (18 points), Transport (10 points), Management (7 points), Water (11 points), Land Use and Ecology (6 points), Emissions (9 points), Innovation (3 points)	1 star (10-19 points), 2 stars (20-29 points), 3 stars (30-44 points), 4 stars (45-59 points), 5 stars (60-74 points), 6 stars (75-100 points)
SbTool	Canada	1998	Urban, Site and Infrastructure Systems, Energy and Resource Consumption, Environmental Loadings, Indoor Environmental Quality, Service Quality, Social, Cultural and Perceptual Aspects, Cost and Economic Aspects	-1 to 0: Below minimum standards (unsustainable) 1: Meets minimum regulatory requirements 2: Good practice 3: Advanced sustainability performance 4: High-performance sustainability 5: World-class sustainability

B.E.S.T.	Turkey	2013	Integrated Green Project Management (9 points), Land Use (13 points), Water Use (12 points), Energy Use (26 points), Health and Comfort (14 points), Material and Resource Use (14 points), Residential Quality (14 points), Operation and Maintenance (6 points), Innovation (2 points)	Certified(45-64 points), Good (65-79 points), Very good (80-99 points), Excellent (100-110 points)

The Environmentally Friendly Green Buildings Association (ÇEDBİK) has developed the B.E.S.T (Ecological and Sustainable Design in Buildings) certification system to be applied in new housing projects in accordance with the conditions in Turkey. LEED (Leadership in Energy and Environmental Design) and BREEAM (Building Research Establishment Environmental Assessment Method) certification systems are commonly used in certified projects in Izmir. The creation of a certification system specific to Turkey's environmental conditions is an important step towards resilient and sustainable urbanization by supporting sustainable architecture.

4. Investigation of Sustainable Building Characteristics of Green Building Certified Housing Projects in Izmir City

Izmir is a tourism city with its advantageous geographical location, renewable energy resources, mild climate, biodiversity and natural beauties. However, population growth and the irregular development of the city have led to increased damage to nature, increased environmental problems and reduced urban resilience to disasters. Within the scope of combating these problems, in recent years, environmental policies have been developed at the urban scale, aiming to increase urban resilience and create sustainable living spaces. The city of Izmir, which is supported by the European Union within the scope of grant programs towards sustainable urbanization, is developing development strategies to improve the damaged built environment and improve the quality of life of the society [6].

In this research, the characteristics of 35th Street, Mistral Izmir and Soyak Mavişehir Optimus projects, which are selected among the examples of resilient and sustainable housing in Izmir, are examined. Within the scope of the research, these projects were selected because they were evaluated through green building certification systems, which have become widespread as a sustainable building evaluation tool.

4.1. 35th Street Project

35. Sokak project, which is one of the sustainable housing projects in Menemen district of Izmir, stands out as the first sustainable housing project from Turkey to apply for the BREEAM certificate, which is widely used among green building certification systems. In 2010, the design phase started and the construction process was completed in 2013. Spread over a total land area of 130,000 m², the project consists of 555 residences and is positioned with a sensitive layout plan on a land with a 60 meter elevation difference between its two ends [15] (Fig. 1).

Fig. 1. 35th Street Project Land Structure and Land Layout of the Project [URL-2].

The location of the land is advantageous in terms of providing sufficient air circulation and a spacious living environment. Located on a 2-kilometer street line, the project is designed in such a way that the living spaces, which are intertwined with nature, are both detached and socially interactive with each other **[URL-4]** (Fig. 2).

Fig. 2. 35th Street Project Site Plan and Land Layout [URL-2-3].

The 35th Street project is located 1 km from the metro station and 300 meters from the bus stop. With its location advantage, the project supports the principle of sustainable buildings being close to public transport and reducing greenhouse gas emissions due to individual vehicle use. 35th Street project has 6 different housing types (Fig. 3). All housing types can benefit from the view and daylight in line with the settlement on the land, which supports the principle of sustainable buildings to benefit from the view and natural light.

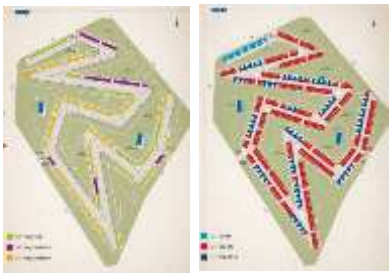

Fig. 3. 35th Street Project Layout Plans According to Different Housing Types [URL-4].

In the interview with Mehmet Kütükçüoğlu, one of the architects of the project, regarding the architectural design process, he noted that the site had a significant elevation difference, and that this topographical feature was utilised in a positive way to ensure that all buildings were integrated appropriately into the landscape. The residential units and social spaces were positioned along a 2-kilometre stretch in harmony with the terrain, enabling all areas to benefit from natural daylight and scenic views. Designing in accordance with the natural structure of the land helped to prevent soil degradation, reduce the heat island effect, and minimise energy losses. Kütükçüoğlu also emphasised that the design decisions were guided by a desire to revive the notion of "street life." In contrast to typical villa developments, which tend to be inward-looking and lack strong neighbourly relations, this project incorporated design principles aimed at fostering socio-cultural interaction within a detached housing typology. Nowadays, in high-rise buildings lacking green areas, the relationship of people with nature decreases, their communication weakens due to the lack of areas where they can socialize, and the socio-cultural interaction brought by the concept of street disappears. Detached houses, where the interaction with nature is higher, are often built further away from the city centers and in isolation. At the same time, the cost of a detached living space in touch with nature is too high for the majority of the population. Sustainable societies should have a high level of welfare and people should be happy in their living spaces. Nowadays, against the problem of dense and irregular urbanization, people need safe and disaster-resistant living spaces where they can easily access green areas, benefit from socio-cultural activities, and where the cost is not too high in terms of accessibility **[16].** 35th Street project has brought the concept of 'street' in traditional Turkish culture to the present day. In the project where green areas are preserved and intertwined living spaces are created, all residences have the advantages of traditional street culture. As the residences in the cities with the 'European Green Capital' award should be at a maximum distance of 300 m from green areas, all residences in the 35th Street project are designed intertwined with green areas **[6]** (Fig. 4). The project supports the principle of land-appropriate settlement, which is a sustainable building criterion, and ensures that the land does not lose its productivity and the green texture is preserved.

Fig. 4. 35th Street Project Site Plan and Land Layout [URL-4].

Sustainable living spaces should have a compact structure where individuals can socialize, do sports, meet their daily needs in a short distance and spend time in green areas [16]**.** The social areas in the 35th Street project are supportive of sustainable building features. There are 2 outdoor semi-Olympic and 1 semi-indoor semi-Olympic pools in the project. In addition, there are various social and recreational areas such as a 1350 m² sports center, basketball court, tennis court, walking and cycling tracks, restaurants, street cafes, library, kindergarten, supermarket, organic vegetable-fruit gardens and private gardens for residents. Streets and courtyards are designed in different forms by establishing unique relationships with the land and landscape [URL-4] (Fig. 5).

Fig. 5. 35th Street Project Social Areas, Walking and Cycling Trails and Street Views [URL-2-3-4].

In the project, the car parking area was solved underground, protecting the social use areas and the green texture of the land. With the design of 1000 car parking spaces, parking space for each residence is arranged in a certain way. Access to the car park from the residences is easy. Above the car park floor of the project, a settlement plan has been created in which mutual residences are lined up to form a street (Fig. 6).

Fig. 6. (a) 35th Street Project Section, (b-c-d) 35th Street Project Street Views [URL-2-4].

In the project, placing the car park underground prevents the heat island effect by preserving green areas, and also contributes to natural drainage and the preservation of social spaces. This approach supports sustainable construction.

In Izmir, which has a high earthquake risk, the durability of buildings is of great importance. In the 35th Street project, the light steel construction system was preferred, which provides advantages in terms of both earthquake resistance and sustainability, thanks to the recyclable feature of steel. The steel frame systems of the houses were manufactured at the Akkon factory in Istanbul and assembled on site. In the project, which is considered to be the largest light steel housing complex in Europe, 30% of the construction works were completed off-site and 70% on site [URL-4].

As shown in Fig. 3, the dwellings are positioned to maximize the use of views and natural light. The interior visuals in Fig. 7 show that the design takes into account the light and landscape factors. This planning supports the principle of indoor environmental quality of sustainable buildings.

Fig. 7. Interior Solutions of Houses in 35th Street Project [URL-4].

Within the scope of the sustainable building features of the project, it is aimed to use sink and shower water in reservoir and garden irrigation with the grey water recovery system, thus contributing to environmental and economic sustainability by saving approximately 50% water. Providing the comfort of detached living at an affordable cost has supported economic and social sustainability by facilitating the access of large segments of the society. The use of renewable energy was encouraged by meeting the energy needs of social facilities and common areas with solar panels.

Thanks to computer-controlled production, the predictability of the design and construction processes has been increased, ensuring that the houses are built with the same quality. The millimeter-precise design allows for the pre-ordering of building elements, shortening the construction process, while the uniform structural system facilitates cost control and labor planning. These practices minimized material waste and material losses by ensuring efficient management of processes, thus supporting economic and environmental sustainability [URL-4].

4.2. Mistral Izmir Project

Mistral İzmir project was designed as a mixed-function project including residential, hotel, office and shopping center in Konak district of İzmir. With a height of 216 meters, the office tower is the tallest building in Izmir and has a construction area of 122,160 m² on a 13,922 m² plot. The project includes 153 offices, 110 residences, a 96-room hotel, 38 commercial units and a sports complex. The office tower has a total usage area of 34.570 m² and 48 floors including the ground floor, while the residential tower has a total usage area of 21.455 m² and 38 floors including the ground floor [17] (Fig. 8).

Fig. 8. Mistral İzmir Project General View [URL-5-6].

Located near public transport, the project supports sustainable building principles by reducing private vehicle use and greenhouse gas emissions. The open bazaar on the ground and first floors are connected to planned recreational areas along the rehabilitated stream, ensuring public space continuity with access from all sides (Fig. 9). Hosting various functions, such as shops, cafes, restaurants, sports facilities, and services, the bazaar offers a space where users can meet their needs and socialise without using vehicles. Shading elements and green roofs enhance climatic comfort by providing sun protection and

mitigating the heat island effect. The inclusion of water features and green areas aims to create enjoyable public spaces, supporting both social and environmental sustainability [URL-7-8].

Fig. 9. Mistral İzmir Project Connection with the Environment and Bazaar Area [URL-7-9].

An application was made to the LEED certification system evaluated by the United States Green Building Council (USGBC) in the 'LEED BD+C core and shell' category for the office tower of the Mistral İzmir project and in the 'LEED BD+C new construction' category for the residential tower. The office tower of Mistral İzmir project has been awarded LEED Gold certificate by receiving 71 points in line with the principles of LEED BD+C core and shell certification, which is evaluated over 110 points. When the sustainable building features of the project are examined, it is observed that appropriate land selection was made by avoiding green areas or undeveloped land. To reduce greenhouse gas emissions from vehicles, the project was located near public transport and designed with a bazaar concept to encourage pedestrian access through shopping, sports, and dining functions. According to USGBC data, bicycle parking was provided, along with special parking areas and charging stations for low-emission and electric vehicles. The project integrates green roof applications, high solar reflective materials to reduce the heat island effect, rainwater control, and water conservation strategies. Water-saving fixtures, grey water use, drought-tolerant landscaping, and rainwater recycling support effective water management. Energy consumption is monitored, and ventilation, air conditioning, and cooling systems that do not harm the ozone layer are used to ensure energy efficiency. Waste management is promoted through the use of recycled and regional materials, supporting the local economy. Indoor air quality is enhanced by using low-emission materials, ensuring thermal comfort, and managing ventilation and construction-related emissions, contributing to both occupant and worker well-being. These factors support the Mistral Izmir office building's compliance with sustainable building standards [URL-10].

In the interview conducted with one of the project's architects, Bora Şahbazoğlu, it was stated that, due to the high wind loads expected on the project site for a high-rise building, extensive and detailed calculations were carried out, and design decisions were made to ensure wind resistance. While the interior surface of the office building of the project has a square form, a dynamic form was obtained by rotating each floor by 1.2 degrees in the exterior surface design (Fig. 10). This form structure, apart from a dynamic appearance, enables the 216 m high office tower to be resistant to wind loads. Taking measures against wind load by evaluating the environmental conditions is a criterion that supports the sustainability of the building [URL-34].

Fig. 10. Mistral İzmir Project Office Tower View [URL-6].

In the office tower of the project, a double skin façade system was implemented as part of the energy-efficient design approach. The ventilated cavity between the inner and outer layers helps retain solar-heated air in winter and provides cooling through air circulation and shading in summer [URL-8]. While the system offers benefits such as sound and thermal insulation, natural ventilation, energy efficiency, thermal comfort, and wind resistance, it also presents drawbacks like reduced daylight transmission, risk of overheating, high initial cost, and increased maintenance needs [18]. Although the system supports energy efficiency and thermal comfort, it limits daylight utilisation [URL-10]. Economically, despite its high upfront cost, it may reduce long-term heating and cooling expenses through improved climate control. However, ongoing maintenance expenses pose a challenge to economic sustainability. To assess the true sustainability of such systems, long-term performance and benefits must be considered.

The residential building of Mistral İzmir project was evaluated according to LEED BD+C New Construction certification criteria within the framework of sustainable construction and was awarded LEED Gold certificate with 67 points out of 110 points. [URL-11].

In the interview conducted with one of the project's architects, Bora Şahbazoğlu, it was noted that the design of the residential building incorporated large terraces, taking into account the common practice among İzmir residents of spending time on balconies, which is a significant aspect of local lifestyle. In the design of the residential building, the habits of city dwellers

to spend time on balconies were taken into consideration and large terraces were planned. While balcony design is generally avoided in high-rise buildings due to the wind effect, balconies have been integrated in the Mistral İzmir project by providing suitable conditions. The form created with 1,2 degree turns on each floor of the building contributes to both a functional and aesthetic facade design by reducing the wind effect (Fig. 11). Design decisions made by taking into account user habits and environmental factors support the project's compliance with the principles of social and environmental sustainability [URL-8].

Fig. 11. (a) Mistral İzmir Project Residential Tower View, (b) Mistral İzmir Project Residential Tower Balcony View [URL-6].

The Mistral project was constructed in Izmir, which has a high earthquake risk, with a composite structural system using reinforced concrete and steel together, and is expected to be highly resistant to earthquakes. In the residential and office towers, outrigger systems were applied to provide resistance against earthquake and wind loads in tall buildings [19]**.**

When the project is analyzed in terms of accessibility, it is seen that it is more accessible for the socio-economic upper income group. However, the bazaar concept at the entrance supports social sustainability by providing access to public space. However, the extent to which this contributes to the social interaction between Mistral users and lower socio-economic groups in the region is a controversial issue [20]**.**

It is seen that Mistral İzmir project exhibits an approach compatible with the reduction of environmental damages caused by buildings. In this way, it can be said that it shows positive features within the scope of combatting climate change. However, the effect of high-rise buildings in cities is an important topic of discussion in the literature. In addition to those who argue that high-rise buildings have a negative impact on the sustainable urbanization model due to their higher energy consumption and carbon emissions compared to other building types, there are also researchers who believe that cities with more compact growth with high-rise buildings will be more sustainable, as opposed to cities that develop with low-rise buildings and increase the spread towards the city periphery [20]**.** In addition, it is thought that the increasing number of high-rise buildings in Mistral İzmir and its immediate surroundings will change the city silhouette and may cause new infrastructure problems as high-rise buildings increase density in the region [URL-12]. In this context, the impact of the Mistral İzmir project, which consists of high-rise buildings, on urban sustainability brings about different opinions.

4.3. Soyak Mavişehir Optimus Project

The Soyak Mavişehir Optimus project, located in the Karşıyaka district of İzmir, is designed in two different building forms, namely “Optimus First” and “Optimus Gold”. In the site plan in Fig. 12, the building on the left consisting of a total of 3 blocks is positioned as “Optimus First” and the building on the right consisting of a total of 2 blocks is positioned as “Optimus Gold” (Fig. 12).

Fig. 12. Site Plan of Soyak Mavişehir Optimus Project [URL-13].

Built on a 37.329 m2 land area, the project has a construction area of 101.000 m2. The project, whose construction phase was completed between 2011-2014, consists of a total of 1109 residences with different apartment plan options including 1+1, 2+1, 3+1 and 4+1. Swimming pools, basketball courts, tennis courts, playgrounds and specially designed landscaped gardens have been designed in the project area, creating areas where people can participate in social activities and have a pleasant time (Fig. 13) [URL-13].

Fig. 13. Soyak Mavişehir Optimus Project Social Areas [URL-13].

Soyak Mavişehir Optimus is a LEED certified project like Mistral İzmir. Evaluated in the LEED BD+C New Construction category, the project received 63 points for the Optimus Gold building and 64 points for the Optimus First building and was awarded LEED Gold certification. The project, Izmir's first LEED Gold certified residential project, supports the reduction of greenhouse gas emissions due to individual vehicle use by being located close to public transportation [URL-14-15-16].
The location of the project in an area with no green areas supports environmental sustainability; it is close to amenities such as public transportation, parks, banks, schools, kindergartens, hospitals, pharmacies and supermarkets, enabling daily needs to be met within walking distance. In order to encourage cycling, bicycle parking spaces have been created at a rate of 15% of the number of residential users, 5% of the parking area has been reserved as priority parking for low emission or alternative fuel vehicles, and charging units for electric vehicles have been added. Thanks to these practices, the use of bicycles and low-emission vehicles is encouraged, aiming to reduce greenhouse gas emissions associated with vehicle use [URL-14-15-17].
More than 20% of the project's land area is organized as green space, and this ratio has been increased with green roof applications. Roof and hard floor materials that reflect sunlight prevent overheating, while permeable paving materials allow rainwater to reach the underground without accumulating on the surface. Water saving has been achieved through climate-compatible, low water consumption landscaping, and water-efficient luminaires have been used in the residences. Energy consumption has been minimized by using heat-insulated materials, energy-efficient equipment, windbreakers and refrigerants that do not harm the ozone layer. Water saving has been achieved through climate-compatible landscaping with low water consumption, and water-efficient luminaires have been used in the residences. Energy consumption was minimized by using heat-insulated materials, energy-efficient equipment, windbreakers and ozone-friendly refrigerants. Waste management was ensured by implementing the “Construction Waste Management Plan” during the construction process, and the amount of solid waste was reduced by using recyclable materials. Carbon emissions from transportation were reduced by using local materials. Within the scope of indoor environmental quality, it is aimed to increase the quality of life by controlling tobacco smoke, natural ventilation, a layout that utilizes daylight and landscape factors, ensuring thermal comfort and using low-emission materials [URL-14-15].
According to the findings of the literature review on the project implemented by Soyak Yapı, the roads within the project area are designed to be accessible for individuals with disabilities and prams. In this context, it can be stated that the project contributes to social sustainability. The social facilities and sports areas in the project allow people to interact with each other. In this context, the project contributes to social sustainability. In addition, water efficiency, energy efficiency and resource conservation, which are evaluated within the framework of environmental sustainability, contribute to economic sustainability.

5. Conclusion and Evaluation

This study focuses on green building certification systems used to evaluate the sustainability performance of buildings on the road to resilient and sustainable urbanization. Certification systems in the United Kingdom, the United States of America, Japan, Germany, Australia, Canada, Germany, Australia, Canada and Turkey, which have created certification systems in accordance with their own living and environmental conditions, are examined. Although BREEAM and LEED certification systems are widely used in Turkey, since sustainable designs should be developed in accordance with the conditions of each country, the B.E.S.T certificate developed specifically for Turkey is expected to be a more effective evaluation tool in terms of its suitability to local conditions.
Among the projects analyzed, the 35th Street project is a housing project that addresses sustainability principles in a holistic manner and includes social and economic dimensions. Particularly, on a land with such a high elevation difference, a design that integrates with the land without disrupting the natural structure of the soil, allowing natural environments that all residences can benefit from equally, reveals the importance of the decisions taken during the design process of a building and the architects, who play a major role in these decisions, on sustainability. In the 35th Street project, practices aimed at reducing the harmful environmental impacts of housing are important in the fight against global climate change. In addition, for the city of Izmir, which has a problem of dense and irregular urbanization, the implementation of a project that is intertwined with nature, low-rise and connects the countryside and the city is very positive for sustainable urbanization. It can be said that the project, which is evaluated within the scope of the BREEAM certification system, supports not only environmental sustainability criteria, but also economic and social sustainability and stands out in the literature research within the framework of all components of sustainability.
The Mistral Izmir project appears to be in line with the goal of reducing environmental damages caused by construction and thus has positive features in combating climate change. However, the effects of high-rise buildings in cities is a controversial

issue in the literature. While there are those who argue that high-rise buildings have a negative impact on sustainable urbanization due to their high energy consumption and carbon emissions, there are also scientists who argue that they offer a model that supports compact growth by preventing sprawl to the city peripheries [20]. However, the high-rise buildings in and around Mistral İzmir will change the city skyline and may cause new problems by increasing infrastructure density [URL-12]. In this context, the impact of the project on urban sustainability brings different views. The criteria evaluated in the LEED certificate are largely focused on environmental sustainability, while the social and economic sustainability of the buildings is addressed in a more limited scope. The principles of water and energy efficiency and resource conservation, which are evaluated within the scope of environmental sustainability, contribute to economic sustainability, but since they involve high-cost systems, it would be more efficient to evaluate them with long-term gains. In the research conducted on the Mistral İzmir project, it was observed that the promotions were mainly based on the green building certificate and that the social and economic sustainability dimensions were not sufficiently evaluated.

The fact that the Soyak Mavişehir Optimus project is largely compliant with environmental sustainability criteria is positive in terms of combating global climate change. Research on the sustainability of the project has generally yielded data evaluated by LEED certification. Since the LEED certification system mainly covers the environmental dimension of sustainable buildings, there is no clear information on the social and economic aspects of the Soyak Mavişehir Optimus project. Although it is generally supportive of sustainable project characteristics, it has been observed in the literature research that especially environmental sustainability criteria are emphasized and social and economic sustainability features are not emphasized much. The results of the research show that existing green building certification systems mostly emphasize the environmental dimension of sustainable construction and that criteria related to economic and social sustainability should be evaluated in more detail. At the same time, although certified projects may include economic and social sustainability criteria, it has been observed that environmental sustainability features are more prominently emphasised during promotional processes. Obtaining a green building certificate does not necessarily indicate that a building is environmentally sustainable; in fact, some projects fulfil environmentally friendly standards without holding any certification. As the certification process can be costly, not every enterprise or organisation is able to participate. The evaluation of all projects based on uniform criteria disregards differences in climate, region, and local needs, which may pave the way for the growing tendency to pursue green buildings primarily for marketing purposes. Therefore, it is of great importance that certification criteria be adapted to local conditions. It should be remembered that certification systems are updated over time; however, approaches that are free from commercial concerns and that adopt a more holistic perspective while considering local realities should be developed . Sustainability should not be achieved merely through certification, but through comprehensive and conscious design processes [21]. In this context, in order to address sustainability principles with a holistic approach, it is recommended to develop measurement systems that analyze economic and social sustainability more comprehensively in addition to existing certification systems. Furthermore, while emphasizing the importance of reducing the environmental impact of sustainable buildings, the need to support social and economic sustainability criteria equally should be highlighted. Thus, a more balanced and inclusive evaluation can be achieved by taking into account all components of sustainability in architectural design processes. It should be taken into consideration that not every project with a green building certificate may fully meet all environmental, economic and social sustainability criteria. Therefore, it is of great importance to implement more comprehensive and holistic architectural design processes to ensure resilient and sustainable urbanization.

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THE INTERPLAY OF ARCHITECTURE AND IDEOLOGY IN TÜRKİYE'S REPUBLICAN AND CONTEMPORARY ERAS

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Abstract
Architecture, by its very nature, carries an inherent ideological dimension. The relationship between ideology and architecture has been consistently evident throughout history. This study examines the transformation of ideology in Türkiye, which marked the centennial of its Republic in 2023, and its architectural reflections through selected buildings. It focuses on two key periods in Türkiye's architectural history: the early Republican era, characterized by the transition from an empire to a secular and modern framework, and the 21st century under the AKP government, defined by prolonged political dominance and its corresponding ideological expressions. These periods were chosen due to the significant role architecture played as a representational tool, particularly in public buildings.
Using a comparative case study analysis, the study explores how architecture has been employed to reflect and reinforce ideological narratives. The early Republican period embraced modernist principles to symbolize progress, secularization, and state authority. This vision is exemplified by the Ministry of National Defense, the Presidential House, İsmet Paşa Girls' Institute in Ankara, and the Florya Presidential Summer Mansion in Istanbul. These structures reflect a modernist approach, prioritizing functionality, simplicity, and a departure from Ottoman architectural traditions, embodying the new Republic's aspirations for a secular and progressive nation. In contrast, 21st-century public architecture has witnessed a resurgence of historical references, particularly Neo-Ottoman and Seljuk-inspired designs. This ideological shift is evident in structures such as the Presidential Complex, Çağlayan and Kartal Courthouses, and the Nation's Library. These buildings integrate Ottoman motifs and forms, signaling a renewed emphasis on national identity and a reinterpretation of historical narratives.
By examining case studies from these two distinct periods, the research highlights the dynamic interplay between ideology and architecture, demonstrating how the built environment serves as both a reflection of and a tool for ideological expression. It argues that architectural design is not merely an aesthetic or functional decision but an ideological statement that materializes power structures.
Employing a qualitative approach, the study draws on literature review, archival research, and case study analysis to establish a theoretical framework. Selected buildings are analyzed through thematic and comparative methods to identify ideological influences on architectural design. The primary goal is to compare structures with similar functions across these two eras, revealing how shifting political ideologies have shaped architectural aesthetics over time.
Key Words: *Republican Türkiye, modern architecture, 21st century architecture, politics, ideology*

1. Architecture and Ideology: A Dynamic Relationship

Ideology, in its broadest sense, refers to a system of ideas and ideals, especially one that forms the basis of economic or political theory and policy [1]. It encompasses a set of beliefs, values, and assumptions about the world, which shape individuals' perceptions and actions. Ideologies can be explicit or implicit, conscious or unconscious, and they often serve to legitimize or challenge existing power structures. In social studies and the humanities, the concept of ideology is defined in different, but sometimes also contradictory ways. For example, ideology can be understood as the sum of all pragmatic and positive beliefs, values, and behaviors, while it is also described as a collection of misconceptions, false beliefs, or illusions shared by a specific social group, class, nation, political party, or cultural sphere. Additionally, ideology has been conceptualized as an illusion that structures social relations while masking deeper societal divisions that cannot be fully articulated [2]. Miodrag Šuvaković, in Architecture and Ideology, defines ideology as a relatively coherent and structured set of ideas, symbolic representations, values, beliefs, and thought patterns. Regarding architecture, he argues that it is fundamentally a political and ideological practice. Through its techno-aesthetic and techno-artistic strategies, architecture not only organizes both individual and collective human life but also represents a society's self-perception and how it is viewed by others [3].

From this perspective, architecture which operates beyond the mere act of constructing buildings; is deeply rooted in ideology, functioning as both a reflection of and a tool for propagating societal values, political power, and cultural identity. It serves as an ideological artifact that encodes power relations, social hierarchies, and historical narratives within the built environment. However, the relationship between ideology and architecture is not a one-way street. While architecture reflects prevailing ideologies, it might also shape and reinforce them. Buildings and spaces can be designed to promote specific social behaviors, values, and norms, while simultaneously reflecting the dominant ideologies of their time. This intrinsic connection is evident across historical and contemporary contexts, where architectural forms and spaces have been employed to express and reinforce ideological narratives. Thus, if architecture is considered a representation of societal organization—whether accurate or distorted—and ideology is understood as a structured perspective on society, the deep interrelation between the two becomes clear [3].

In architecture, ideology manifests in various ways. Architectural styles, forms, and spaces often carry symbolic meanings that convey ideological messages. For instance, the grandeur and monumentality of ancient Egyptian temples reflected the

pharaoh's divine power and the hierarchical structure of society [4]. Similarly, in ancient Rome, the construction of monumental structures like the Colosseum and the Pantheon served to glorify the empire and reinforce its dominance [5]. During the Renaissance, the revival of classical architectural forms reflected the humanist ideals of the era [6]. Gothic cathedrals in medieval Europe, with their verticality and intricate ornamentation, signified the Church's authority and the aspiration for spiritual transcendence [7]. Since architecture inherently embodies the values and beliefs of the societies that produce it, the built environment functions as a physical manifestation of abstract ideological constructs. Throughout history, architecture has been a powerful instrument of political ideology, shaping urban spaces to assert authority, enforce control, and construct national identity. One striking example is the transformation of Paris under Baron Haussmann in the 19th century. The redesign of the city's boulevards was not merely an aesthetic or functional improvement but a strategic effort to facilitate military movement and suppress revolutionary uprisings, demonstrating how urban planning could serve as a mechanism of state power [8].

In the 20th century, the ideological function of architecture became even more pronounced, particularly in state-sponsored projects designed to project dominance and permanence. Mussolini's EUR district in Rome (Esposizione Universale Roma) and Albert Speer's architectural vision for Nazi Germany employed classical forms to evoke a mythic national past, reinforcing authoritarian rule. Early Soviet architecture initially embraced socialist ideals through functional and communal spaces before evolving into Stalinist monumentalism, which sought to embody state power through grandeur and scale [9]. The connection between modernist architecture and political ideology was also widespread. Various regimes utilized modernist architecture to assert their legitimacy. Fascist Italy and Stalinist Russia adopted it as a symbol of power, while the Zionist movement used it in building Tel Aviv to project a forward-looking identity. In the interwar period, modernism became a tool for emerging regimes, representing progress and securing state support for architects [10]. Modernist architecture in the 20th century rejected traditional styles in favor of new technologies and social ideals [11]. Cities were once shaped by the ideologies of individual planners and architects, whose visions gradually gained widespread acceptance, ultimately shaping collective ideology [12]. In the contemporary era, architecture struggles with global challenges such as sustainability, globalization, and cultural diversity. However, the reflection of ideological shifts in architectural practice is not always evident. For instance, Ibelings argues that architecture of 2010 is not drastically different from that of 1990. The famous names in architecture are still famous, icons are still the icons [13]. While this observation holds true for many countries, Türkiye presents a different case.

1.1. Materials & Methods

This study employs a qualitative approach to examine the relationship between ideology and architecture in Türkiye through literature review, archival research, and case study analysis. Relevant resources were analyzed to establish a theoretical framework. Case studies of significant buildings from different periods were examined using thematic and comparative analysis to identify ideological influences on architectural design. The study examines the early decades of the Republic and its centennial in the 21st century. In these periods, selected buildings serve as case studies, illustrating the visual manifestation of ideological shifts in architecture. The main objective is to compare architectural products with similar functions across these two eras to reveal how political ideologies have influenced architectural aesthetics.

From the Early Republican Era four cases were selected: Ministry of National Defense, symbolizing a conservative approach to modernism; the Çankaya Palace, serving as the Presidential Palace and representing the residence of the new regime's leader; the Florya Palace, embodying modernist simplicity and transparency, chosen for its iconic status as a presidential residence; and the İsmet Paşa Girls' Institute, reflecting the Republic's efforts to promote a modern lifestyle for young women.

From the 21st century, four contemporary examples were selected for comparison: the Çağlayan and Kartal Courthouses, representing the authoritarian discourse of the period, akin to the Ministry of National Defense; the Presidential Palace, serving as the new residence of the president and embodying a shift in symbolic representation; and the Nation's Library, chosen as an example of cultural and educational expression. These 21st-century buildings, which adopt an eclectic approach, emphasize the AKP's (Justice and Development Party) vision of historical continuity, cultural grandeur, and a gigantist architectural aesthetic. The transformation of architecture in Türkiye reflects a broader ideological shift from modernist secularism in the early Republican period to Neo-Ottoman revivalism in the 21st century. The selected case studies illustrate how architectural design visually serves as an ideological tool, reinforcing political narratives and shaping national identity. By analyzing these examples, this study contributes to a deeper understanding of how architecture functions as both a medium of representation and an active agent in ideological discourse (Table 1).

2. The Case of Türkiye: Architecture and Ideology Relation

Throughout Türkiye's history, architecture has served as a powerful tool for political administrations to express and reinforce their ideological visions. This practice became especially prominent in the 1930s after the establishment of the Republic, when the new government sought to distance itself from the remnants of the Ottoman Empire, both politically and culturally, in order to create a distinct national identity. This transformation went beyond mere aesthetics; it was deeply ideological, aligning with a broader vision of modernization and citizen engagement. The shift from monarchy to republic,

the abolition of the caliphate, and sweeping legal reforms were all integral to this change, reflecting the Republic's commitment to redefining the nation's political and social foundations. In the social and cultural realm, secularization, educational reforms, language reform, and women's rights policies were key initiatives shaping the institutional and societal framework of the Republic. Architecture and urban transformations played a crucial role in achieving these goals. As Bernd Nicolai (2011) noted, architecture became the most significant tool for expressing the Kemalist vision in Türkiye. Traditional Ottoman architecture, associated with the imperial era, was no longer favored. Instead, the Republic embraced a modernist, international architectural language, one that was entirely disconnected from Ottoman influences. This new architectural style not only represented the emerging nation but also positioned Türkiye as a contemporary state in line with global trends. The young Republic sought to build a nation that was drastically different from its predecessor, which had governed the country for centuries. Therefore, its symbolic and representational tools had to reflect this departure. Architecture, as a primary medium of ideological expression, played a central role in shaping the national identity and reinforcing the Republic's modernist vision and global integration.

The years that followed can be described as a period of contextualization within the global context. In the 1940s, after Atatürk's death, the political and social conditions changed, and the architectural expression of the ideology shifted toward a more nationalist style, known as the Second National Architectural Movement. This period saw the incorporation of elements from classical and Anatolian architecture alongside rationalist, monumental architectural language. European political ideologies and architectural trends, particularly nationalism, also influenced this era, creating a blend of global and local influences. In the 1950s, the rise of the Democrat Party brought a shift in both ideology and architectural style, with global modernist approaches being embraced once again. The 1960s were marked by a military coup, which led to a transformation in the political and ideological landscape. The adoption of the 1961 constitution introduced more democratic freedoms for society. Architecturally, this period saw the emergence of modernist, functional, and diverse design strategies. The 1970s were marked by political polarization between the right and left wings. These years also witnessed rapid urbanization, fueled by migration to cities and the growth of informal settlements, particularly in the urban periphery. Large-scale infrastructural projects, including transportation networks that connected different parts of the city, were implemented. In the 1980s, another military coup resulted in a period of authoritarian rule. This period was characterized by massive urbanization and a growing demand for infrastructure and housing. The 1990s in Türkiye were defined by efforts to embrace globalization as neoliberal political strategies took hold. Postmodern architectural styles dominated this era until the devastating Marmara earthquake (1999), which prompted large-scale urban transformation projects. This period also saw the rise of the Justice and Development Party (AKP) in 2002.

Table 1. A comparison for 1930s and 21st century Türkiye in terms of ideology and architecture

Theme	1930s	21st century
Ideology & Politics	Nation building Modernization Kemalism (secularism, republicanism, nationalism, reformism, etc.) Rejection of Ottoman Imperialism and Islamism	Populism Nationalism Conservative democracy Islamism with modern additions Neoliberal policies Neo-Ottomanism Authoritarianism
Politics & Architecture	Use of architecture for modernization, nation-building and political identity construction	Use of architecture for neoliberal policies and new political ideology construction
Architecture	Buildings representing the state's authority and modernization goal	Monumental structures as a political power display & ideology
Architectural Approach	New modern architecture (symmetrical, monumental (public buildings), cubic forms, simple and rational lines)	Neo-Ottoman and Seljuk-inspired designs (capitalist mix) Monumental forms Gigantism
Urban Planning Approach	Planned urbanization Emphasis on public spaces (e.g., the design of Ankara as the capital)	Mega projects, Profit-driven urbanization (e.g., Kanal İstanbul, TOKİ projects, urban transformation)
Notable Showcases	Government buildings in Ankara (TBMM, ministries) Presidential Palace Florya Mansion People's houses	Çamlıca Mosque Presidential Complex Presidential/Millet library Courthouses Millet Gardens

In its early years, the AKP refrained from highlighting national and traditional architectural elements. However, over time, influences from Islamic and Ottoman architecture gradually resurfaced in both political discourse and the built environment. This transformation, particularly evident in the 2000s, marked a shift in architectural and ideological expression. Initially oriented toward global trends, the AKP later adopted a distinctive architectural identity inspired by the Ottoman and Seljuk

eras. This evolution reflected broader political, administrative, and socio-cultural changes, utilizing historical references to reshape the nation's image. In the following sections, these two periods are examined in greater detail within the framework of architecture and ideology. Specific examples are provided and analyzed to illustrate their characteristics. Additionally, a comparative analysis is conducted through a thematic table, highlighting both the differences and similarities between the two periods (Table 1).

2.1. Republican period: New "modern" ideology and its' architectural reflections

"Old versus new" was the main theme in the early republican era of Türkiye in terms of the political ideology and its reflection on the architectural practice. So, the early Republican era witnessed a significant shift in architectural paradigms. The new republic sought to distance itself from the Ottoman past and embrace modernism as a symbol of progress and Westernization. With the modernization movements that began in the early Republican period, a new ideology emerged. The ideology of the period that emerged with the revolutions and changes made during this time is referred to in the literature as Kemalist ideology [14]. Every ideology is manufactured through various practices such as education, art, and architecture [15, 16]. This is also seen in the early Republican period. During this period, the country experienced a modernization movement in the fields of education, social affairs, law, and politics, and with the transition from empire to republic, quite fundamental changes occurred. Kemalist ideology chooses women and modern architecture as its means of representation. The city chosen for the implementation of modern architecture was the new capital, Ankara. Ankara was a deliberate choice both because it was architecturally untouched and because it had few imperial references [17]. To sum up, the Kemalist project signifies a broad transformation undertaken by Atatürk and his followers in the early 20th century designed to create modern Türkiye by focusing on secularism, nationalism and a western oriented societal structure.

During the years when Europe was gripped by the pressure and fear of Hitler's regime, Türkiye, under Atatürk's directive, opened its doors to approximately 800 European artists and scientists fleeing the persecution of Nazism. One of these valuable figures was Clemens Holzmeister, the Austrian architect, educator, and painter. After Ankara became the capital, the need arose for a government center where administrative buildings carrying out governance functions would be located together. The task of designing this center was entrusted to Holzmeister [18]. Additionally, in the late 1920s and early 1930s, many foreign architects were invited to Türkiye to design governmental buildings in Ankara and other parts of the country, as well as to take on leading roles as educators. Among the most prominent names were Bruno Taut, Ernst Egli, and Martin Wagner, followed later in the 1940s by Paul Bonatz. These architects popularized modern architecture as an International Modernist model in Türkiye, an adoption favored by the Republican regime [19]. Thus, modern architecture was introduced to Türkiye through German and Central European architects. These architects developed a framework of conservative modern architecture in Ankara, stripped of ornamental elements. This architectural style differed from the canonical aesthetics of the 1930s "International Style," which featured flat, white boxes, transparent walls, and advanced industrial materials. Modern architecture in early Republican Türkiye stood apart from its famous European counterparts due to the limited capacity of the country's construction industry and various constraints. In general, buildings were constructed using more traditional methods. This architectural language, particularly evident in public buildings, became visible in the capital through numerous structures such as ministry buildings and educational institutions [20]. These modernist public buildings, some of which are Ministry of National Defense, General Staff Headquarters, Military Officers' Club, Ministry of Interior, Central Bank of the Republic of Türkiye, Grand National Assembly of Türkiye, Ministry of Public Works and Settlement designed by Holzmeister; Faculty of Language, History, and Geography of Ankara University and Ankara Technical High School designed by Taut; **Ismet Paşa Girls' Institute,** Faculty of Political Science of Ankara University **designed by Egli** served as symbols of the new republic's aspirations for a modern and secular nation in Ankara. These foreign architects had effected and influenced Turkish architects with the modernist style which was approved by the Republican regime. Also, some of the Turkish architects had been sent to Europe by the government to have a European modernist vision. So, some of the Turkish architects were influenced by the foreign architects and some of them gained a modernist architectural vision in Europe. These Turkish architects such as Adil Denktaş, Seyfi Arkan, Şevki Balmumcu, are some of the popular names of their period in terms of their modernist architectural strategies. At this point, understanding the dominance of foreign architects during those years is an important issue. In this context, it becomes clear why Turkish architects built a limited number of public buildings such as Ankara Exhibition Hall by Balmumcu, Bank for Municipalities by Arkan which exemplify this modernist approach with their emphasis on functionality, simplicity, and a break from traditional Ottoman forms. As a result, Turkish architects focused more frequently on residential construction to sustain their presence [21]. But there were exceptional cases like the people's houses that dominated the architectural scene for a while in different cities. These buildings served as iconic, gathering zones with the aim to educate and enlighten the new, modern and "ideal" citizens [22]. Here, it should also be underlined that although Ankara emerges as a city where modern architecture is showcased through public buildings in the process of nation-building, it is also possible to find examples of modern architecture as an ideological representation of the era in the former imperial capital, Istanbul. However, these examples are mostly at the residential scale. In the following years, greater diversity is observed both in the field of architecture and in the urban context.

2.1.1. Modern architecture in the country; Showcases of the period

In order to understand the early Republican era, four examples dating back to late 1920s and 1930s are selected in terms of their importance in the architectural context. These examples represent the change in the architectural practice after the foundation of the republic that refuses the Ottoman architectural references in order to highlight the transformation and the construction of the new nation. Here, it is observed that there is a variation in terms of the modernist architectural vocabulary. In this vocabulary both conservative modernism and international style's reflections are observed.

Fig. 1. First row: (a) The Ministry of National Defense [23]; (b) Çankaya Palace [24];
Second row: (c) **Ismet Paşa Girls' Institute** [25]; (d) Florya Mansion [26]

First showcase project to be analyzed is the Ministry of National Defense which was designed by Holzmeister between 1927 and 1931 in Ankara. He stated that the conditions for the successful realization of construction were extremely difficult at the time, as building in European terms, along with construction materials, equipment, and almost all aspects of construction management, were little known in Türkiye [27]. Working under these limited conditions, he designed a series of buildings in Ankara one after another, which came to be known as the buildings of the new regime [27]. Considering that Holzmeister was responsible for designing several ministry buildings, it can be argued that his architectural approach in Ankara functioned as a showcase for the new regime [17]. Thus, he can be seen as an architect who interpreted political ideology through his monumental structures. His buildings served as monumental representations that made political ideology visible. Due to the constraints of the country, Holzmeister utilized local materials in his designs. Within the limits of available construction techniques, he sought to introduce variety into his architectural works. Notable features of his designs include T-reversed plan projections, which contribute to façade modernism, emphasizing the interplay of light and shadow, as well as modern volumetric expressions. This demonstrates that Holzmeister did not strictly adhere to the modernist aesthetic canons of the 1930s in Ankara. Instead, when analyzed as a whole, his works appear as simple, unadorned structures that integrate naturally into their contexts. In this sense, the Ministry of National Defense building stands as a reflection of his architectural approach. This approach marked an innovative architectural understanding for Türkiye at the time [28].

Another significant example to be analyzed here is the Presidential Palace (also known as Çankaya Palace or Pink Palace) (1930-1932), which was also designed by Holzmeister. Similar to his other buildings, this structure does not reflect the theme of transparency, which was a fundamental element of modern architecture. Additionally, the color white, often associated with modernist architecture, is not prominently used across the mass of the building. However, a symmetrical composition is frequently observed in the design. According to Uğur Tanyeli, Holzmeister's buildings can be described as "modern-esque" rather than purely modern [28]. The Presidential Palace, designed for Atatürk, also exhibits façade modernism, reflecting Holzmeister's characteristic architectural approach. Holzmeister stated that due to the lack of materials and technical expertise in the country, the President Atatürk requested support from Viennese craftsmen for the interior design of the Presidential Palace. As a result, it is known that Viennese artisans and craftsmen worked for months on the interior of this residence [27]. Atatürk used this building as his residence, workplace, and official reception venue until the end of his life. Here, he hosted and met with foreign heads of state, ambassadors, politicians, scientists, and literary figures, among others. This structure stands as one of the most significant monumental buildings in the history of the Republic of Türkiye and is now preserved as the Atatürk Museum Pavilion. In summary, Holzmeister's projects in Ankara, at various scales, can generally be described as functional and aligned with the principles of local architecture [29].

Third showcase to be analysed is another foreign architect's work. During the construction phase of the new capital, one of the first designers invited to the country was Ernst Egli, who designed various buildings in Ankara and contributed to the city's modernization process. Like Holzmeister, the Swiss architect Egli played a key role in introducing European modernism to Türkiye**.** He also used local materials to create contextually appropriate, functional, and simple designs. Although Egli was sensitive to regional conditions, his projects generally featured more modern compositions compared to Holzmeister's. After the resignation of Vedat Bey and Guilio Mongeri, he also served as the director of the architecture department at the *Sanayi-i Nefise Mektebi* (Academy of Fine Arts). Thus, it can be said that Egli also had a significant impact on architectural education

in Türkiye**.** By introducing his students to European modernism, he influenced a new generation of architects who, upon graduation, incorporated this architectural language into their own projects [30]. The Ismet Paşa Girls' Institute, which was a technical and vocational school [31] was designed by him and it was constructed in 1930-1934. This institute is the first institute that was designed for girls in the republican history. Egli used a volumetric expression focusing on the latest international trends of the era such as flat roofs, rounded corners, large windows, undecorated walls, and continuous balconies [17]. Here, beyond seeing the ideological representation of modern architecture within a building, we also observe the emergence of a new building typology as a reflection of Kemalist ideology's aspiration to transform the role of women in society.

Last example to be analysed is a design by a Turkish architect Seyfi Arkan. In addition to the works of foreign architects, the Republic—aligned with its uncompromising Westernization initiative—chose him as the key figure in establishing modern architectural practice. According to Afife Batur, one of the buildings that initiated the modern architectural discourse in the early Republican period is the Hariciye Mansion (Köşk) designed by Arkan. In this context, Arkan is regarded as one of the pioneering architectural figures who launched modern architecture [32]. Renowned for his numerous designs in the 1930s, particularly in residential projects of various scales, Arkan became a significant figure in the Republican era with his modernist approach. Here, as noted by Sibel Bozdoğan [17], the Presidential Florya Mansion, a representative of the new regime of Türkiye [33] and one of the paradigmatic modernist structures of the 1930s is examined. For this mansion, Atatürk organized an invitational competition in which Martin Wagner and Arkan both participated. In the competition, an entertainment area integrated with the public was demanded; in Arkan's proposal, he located the mansion entirely over the sea, leaving the coast as a public beach [33]. This iconic structure, which follows a holistic design approach, symbolizes the meeting of modernism with the masses. In both its design and interior [34], the 1935 building exhibits influences of Bauhaus and Art Deco and has been associated with transatlantic aesthetics [33]. Positioned over the sea, the mansion features open corridors reminiscent of a ship's deck, curved windows, and balconies, offering simple, geometric, and functional solutions that embody this aesthetic [35]. The fact that this structure, influenced by modernist effects, was built as the presidential mansion reveals that the architectural ideology of that period shifted compared to the previous era and now supported the international modern approach [36]. Modern architecture is, to some extent, ideological in an international context. In the history of Türkiye, however, modern architectural pursuits are interpreted by national conditions. In this regard, the buildings constructed in this period serve as strong visual representations of early Republican ideology and the Turkish modernization journey [37].

2.2. 21st Century ideology and its' architectural reflections

As mentioned above, another drastic change in terms of the relation between architecture and ideology is the change in the 21st century. While the architectural vision of the early Republican period was shaped by modernist ideals emphasizing progress and secularism, the transition to the 21st century was not immediate or linear. The late 20th century witnessed increasing globalization and neoliberal economic policies, which led to an eclectic architectural landscape. These developments laid the groundwork for the AKP era, where the revival of Ottoman and Seljuk architectural references was not merely a return to history but a reinterpretation shaped by both political ideology and contemporary urbanization trends. Understanding these intermediary influences helps contextualize how the architectural language of the AKP era differs from earlier traditions. During the AKP rule, architecture was shaped by ideological and economic transformations, with a distinct neo-Ottoman and conservative approach guiding its discourse. An aesthetic rooted in Ottoman and Seljuk references became prevalent, marked by domed mosques, arched façades, and traditional motifs adorning public buildings. In contrast to the modernist and rationalist architecture of the Republican era, the aim was to construct an identity reinforced by historical elements. As in the 1930s, architecture during this period was not merely an aesthetic choice but also a political and ideological tool of representation.

A defining feature of this era was the emphasis on large-scale urban projects and infrastructure investments. Large scale projects such as Istanbul Airport, Çamlıca Mosque, the Presidential Complex, and the Canal Istanbul Project—dubbed the "Crazy Project" [38]—, city hospitals, millet gardens, reflect the AKP's centralized governance and its effort to assert power through spatial design. Urban transformation policies, largely driven by TOKI (the Housing Development Administration of Türkiye), prioritized high-density, rapid housing production. This approach favored standardized designs with historical references over modernist and contemporary architecture. However, such policies have been criticized for erasing urban memory, reshaping public spaces, and contributing to social fragmentation. Ultimately, AKP-era architecture emerged as a blend of historical identity construction, large-scale projects, and urban transformation policies, functioning not just as an aesthetic preference but as a medium of ideological expression. In addition to these, a praise for horizontal architecture and smart cities is visible, it is possible to argue that the construction produced during this period contradicts these claims. This is because the number of skyscrapers built during this time far exceeds that of previous periods. It should also be noted that the stock of buildings constructed during this period is greater than all those built up to now. Thus, it can be pointed out that the ideological praise for construction and building, in a time when the country has turned into a giant construction site, is indeed part of this period. So, some other keywords for the last 25 years of the country's architectural dilemmas might be the obsession of "gigantism" (biggest court hall in the world, a mosque visible from all directions, etc.), mosque architecture (the replica mosques in the country accelerated) [39].

It is possible to say that in societies undergoing political transformation, the government places significance on architecture and that anti-democratic regimes emphasize architecture as an ideology-building practice [40]. A similar situation can be observed in recent years in Türkiye. As Ali Uzay Peker has stated, contemporary public architecture shows a rejection of the modern architectural language that was emphasized particularly during the early Republican period. In the 1930s, due to the country's limitations, traditional materials and techniques were notable in architectural practice; however, in the current period, where there are no such constraints, the influence of neo-Ottoman design can be observed, which can be interpreted as an ideological imitation of this era [41]. In societies undergoing political transformation, it can be said that ruling powers place great emphasis on architecture and that regimes with anti-democratic tendencies underscore architecture as an ideology-forming practice [40]. A similar situation can be observed in recent years in contemporary Türkiye. As Ali Uzay Peker also points out, today's public architecture shows a rejection of the modern architectural language that was especially emphasized during the early Republican period [41]. Whereas in the modern architectural approach of the 1930s, traditional materials, and techniques were highlighted due to the country's constraints, in today's era -where such limitations no longer exist- the neo-Ottoman influence in architecture can only be interpreted as an ideological imitation of that period.

2.2.1. New ideology - old references; Gigantic showcases of the period

In order to understand the 21st century Türkiye four examples are selected in terms of their effects for the architectural vocabulary. These examples show the changes in the architectural practice during the AKP rule that emphasizes classical architectural references such as Ottoman-Seljuk touches and monumental strategies. Here, all these examples are the showcases of the gigantism approach of the government as a popular architectural reference to highlight the power.

Fig. 2. (a) Çağlayan Courthouse [42]; (b) Kartal Courthouse [43]; (c) Presidential Complex [44]; (d) Presidential Library [45]

In the last 25 years, courthouse buildings have dominated the stock of public buildings. Since the second half of the 2000s, the construction of new courthouse buildings in Türkiye has accelerated, and between 2003 and 2020, a total of 246 courthouse buildings were constructed across the country [46]. On the other hand, district courthouses have been closed down, and judicial services have been centralized in larger courthouse buildings located in city centers. This trend has been justified as “efforts to merge courthouses that are close to each other and have a low workload with nearby courthouses.” In 2012, with the decision of the High Council of Judges and Prosecutors, 102 courthouses in Türkiye were merged with other courthouses [47]. According to a study by Ceren Bilgin and Deniz Dokgöz, which analyzed 149 courthouse buildings with publicly available images online, 114 courthouse buildings incorporated architectural elements referencing historical styles, such as monumental gates, pointed arches, wide eaves, and bay windows, while 35 courthouse buildings did not include such historical references. Another significant issue is that during this period, only two courthouse projects were designed through architectural competitions [46]. This situation reflects the state of the architectural competition culture for the design of public buildings, which was introduced during the Republican era. According to Batuhan Durmuş, when evaluating the Republican period and beyond, the practice of designing public buildings in Türkiye through architectural competitions has been regulated by competition regulations and specifications, particularly since the 1950s. For example, open national architectural competitions were organized for courthouses in Istanbul Sultanahmet (1949), Ankara Sıhhiye (1973), Antalya (1983), Bursa (1986), and Istanbul Bakırköy/Surdışı (1990). In addition to these open competitions, "invited" competitions were also held. The practice of invited competitions has been particularly prevalent under the current political administration [49]. Istanbul is one of the main centers where this trend has been observed. Therefore, this section of the study focuses on two major courthouses in the city.

The first showcase to be analyzed is Çağlayan Courthouse (Istanbul Courthouse), one of the three largest courthouses in the city (along with Bakırköy and Kartal). In 2005, the "Istanbul European Side Courthouse" project competition was won jointly by Aytüre Genç Proje and A Tasarım. The building, which has been emphasized as “Europe’s largest courthouse”, was opened in 2011 and consolidates 11 separate courthouse buildings on the European side [48]. The official website of the courthouse states that the structure represents a fusion of modern architecture and Turkish architectural elements [48]. The

second example is Kartal Courthouse (Istanbul Anatolian Courthouse). The project for this building was selected through an invited competition involving five participants, and the design by Haldun Erdoğan was chosen for construction [49]. This structure has been promoted as “the world’s largest courthouse” building. The architect describes the project as a smart building with modern lines that harmonizes with its surroundings and incorporates the latest technology. In general, these buildings, shaped with a repetitive façade system and a symmetrical layout, do not establish a specific relationship with their context and are isolated from their surroundings due to their scale. It can be argued that these two massive structures signify an authoritarian discourse and align with the political ideology of the period. In this context, it is evident that architecture has once again been used as an ideological tool through these buildings. On the other hand, as Doğan Tekeli points out, these newly constructed courthouse buildings do not reflect the architectural heritage of Turkish architecture. According to Tekeli, while the courthouses in Istanbul do not conform to a high level of architectural understanding, they are still much more contemporary compared to similar new buildings in other cities. He argues that courthouse buildings in smaller cities, especially, are of poor quality and eclectic. While these structures are expected to reflect the secular regime, they instead refer to Ottoman and Seljuk architecture, deviating from the anticipated contemporary architectural identity. Tekeli interprets this as an intervention by the ruling government in architecture [50].

Third showcase to analyzed here is perhaps the most controversial structure or group of structures built at the request of the government during this period, is the Presidential Palace, which was opened in 2014. This building has been widely criticized for being located within Atatürk Forest Farm in the Beştepe district of Ankara. This complex is also referred to by different names such as Beştepe Palace, Presidential Complex, and *Ak Saray*. Until the presidency of Recep Tayyip Erdoğan, all previous presidents resided in the Çankaya Presidential Mansion during their terms. However, at President Erdoğan's request, a *"külliye"* (Islamic complex) was constructed based on references to Ottoman city planning [51]. Consequently, the decision not to use the Çankaya Mansion, which had served as a symbolic center for the presidency since the founding of the republic, has been seen as an ideological and historical shift in the context of Republican history. Architect Şefik Birkiye’s design of this thousand-room complex was inspired by Seljuk and Ottoman architecture motifs [52]. The complex includes the presidential residence, offices, and administrative buildings, as well as public spaces such as a library and a mosque. Defending the construction of this complex, President Erdoğan has argued that the new Türkiye deserves this complex and it fulfills a national need. In this sense, the concept of a *"külliye"* can be interpreted as a symbol of a new era in the political history of the republic. Through this project, the rise of political Islam, its accession to power, and its dominance are spatially emphasized. This structure emerges as a representative space of political Islam in contemporary Türkiye [53]. In Ottoman cities, the *külliye* was a system in which structures clustered around a mosque; however, this concept had no equivalent in the Republican era [54]. Therefore, it can be said that this situation reflects the shifting ideology of the country. Fourth example is one of the most significant buildings within Beştepe complex is the Presidential Library *(Cumhurbaşkanlığı Millet Kütüphanesi)*, which has been constructed as the country’s “largest library” by Şefik Birkiye in 2020 [55]**.** Covering an area of 125,000 square meters and offering a seating capacity of 5,500, the library serves readers on a grand scale [54]**.** As with the other structures, this building also exhibits a symmetrical organization, façades influenced by Ottoman and Seljuk architecture, and a strong emphasis on grandeur and magnificence through Neoclassical architectural patterns and elements.

In this context, when evaluating the examples mentioned above and many other public buildings, it becomes evident that the ruling AKP, which has been in power for over 20 years, has used architecture as one of the practices shaping its ideological foundations [56]. The dominant stance of the current government on this issue aligns with its rhetoric, making its ideology visibly manifest. Summarizing from this perspective, it is possible to underline that Türkiye has undergone profound political and ideological shifts, deeply affecting architectural discourse and practice since the early 2000s. The rise of nationalist-conservative rhetoric, particularly after the 2010s, has positioned architecture as a means of asserting power and control. Projects mentioned above all exemplify the dominance of monumental, historically referential, and politically charged architecture. The notion of a "national" or "authentic" architecture, promoted under the "New Türkiye " discourse, has further reinforced these ideological undertones, often sidelining modernist and pluralistic approaches. Another major architectural transformation has occurred through urban renewal projects, which, while reshaping Türkiye’s urban landscape, have also raised concerns regarding social justice, displacement, and gentrification. The profit-driven nature of these projects has exacerbated economic inequalities and deepened spatial segregation. Meanwhile, oppositional voices in architecture—civil organizations, architects, and urban activists—have criticized these developments, advocating for more participatory and inclusive urban planning.

2.3. Analysis of the findings

Within the context of the analysis of the study a graphic and a table is created. In the graphic (Fig. 3.), selected cases’ are examined through visual and textual information. Visual information is collected from different photos of the cases and textual information is based on the key words that reflect the common and different characteristics of the eras and the cases. Here, the cases are compared in order to represent their own eras. The criteria is to have similar functions so that a comparative study would be more meaningful. On the other hand, Table 1 emphasizes 1930s and 21st century Türkiye in terms of ideology and architecture through several related themes. It is considered that by the help of these themes the discussion of the periods could have been more descriptive and distinctive.

In the light of these, the findings of this study highlight the significant role of architecture as an ideological tool in Türkiye across different political periods. The early Republican era adopted modernist architecture as a means of visually manifesting the state's commitment to modernization, secularism, and Westernization. The selected case studies from this period, such as the Ministry of National Defense and the İsmet Paşa Girls' Institute, illustrate how architectural aesthetics were employed to break away from Ottoman traditions and reinforce a new national identity. Functionality, simplicity, and rational design principles characterized public buildings, demonstrating an ideological alignment with international modernism while maintaining contextual adaptations.

Fig. 3. A comparison for the selected cases

In contrast, the AKP era marks a deliberate revival of historical references, particularly drawing upon Neo-Ottoman and Seljuk architectural elements. Monumental projects such as the Presidential Complex and the Çağlayan Courthouse exemplify how architecture has been utilized to consolidate political power, symbolize continuity with an imperial past, and assert a nationalist-conservative discourse. The era's emphasis on gigantism, urban transformation policies, and large-scale infrastructural investments reflects not only an aesthetic shift but also broader economic and political strategies. However, this approach has been criticized for erasing urban memory, transforming public spaces, and reinforcing socio-political divisions. Through the comparative analysis of these two periods, it becomes evident that architectural production in Türkiye is deeply intertwined with ideological imperatives. While the Republican period prioritized modernization through rationalist and functionalist design, the AKP era has redefined architectural discourse by intertwining national identity with historical revivalism. This transformation underscores the interplay between political ideology and architectural practice, setting the stage for the concluding discussion on the implications of these ideological shifts.

3. Concluding Remarks

Architecture has long been a powerful medium through which political ideologies are articulated and legitimized. In Türkiye, this relationship is particularly evident when comparing the Early Republican period with the past two decades under the AKP government. Both eras strategically employed architecture as a tool for ideological expression, yet their approaches diverged significantly in terms of symbolism, aesthetics, and spatial strategies.

The early Republic embraced modernism to establish a national identity distinct from the Ottoman past. Rational, functionalist designs symbolized modernization, secularism, and state authority. Public buildings mostly reflected these values, reinforcing a collective identity based on progress and rationality.

In contrast, the 21st-century AKP era has revived historical references, particularly Neo-Ottoman and Seljuk-inspired aesthetics. Most public projects of the period serve to consolidate political power and reinforce nationalist rhetoric. The shift from modernist simplicity to monumental forms, along with large-scale urban projects, highlights broader political and economic strategies, often prioritizing ideology over inclusivity. This transformation has moved urban planning from public-centered design to profit-driven development, sidelining modern and pluralistic architectural approaches. The emphasis on historical motifs and grand structures signals an ideological departure from the Republican vision.

Another important point about the architectural perspective of the two period might concentrate on the opportunities. Republican period aimed to achieve the new one through limited technologies and materials. The architectural vocabulary follows the new, modern and global one and rejects the old to underline the change in the country and the new ideology. But, in the last period there is not any limitation in terms of technology, materials or possibilities. Still, it can not be assumed that this period aims to achieve the new and original one. Since the AKP rule is a longtermed one, the architectural discourse had been various. At the beginning it was adapting the global context, later horizontal architecture had become a focal point and for the last phase traditional references had been highlighted which means a transition of AKP ideology. This even shows that, under the same rule for a long time there could be even ideological changes that reflect on architecture.

In the meantime, architecture does more than reflect ideology; it also shapes societal values and political narratives. Its meanings evolve with cultural, social, and historical shifts. Moving forward, fostering an inclusive and democratic architectural discourse is crucial. Architecture should serve as a platform for cultural expression, social equity, and collective well-being, rather than just political symbolism. By analyzing these ideological shifts, this study contributes to understanding architecture as both a medium of representation and an agent of political discourse. The evolving architectural landscape in Türkiye underscores the ongoing relationship between political power, cultural identity, and urban transformation.

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FROM TECHNOTOPIAS TO A FUTURISTIC SPATIAL DESIGN CONCEPT: CAPSULE LIVING IN HOSPITALITY INDUSTRY

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Abstract
This study focuses on the evolution of the capsule hotel typology which is an extension of capsule architecture's lineage. Originating as compact, mobile spatial units, capsules emerged as a both utopian and realistic response to post-war urban challenges, including spatial constraints and rising housing costs. That is to say, capsule architecture arose as an interscalar attempt to define an interior design typology within restrictive conditions of cities, which constitute macro wholes of spaces as evidenced by the use of mobile interior spaces in city planning strategies. Influenced by industrialization, wartime technologies, and the Space Race, the capsule typology was shaped by both Archigram and Metabolism – two avant-garde movements with distinct, yet overlapping facets. Archigram's capsule interpretation was entirely utopian, the capsules functioned like moving small parts of a gigantic machine, whereas Metabolists transformed capsule architecture into a multi-disciplinary design principle that brought capsule hotel concept to life through applicable projects.

Capsule hotels serve transient urban dwellers by balancing privacy with efficient space utilization. Initially developed by Metabolist architect Kisho Kurokawa, these accommodations have evolved into a marketing tool, leveraging their futuristic appeal, modular design and digital integration. In this regard, study revealed the interplay between architecture and consumer culture, demonstrating how capsule in accommodation function not only as spatial solutions, but also commodified and aestheticized experiences within interior design aspect.

Key Words: capsule hotel, mobile spaces, hotel design, technotopia, Metabolism

1. Introduction

The term capsule in architectural design refers to movable and compact spatial units utilized in various design approaches, the necessity of which emerged in the mid-20th century as solutions for functional optimization of limited spaces and mobility challenges in cities that rapidly expanded in the post-war period. In fact, they firstly appeared in some technological utopian narratives in the 60s. As spatial complexity progressively increased in parallel with evolving human perceptions of space, the devastating impact of WWII necessitated a shift towards much simpler and more compact dwellings [1-2]. This shift was largely driven with risen costs associated with housing industry and the diminishing availability of buildable land in the city [3]. On the other hand, with the disproportionate growth of cities, both economically and in terms of land area has created mobility issues within urban environments. In response to these conditions, some utopian and avant-garde architectural communities, developed the concept of capsular space as a strategic intervention in urban design, addressing problems related to spatial efficiency, adaptability, and mobility in urban fabrics constantly increasing.

It should be considered that typological evolution occurs not only within architecture, but it is influenced by many external factors such as artistic movements, popular culture, scientific and political developments and conditions, religion, sociological structures. When it comes to the capsule form, developing rapidly between 1960 and 1980, it was earlier influenced by industrialization and individualization, but gained momentum due to urban destruction in the WWII, use of wartime technologies and materials entering civilian construction, the US-Soviet Space Race, and retro-futurist trends [4]. Postmodern era and marketing strategies also fueled demand, making minimalist and capsule living increasingly prevalent.

This study aims to investigate the formation of the capsule accommodation (hotel) concept referring to capsule dwellings and the technotopias of the 60s and figure out the process of its transformation into a marketing material. The capsule hotel design concept appeals to the travelers, workers, officers who are not able to access home at late night and need hourly accommodation unlike long-stays in classical hotels. They are mainly located in places where there is a heavy emphasis on temporariness and transition areas. This sort of space fills a gap between classical hotels and hostels owing to its privacy threshold which is at the middle. In the capsule hotel concept, although units cannot move, mobility is handled with the emphasis on temporariness and the ability to adapt flexibly into changing conditions. Additionally the sense of flexibility is often supported with multi-functionality inside units.

Capsules in hotels are considered industrial design products. It is known that the capsule hotel concept is the result of the inter-scalar attitude in the Japanese Metabolist capsule architecture. So much so that, the creator of the sleeping capsules and the one who organized sleeping pods within a compact hotel was Kisho Kurokawa, who is the creator of Metabolist capsule architecture [5].

At the present time, it can be simply observed that capsule accommodation is used as a marketing strategy by its unusual spatial experience consisting of futuristic forms, compactly designed small areas and high-tech equipment. It also aligns with modern design trends such as modular architecture, sustainability, and digital integration, making them highly shareable on social media platforms. It should be considered that the consumption of space are mainly done via social media platforms nowadays. This virality serves as a key marketing driver, positioning capsule hotels as trendy, picturesque (worth-capturing) destinations that cater to eco-conscious, tech-savvy consumers. As marketing increasingly intersects with design trends, businesses that embrace user-centric, space-saving innovations can create a compelling brand identity while meeting the evolving demands of modern travelers.

2. The Capsule Concept in the 20th Century Technotopias

The process of spatial contraction and mobilization can be deemed as a return to humanity's dwelling archetype as "Primordial Hut", or its transportable form "nomadic tent" [6]. Indeed, capsules, like other archetypal forms consists solely of their causality since they have simple functional flows and minimal forms. It also signifies a compression of the habitus acquired through modern life. When the transformation of archetypes into forms is evaluated by capsules, it's observed that both analogy and metaphor are followed in the act of creation. Over the span of 20 years from 1960 to 1980, capsule architecture acquired its defining characteristics. Approaches in capsule architecture are broadly divided into two: Archigram and Metabolism. The main different point between these approaches is the source of inspiration. The Archigram capsules were analogical for their strong relations to space capsule models of the term Space Race, and the futuristic science-fictional productions, but the Metabolist capsules were the components reflected as a part of the modern and metaphorical interpretation of the Japanese tradition. Although both Archigram and Metabolism share common features, they are distinctly different in terms of feasibility of their projects and potential sociological interactions provided. They both can be regarded as a search for salvation from tragic postwar urban environments. Spatial autonomy, flexibility and movability are the common features of two approaches which emerged in almost same time periods, because many metropoles had suffered from disproportionate urbanization. Therefore, macro areas were planned with compact and mobile spatial units (capsules) and positioned in the city through megastructures, allowing for relocation [7-8].

2.1. Archigram

Archigram consisted of a group of architects in London, who need a platform to criticize London's bulky environment, yet the primary reason was the housing crisis caused by WWII. The term "capsule" was first used in 1964 by Warren Chalk while developing Plug-in City, to describe Capsule Homes, which he simultaneously designed for this city [9]. There are findings that the Archigram capsules were inspired by space travel capsules as it can be seen Fig.1. Capsule Homes, designed in 1964 as an inspiration from the Gemini-6 spacecraft, the successor to Vostok-I, the most striking example illustrating interaction between astronomy and architecture.

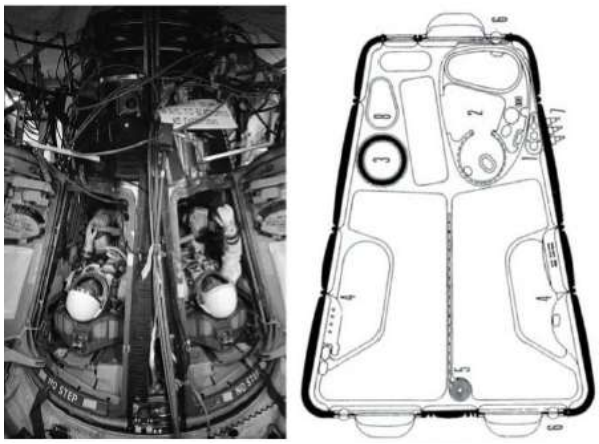

Fig. 1. (a.) Gemini-6 Space craft; (b.) Capsule Home plan (Cook, 1999; Senk, 2018)

The progressive materials proposed for the shells of these units, such as composite metals and GRP (glass-reinforced-plastic) are noteworthy, as fiberglass-enriched composite plastics are widely used in capsular spaces [10].

Designer Chalk also stated that the units in Capsule Homes were an ergonomic and refined version of space capsules. Although, he did not specify which capsular form served as a model, it is high-likely that Gemini-6 was the source of inspiration. Capsule Homes reflect the megastructure tendency observed both in Archigram, and among the Metabolists. The capsules are attached to massive structures, presenting a functional planning approach, see Fig. 2. It must have been recognized that, as autonomous units, the capsules could lead to uncontrolled chaos, prompting the implementation of measures that both restrict and enhance the flexibility of capsule living [11]

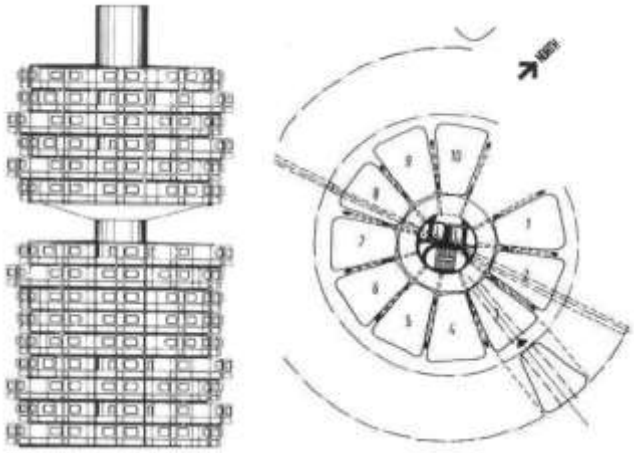

Fig. 2. (a.) The façade view of the Capsule Homes (b.) The plan of Capsule Homes (Cook, 1999; Senk, 2018)

In the example of Capsule Homes, it's evident that beyond the unit scale, there was an intention to organize these units with large structures in strategically necessary locations within the city. In these systems, capsules were designed not only for interior or dwelling use, but also to function as integral and movable components of macro-level structures. Plug in City, see Fig. 3, represents a significant example of Archigram's mega-structural capsule planning, constitute a project focused on rapidly modifying cities according to needs. The concept suggests that capsules attached to structures could be easily relocated with the necessary infrastructure [12].

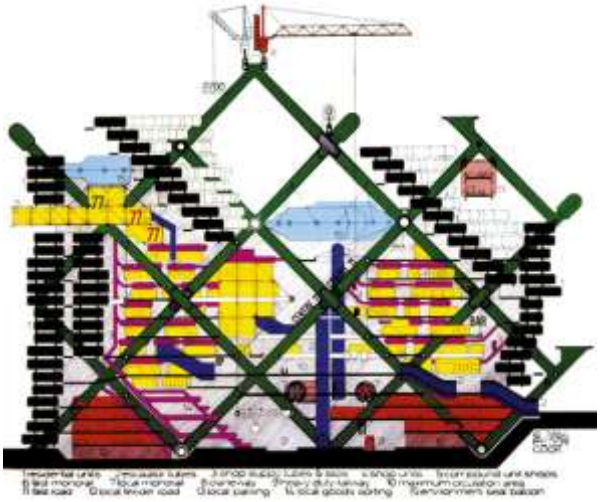

Fig. 3. Capsule units (indicated with black) as residential units attached to mega-structures in Plug-in City (Cook, 1999)

2.2. The Metabolists

The widespread destruction Japan faced during WWII necessitated rapid renewal of urban building stocks in cities such as Osaka, Tokyo, see Fig.4. Practical and utopian approaches sought to create more mobile and easily constructed cities. The Metabolists believed that, integrating modern elements as extensions of traditional structures would preserve the city's organic unity. Viewing the city as a living organism, Metabolist thought emphasized, self-renewing and adaptable urban forms. This approach contrasted sharply with European urban planning, which prioritized preserving city centers in their original state. Kenzo Tange, a key figure in Metabolism described it as a new tradition asserting that despite evolving construction techniques and materials, spatial essence of Japanese culture remained intact [13-14].

Fig. 4. An aerial photograph or Tokyo after being bombed by American forces on 10 March 1945 [31]

The semi-autonomous organization of capsule-like mobile units in cities led Metabolists rethink urban centers and functional flows. Capsule architecture first gained visibility on an urban scale through Kenzo Tange and Kiyonori Kikutake's Tower Shaped Community, see Fig.5, presented at CIAM.[1] In 1959, Tange and Kikutake introduced this concept bringing global recognition to Metabolism, though it was not yet labeled as such. Kikutake developed the project in response to Japan's postwar urban challenges, proposing an alternative living model. Structurally, it featured a reinforced concrete core with compact residential units, designed for families, even if most capsules are designed for individual use, due to gradual increase of individualization in the industry society over the world [15].

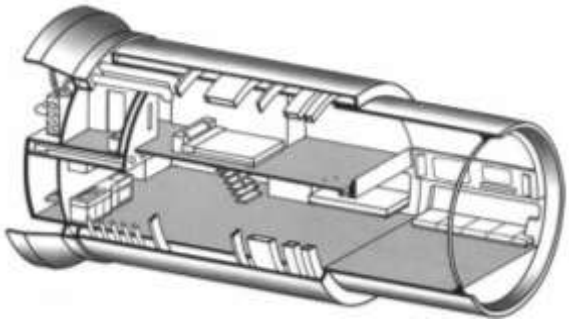

Fig.5. The section of capsule unit from The Tower Shaped Community (Senk, 2018)

Kikutake's project was a proposal for a system, not designed to be directly integrated into the urban fabric of Tokyo. Kenzo Tange advanced the process by presenting his megastructure design experiments in his 1960 *Tokyo Bay* masterplan, see Fig.6, taking the concept a step further within the Tokyo context. The principle of decentralization, aiming to transform parts of Tokyo when needed, is evident. Additionally, Tange's approaches foreshadows Archigram's Plug-in City and Walking City, where megastructures were used to facilitate the controlled placement and movement of smaller units [16].

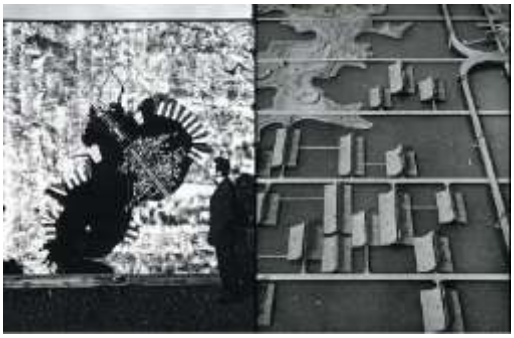

Fig.6. Tokyo Bay Masterplan and its model [32]

[1] *Congrès Internationaux d'Architecture Moderne*

The global design community became aware of the Metabolists' architectural principles through the 1960 Tokyo World Design Conference, coordinated by Tange's assistant, Takahashi Asada. During this event, a group including Kiyonori Kikutake, Fumihiko Maki, Masato Otaka, Noriaki (Kisho) Kurokawa, Noboru Kawazoe, and Kiyoshi Awazu published Metabolism 1960 – The Proposals for New Urbanism, a manifesto that not only defined their approach but also named the movement. Despite working on projects of varying scales, all members shared a common architectural vision centered on mobility, growth, and transformation. Mobility emphasized transportable and prefabricated structures, while growth and change necessitated adaptable, self-contained units responding to user needs. Kurokawa later formalized this concept as the capsule in The Metabolism in Architecture, marking its first explicit use [17].The origins of the capsule concept remain uncertain, though some scholars suggest it emerged from a 1957 project led by Tange's student team, designing living quarters for researchers at a Japanese Antarctic base. The Takenaka Shelter (see Fig.7), developed within this design laboratory, and incorporated three fundamental qualities: spatial limitation, multi-functionality, and insulation from external conditions. Kurokawa's later involvement in capsule-based architecture strengthens this connection. However, some argue that capsule-like structures have precedents in Japanese culture, such as the kago (see Fig.7), a compact, mobile palanquin used by samurai during travel. Kurokawa, however, linked the origins of metabolist capsules to chashitsu (traditional tea houses). His Capsule House K (1973), featuring a circular window and built-in interior furnishings, closely reflected the defining characteristics of metabolist capsule architecture [18-19].

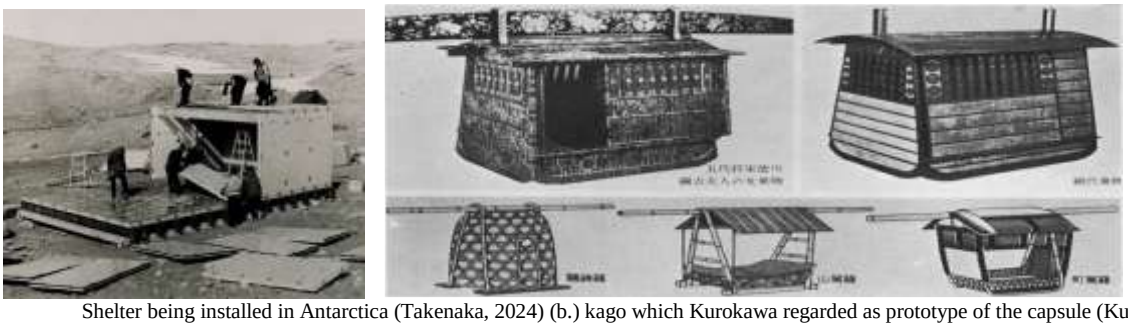

Fig.7. (a.) Takenaka Shelter being installed in Antarctica (Takenaka, 2024) (b.) kago which Kurokawa regarded as prototype of the capsule (Kurokawa, 1977)

When shifting from urban design scale to architectural design scale, it's seen that capsule architecture has also been practiced on building basis as well as urban scale. Kurokawa, as known as the capsule architect, designed Nakagin Capsule Tower which is the beginning of the Metabolism and capsule's leap from scale to scale. At Expo'70 in Osaka, he found an environment where he could experimentally develop his style through two attempts. The research and development work he began with the temporary structures at Expo'70 in Osaka was solidified with the Nakagin Capsule Tower, achieving permanence. The function of the structure is not residential; it was designed as a hotel for short and medium time stays. As Tokyo continued to expand, most suburban area where a significant portion of the urban population settled permanently. The Nakagin Capsule Tower became an affordable accommodation option in the city centre for people working overtime, those who left the office late for various reasons, artists, travelers, and some low-income individuals [20]. Some families also used the capsules to create satellite spaces for their homes when they found the area insufficient. The Nakagin Capsule Tower consists of 13 floors and 144 capsules. The first three floors are created from reinforced concrete slabs, while remaining 10 floors are composed of capsule living units. When viewed from the façade perspective, a regular grid plane in which units are vertically arranged can be observed. In this way, megastructures proposed by Metabolism in urban planning were adapted to the building basis by Nakagin Capsule Tower, see Fig. 8[21].

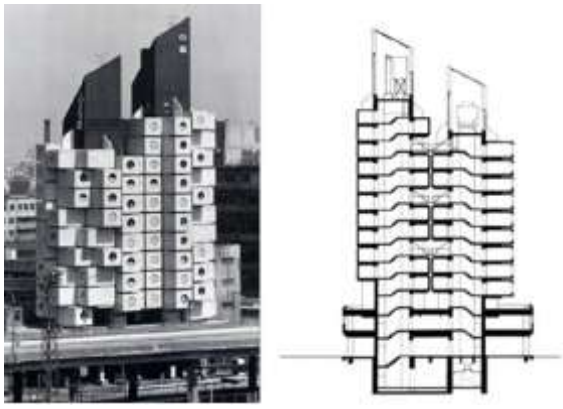

Fig.8. (a.) The façade perspective of Nakagin Capsule Tower designed by Kurokawa (Kurokawa, 1977) (b.) The section of Nakagin Capsule Tower designed by Kurokawa (Kurokawa, 1977)

The construction of Nakagin Capsule Tower completed within 30 days. The capsules were mounted onto a reinforced concrete core using high-tension bolts. Thanks to the independent structure of beams from the whole building, the capsules can be easily relocated and dismantled with no harm to other capsule attached to the structure. The capsule units could be transformed into room for any preferred function, and could be connected to each other through doors. The ability to attach and remove capsules from the tower allowed for continuous modifications to the floor plans, see Fig.9 [22].

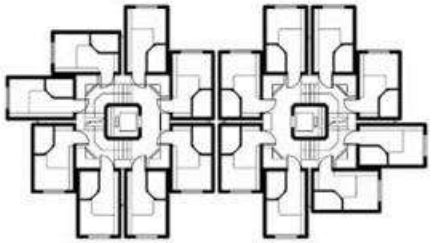

Fig.9. A floor plan from capsules' area in Nakagin Capsule Tower designed by Kurokawa (Kurokawa, 1977)

Individuality is considered one of the most important concepts associated with capsule forms. However this structure emphasize that individuality in capsule spaces does not mean isolation from society. Until the Nakagin Capsule Tower, Kurokawa had organized functional units within a structural framework by connecting them according to the flow of functions. However, in the Nakagin Capsule Tower, each 10m^2 of unit were designed to be multi-functional, see Fig10. Since many functions were layered into the built-in design, functional areas were skillfully concealed behind embedded surfaces at first glance [23]. These articulated features are evaluated as design flexibility, as the ability to adaptation into new conditions and needs by many design theorists [24].

Fig.9. Views from inside of Nakagin Capsules [33]

3. Capsule Living Concept in Hospitality Industry

The hospitality industry, in parallel with the rise of the post-fordist production model, aimed to operate hotels with unique and unexploited design themes. The constant searches for unique experiences form the biggest part of marketing strategies in tourism [25].

After the 1940s, as metropolises such as Osaka, Tokyo and Kyoto expanded outward, residing and lodging in city centers became increasingly costly. The rising cost of living in urban areas, driven by Japan's economic growth, played a significant role in this trend. As urban living expenses escalated, a substantial portion of the population relocated to the urban periphery, and it took time for intra-city transportation to adapt to this rapid expansion. In this context, both the previously mentioned Nakagin Capsule Tower and capsule hotels within city centers emerged as affordable, functional, and compact accommodation units designed to address the commuting challenges faced by the working population [26]. Therefore, it is not implied that the conceptuality of capsule hotels has emerged totally under the post-modern attitudes. By its requirements, it can be examined at the intersection of classical hotels and hostels. The most distinctive feature of capsule hotels from hostels is individual resting areas.

Kurokawa's design approach in Capsule Inn was not merely a conventional subdivision of an existing building into a hotel, but rather a transformation of the building's function through the integration of modular functional units (capsules), see Figure 10.

Fig.10. (a.) The early type of sleeping capsules (pods) used in the capsule hotel called Capsule Inn Osaka (b.) The renewed protoype of sleeping capsules in Capsule Inn Osaka [34-35]

The hotel was specifically designed to offer mobile lodging services for office workers in Japan. Although Nakagin Capsule Tower was a pioneering work in capsule architecture, it did not function entirely as a classical hotel. It was used both for temporary and permanent stays. In 1979, Kurokawa designed the first capsule hotel, Capsule Inn, established in Osaka. Upon its inauguration, it comprised 410 capsules and six small rooms. Since the primary purpose of the capsules was to provide sleeping space, their internal dimensions were 950mm (H) x 950mm (W) x 1910mm (D). [27].

First sleeping capsules (as can be seen in Fig. 10) were for a single person, however, at the present time, it's possible to see double-bed capsules for two persons, see Fig. 11. It's very likely that more customization and personalization in an object of experience means higher demand for that service. In the case of capsule hotels, while offering affordable accommodation for workers, nomads, solo travelers, et a.l., the evolution into a product equipped with double beds and technological amenities indicate that the demand for this theme is rising among a growing group.

Fig.11. (a.) The capsule units placed side by side in City Hub Rotterdam (b.) The interior volume of the hubs [36]

Capsule hotels not only provide people with encapsulated personal sleeping areas, but also fit other aspects of daily life (such as dressing, shower, toilet, shower, etc.) into areas in public or semi-public use. Accommodating people in a limited space simultaneously requires to redefine the boundaries between privacy and publicity; see Fig. 12. The abundance of places with varying degrees of privacy closely aligns with Metabolism's spatial perception based on dualities. One of the greatest claims of Metabolists' is that cities and spaces always exist through contrasts. Thus, a built environment can sustain itself as a living organism through the integration of these contrasts such as modern and traditional, affluent and poor, and so on [28]. The concept of antagonistic coexistence, which Kurokawa defined as duality, is realized in capsule hotels by merging private and public volumes [29]. In the case of sleeping capsule, it is possible to construct a dialectical relationship between being in an individual volume, and being surrounded by numerous capsules within a common space.

Fig.12. (a.) The locker room (changing room) in 9h Capsule Hotel in Tokyo (b.) A view from the restroom in 9h Capsule Hotel in Tokyo [37]

Today, capsule hotels also serve as experiential spaces for tourists. As a result, they diversified into various affordable lodging options, particularly in city centers and transit locations such as airports and terminals where the concept of temporariness and transience are strongly emphasized. Accommodation facilities are crucial parts of tourism. They are also consumed like touristic places in parallel to John Urry's statements [28]; as contemporary tourism needs desire objects to attract guest to place. In this way the capital can be kept within locations. It can be clearly seen that futuristic aesthetics, minimalism and high-tech equipment feed the desirability and spatial consumption of capsule hotels.

4. Conclusion

The emergence of capsule architecture reveals its deep roots in both technological advancements, socio-economic conditions of the post-war period, popular culture, and scientific (astronomic) developments, reflecting a shift toward spatial efficiency and adaptability in rapidly expanding urban environments. Apart from the Western approach, Japanese architect tend to find the essence of capsule architecture within their national heritage and philosophical tradition. Emerging from the ideals of technotopias and avant-garde movements of the 1960s, capsule designs were driven by the need to address the growing mobility challenges and housing shortage in cities.

The capsule hotel, in particular, illustrates the transformation of architectural concepts from futuristic visions to a marketing –driven phenomenon, capitalizing trends such as modularity, flexibility, and digital integration. In the context of contemporary marketing, capsule hotels have evolved from a novel architectural experiment to a mainstream offering that caters to modern consumers seeking both privacy and flexibility. As the design world continues to shift towards more compact, adaptable and sustainable solutions, capsule hotels stand as a testament to the ongoing dialogue between architecture, technology and marketing strategies.

In conclusion, the capsule concept implies a hybrid space that includes opposite parts like separated as public and private. It's filling a blank between classical hotels and hostels. Even if it's made an attraction object in certain places, it constitutes a unique plan scheme and functional flow. This finding is adequate to define capsule hotel as mobile, or distinct typological assets.

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A COMPARATIVE STUDY ON SPATIAL QUALITIES IN POST-DISASTER TEMPORARY SETTLEMENTS IN YALOVA AND MALATYA CITIES

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Abstract
Post-disaster urban recoveries cause more serious problems than disasters can do, although disasters affect not only physical environments, but also human life and their future. Especially, unsuccessful urban recovery policies affect the psychology of survivors, their socio-cultural lives, their memories, their daily life activities, and habits. The necessity of interconnection between past, present, and future plays a significant role on post-disaster urban recovery and planning. Therefore, in this study, we will try to find answers to the questions: How successful have we been in post-disaster urban recoveries as an earthquake country over the last 25 years? Have we learned from the mistakes made regarding post-disaster house settlements?
Within the aim of this paper, we consider re-evaluating the two case studies, which were examined and evaluated by a method of observation-based study and face-to-face interviews with the survivors who lived or live in temporary housing settlements in the cities of Yalova and Malatya after the earthquakes that occurred between August 17, 1999 and February 6, 2023.
In this context, we determined the differences in additions and modifications by comparing the privacy requirements, territoriality and defensible space, behaviors and different cultural appearances of behavioral patterns required by daily life at temporary post-disaster settlements at Yalova and Malatya.
Thus, with the help of these outcomes, we try to point out the importance of making a disaster management and post-disaster recovery policy in which structuring all processes together, performing the post occupancy evaluation and using experiences as feedback information.

Key Words: *post-disaster, temporary, housing, planning, management*

1. Introduction

Post-disaster urban recoveries cause more serious problems than disasters can do, in spite of the fact that disasters affect not only physical environments, but also human life and their future. Especially, unsuccessful urban recovery policies affect the psychology of survivors, their socio-cultural lives, their memories, their daily life activities, and habits. Without incorporating with local administrations, even increasingly, governmental urban planning and recovery policies cause noticeable reactions from survivors. Such as to leave or not to use the post-disaster houses, to make deformations on or additions to them or to reconstruct their new buildings. The necessity of interconnection between past, present, and future plays a significant role on post-disaster urban recovery and planning. Therefore, in this study, we will try to find answers to the questions: How successful have we been in post-disaster urban recoveries as an earthquake country over the last 25 years? Have we learned from the mistakes made regarding post-disaster house settlements?

Within the aim of this paper, we consider re-evaluating the case studies carried out at different times in temporary housing settlements in the cities of Yalova and Malatya after the earthquakes, affected more than one city at the same time, that occurred between August 17, 1999, and February 6, 2023, in our country.

In this context, in two case studies conducted in Yalova and Malatya cities at different times, the effects of the privacy requirements, the behaviors of the territoriality and the defensible space, the reactive behaviors related to environmental stress and the behavioral patterns required by daily life according to cultural differences on the temporary housing settlement will be compared during the period they live.

With the help of this comparative study, we will reveal what kind of changes on the problems related to temporary post-disaster housing and settlements in the 25-year period? and what experiences contribute to the post-disaster sheltering process?

Thus, with the help of these outcomes, we try to point out the importance of making a disaster management and post-disaster recovery policy in which structuring all processes together, performing the post occupancy evaluation and using experiences as feedback information.

1.1. Overview on temporary post-disaster settlements at Yalova and Malatya

Yalova is a high densely populated industrial city, located in northwestern of Turkey. 7,6 Richter scale earthquake affected the city of Yalova and many other cities in the Marmara region on 17th of August 1999. The government and non-governmental organizations built the temporary post-disaster housing settlements at the fields with apple trees and agricultural lands on the outer skirts of Yalova city. These post-disaster housing settlement at Yalova, was a temporary settlement where both rural and city survivors lived together.

Due to need for numerous permanent post-disaster house constructions, survivors had to live more than two years in their temporary post-disaster house. Unfortunately, these one-storied prefabricated temporary houses, suitable for a year or less,

consisted of a living space and a bathroom. Because of this reason, survivors made various additions and modifications on their temporary housing units.

Within the scope of this study, we discuss the temporary housing settlement, which was built 24 years ago after August 17, 1999, earthquake, due to the uniqueness of the problems, experiences, and solutions by survivors.

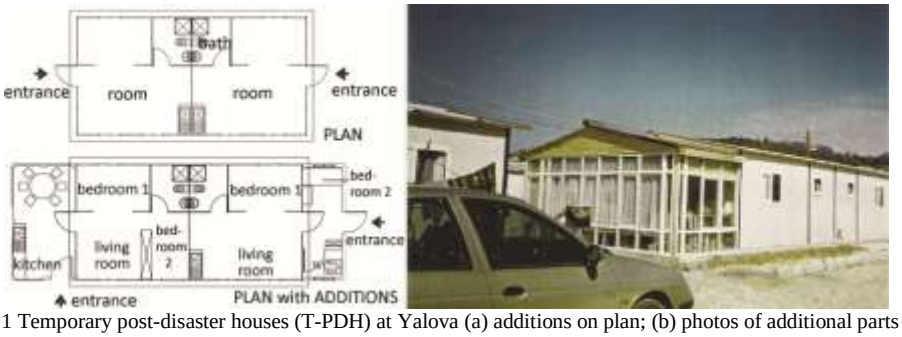

Fig. 1 Temporary post-disaster houses (T-PDH) at Yalova (a) additions on plan; (b) photos of additional parts

Malatya is an agricultural city in the Eastern Anatolia region of Turkey. The twin earthquakes with magnitudes of 7.7 and 7.6 that occurred on February 6, 2023, affected 11 cities including Malatya. Immediately after the earthquakes, government built temporary housing settlements in many parts of the city. They organized temporary housing settlements in different districts of Malatya city, considering the demographic structure differences. However, even after two years, most of the tenants and homeowners whose homes were damaged or destroyed by the earthquake are still living in their temporary housing.

Thus, within the scope of this paper we selected the case study, conducted in Teknokent Container City, where city survivors live in Battalgazi district of Malatya, and Elemendik Container City, where rural survivors live in Yeşilyurt district.

Fig. 2 (a)Teknokent T-PDH ; (b) Elemendik T-PDH; (c) Plan of T-PDH at Malatya

Fig. 3 Plan of T-PDH at Malatya

2. A Comparative Study on Two Case Studies

This comparative study on spatial qualities is composed of two different case studies, which were examined and evaluated by a method of observation-based study and face-to-face interviews with the survivors who lived or live in temporary post-disaster houses in Yalova and Malatya (Battalgazi and Yeşilyurt districts) cities.

Within the scope of both studies, we visited Yalova temporary housing settlement [1], Teknokent Container City in Battalgazi district of Malatya and Elemendik Container City settlement areas in Yeşilyurt [2] district separately, observed with a subjective approach and photographed the exterior and/or interior spaces of each temporary housing units.

We asked about the reasons, to determine differences, additions and modifications between the original house unit and the current situation. In addition, in both case studies, we tried to determine if there were different approaches depending on the rural or city living habits of survivors.

In this context, we determined the differences in additions and modifications by comparing the privacy requirements, territoriality and defensible space, behaviors and different cultural appearances of behavioral patterns required by daily life at temporary post-disaster settlements in Yalova and Malatya.

2.1. Additions and Modifications Due to Privacy Requirements

There is no defined boundary between the street and the housing units in Yalova temporary housing settlement. To ensure privacy, they usually covered the windows facing the street with curtains and they drew the boundaries between house units and streets by using bricks or fences, planting flowers. Entrances were from the side of housing units. For this reason, additions and arrangements for privacy were generally located on the narrow side facades of the housing units.

In these additions, the preferences of the disaster victims regarding olfactory, auditory, visual or cultural privacy also affected the material choices. While olfactory and visual privacy were at the forefront for city survivors, the distinction between guest/stranger and family spaces came to the fore for rural survivors depending on the cultural view of privacy.

Fig. 4 (a) Yalova T-PDH ; (b) Elemendik T-PDH at Malatya

Survivors have been living at the temporary housing units, built in Teknokent Container City in Battalgazi district and Elemendik Container City in Yeşilyurt district, since March,2023. Entrance of each unit is on the wide façade opening to the street.

For this reason, we determined that they made various additions to the entrance areas to ensure the privacy of the family during daily activities against strangers or guests. These additions may show differences in terms of spatial use, structural and material preferences, depending on whether survivors come from a rural area or an urban center.

Survivors, from Malatya city center, live in Teknokent Container City in Battalgazi district. City survivors reflect less privacy solutions or need less privacy than rural survivors. The tulle curtains stretched in front of the entrance doors of the residence allow the ventilation of inside, while preventing the interior from street level watch. We did not observe any spatial arrangements or additions for privacy instead of curtains on the windows.

Table 1. Problems and solution due to privacy requirements

BEHAVIOR	ELEMENTS	TEMPORARY HOUSE SETTLEMENT	PLACE OF ADDITIONS AND MODIFICATIONS	PROBLEM	SOLUTION
NEED PRIVACY	boundary	Yalova PDTH Settlement (Rural an	no defined boundary between the street and the housing units	needed to ensure privacy	drew the boundaries between house units and streets by using bricks or fences, planting flowers
		Malatya Teknokent Container City	boundaries between units and street are defined	Needed to be more visible	Stretching sunshades between houses, placing cargo pallets
		Malatya Elemendik Container City	boundaries between units and street are defined	Needed to be more visible	arranged additional spaces
	Entrance	Yalova PDTH Settlement (Rural an	on the left or right side of housing units	needed additions and arrangements to ensure the privacy at house unit entrances	additions and arrangements for privacy were generally located on the narrow side facades of the housing units.
		Malatya Teknokent Container City	on the wide façade opening to the	needed to ensure only indoor privacy	The tulle curtains stretched in front of the entrance doors is enough to prevent the interior from street level watch. This arrangement also allows the ventilation of inside.
		Malatya Elemendik Container City	on the wide façade opening to the	needed to ensure the privacy of the family during daily outdoor and indoor activities against strangers or guests	made additions to the entrances to solve spatial requirements such as preparing food (to prevent inside of the house smelling), eating, resting, hosting guests, drying laundry or storing.
	Windows	Yalova PDTH Settlement (Rural an	on the wide façade opening to the	needed to ensure privacy	covered the windows facing the street with curtains
		Malatya Teknokent Container City	on the wide façade opening to the	needed to prevent the interior from street level watch	used curtains on the windows.
		Malatya Elemendik Container City	on the wide façade opening to the	needed to prevent the interior from street level watch	Used curtains on the windows. But also use tent-like covering materials
	sensational and cultural arrangements	Yalova PDTH Settlement (Rural an	Arranged at left or right side of house entrance	olfactory and visual privacy were important for city survivors, the distinction space between guest/stranger and family spaces for rural survivors	City survivors built kitchen, dinning room but rural Survivors built reception room, storage as an additional spaces.
		Malatya Teknokent Container City	Arranged furnitures at front (entrance) facade of house	No specific privacy needs	For resting and hosting guests use outdoor. For daily house activities use indoor.
		Malatya Elemendik Container City	Arranged additional spaces at front (entrance) facade of house	Needed to define private, semi public and public spaces clearly	arranged additional spaces for preparing food (to prevent inside of the house smelling), eating, resting, hosting guests, drying laundry or storing.

Rural survivors, who live at Elemendik temporary post-disaster settlement, made additions to the entrance of their temporary housing units according to three different cases: open, semi-open and closed. Rural survivors have arranged additional room(s) to solve spatial requirements such as preparing food (to prevent inside of the house smelling), eating, resting, hosting guests, drying laundry or storing.

Rural survivors can make additions according to their financial income. We observed that the survivors who have better economic conditions, arranged additional spaces which defined the private and public boundaries clearly. Moreover, they use proper structures and covering materials for different uses, privacy needs or weather conditions. However, we can say that low-income survivors tend to prefer simple, tent-like solutions.

2.2. Additions and Modifications based on Territoriality

According to Altman (1975), territoriality behavior is a boundary regulation mechanism that involves the marking or personalization of a place or object, where communication is claimed by an individual or group [3]. In post-disaster housing settlements consisting of similar housing units, survivors apply various methods to differentiate their housing unit from others, to personalize it and to indicate that it belongs to them. Within this behavioral theory, spatial arrangements were determined in the context of territoriality behavior in both case studies.

In general, we observed that the arrangements around the housing units related to the territoriality are outdoor use preferences in cities and rural settlements. While people who live in cities, arrange their outdoor spaces as landscape and recreation areas, people in rural areas arrange their outdoor spaces for daily work and winter preparations.

We identified a similar outdoor arrangement in the Yalova temporary housing settlement. Rural survivors arranged the given space around their housing unit to hang out their laundry or leave it void. But city survivors laid out the space as gardens. Moreover, added flowerpots, fences, brick barriers, paths, etc. to define the boundaries between street and their houses.

Fig. 5 (a) Yalova T-PDH ; (b) Elemendik T-PDH at Malatya; (c) Teknokent T-PDH at Malatya

Table 2. Problems and solutions based on territoriality

BEHAVIOR	ELEMENTS	TEMPORARY HOUSE SETTLEMENT	PLACE OF ADDITIONS AND MODIFICATIONS	PROBLEM	SOLUTION
TERRITORIALITY	Identity/ personalizing	Yalova POTH Settlement (Rural and	on the left or right side of housing units	consisting of similar housing units, no identity	City survivors arranged their outdoor spaces as landscape and recreation areas, rural survivors arranged their outdoor spaces for daily work and winter preparations
		Malatya Teknokent Container City	on the wide (entrance) façade opening to the street.	consisting of similar housing units, no identity	survivors indicating their territoriality behavior by placing their belongings such as sofas, tables, chairs, refrigerators, storage cabinets, and flowerpots
		Malatya Elemendik Container City	on the wide (entrance) façade opening to the street.	consisting of similar housing units, no identity	placing their belongings such as sofas, tables, chairs, refrigerators, storage cabinets, and flowerpots
	Outdoor Arrangements	Yalova POTH Settlement (Rural and	on the left or right side and wide facade	needed territoriality against strangers	using bricks or fences, planting flowers, building balconies or patios
		Malatya Teknokent Container City	on the wide (entrance) façade opening to the street.	needed territoriality against strangers	Stretching sunshades between houses, placing cargo pallets to use as stairs of entrance
		Malatya Elemendik Container City	on the wide (entrance) façade opening to the street.	needed territoriality against strangers	arranged additional spaces (multifunctional room)
	Defining boundries	Yalova POTH Settlement (Rural and	at all side of a house unit	no defined boundary	using bricks or fences, planting flowers, doghouse
		Malatya Teknokent Container City	on the wide (entrance) façade opening to the street.	needed to define the boundaries between private and general outdoor spaces.	placing their belongings, flowerpots, sunshades,
		Malatya Elemendik Container City	on the wide (entrance) façade opening to the street.	needed to separate the boundaries between private and general outdoor spaces.	arranged additional spaces (multifunctional room, storage)

When we examined the Malatya temporary housing settlements, we observed that survivors indicating their territoriality behavior by placing their belongings such as sofas, tables, chairs, refrigerators, storage cabinets, and flowerpots on the front and entrance facade of their temporary housing units.

Stretching sunshades between houses, placing cargo pallets to use as stairs of entrance doors indicates the boundaries for territoriality against strangers and emphasize that they cannot enter without permission.

However, in both Teknokent Container City in Battalgazi district and Elemendik Container City in Yeşilyurt district, the concrete dam application between the road level passing in front of the housing units and the level inside the housing separates the boundaries between private and general outdoor spaces. This application helps survivors to define their personal spaces against others.

There is another application to ensure the security of storage spaces between two temporary housing units. This application indicates to other survivors that this space is used. Moreover, it helps to personalize the housing unit, and to distinguish it from other similar ones.

2.3. Additions and Modifications According to the Cultural Aspects on Behavioral Patterns

Behavioral patterns play a significant role in the formation of the physical environment as a result of human action patterns that repeat in spaces. When we compare different cultures or subcultures, we can say that these repetitive human actions (behavioral patterns) help us to define these differences. Based on this idea, we tried to examine the spatial arrangements according to the behavioral patterns of survivors whether they were from rural settlement or city.

City survivors who lived at Yalova temporary post disaster settlement, made additions to arrange indoor spaces of housing units for their daily activities. They utilized second hand structural elements and materials forming additional spaces such as kitchen, dining room or another extra room. They constructed these additions to prevent cooking smalls not to enter inside of the house or to customize day and night spaces of the housing units.

But rural survivors have added semi-closed or closed spaces (reception rooms) where they welcomed their guests or strangers. Arrangement was just about dividing the housing unit into two parts for welcoming and family daily use. There is no specific distinction inside of the original housing unit. They fixed portable hangers or rope hangers for drying laundry, drying vegetables and fruits, cooking, making tomato paste, preparing soap salt for winter.

We observed that city survivors, who live at Malatya, arranged the front door and the outdoor spaces for resting, dinning, spending time individually or collectively. However, they conducted daily activities and other preparation inside their house.

Fig. 6 (a) Elemendik T-PDH at Malatya; (b) Elemendik T-PDH at Malatya

However, we observed that rural women survivors, individually or collectively, performed daily household chores or long-term activities such as winter preparation outside of temporary housing units. Rural survivors arranged their front outdoor spaces for drying laundry, drying vegetables and fruits, cooking, making tomato paste, preparing soap salt, and washing carpets. They organized the spaces by using mobile furniture such as tables, chairs, or floor coverings. They fixed portable hangers or rope hangers mounted with screws or welding on the facades.

Within this data, we can say that urban or rural disaster victims continue their usual pre-disaster behavior patterns, and therefore they need flexible spatial arrangements inside and outside their homes, whether individual or collective.

Table 3. Problems and solutions according to the cultural aspects on behavioral patterns

BEHAVIOR	ELEMENTS	TEMPORARY HOUSE SETTLEMENT	PLACE OF ADDITIONS AND MODIFICATIONS	PROBLEM	SOLUTION
CULTURAL ASPECTS ON BEHAVIOR PATTERNS	Spatial Arrangements	Yalova PDTH Settlement (Rural and	outdoor and indoor spaces of housing units	lack of indoor and outdoor spaces for daily activities	City survivors made additional spaces such as kitchen, dining room or another extra room to arrange indoor spaces for their daily activities. Rural survivors made additions to divide the housing unit into two parts for welcoming and family daily use
		Malatya Teknokent Container City	outdoor spaces of housing units	Lack of outdoor spaces for resting, dinning, spending time individually or collectively.	They arranged the front door and the outdoor spaces for resting, dinning, spending time individually or collectively. But they conducted daily activities and other preparation inside their house.
		Malatya Elemendik Container City	outdoor spaces of housing units	Lack of outdoor spaces for daily household chores or long-term activities	arranged the outdoor spaces to be used individually or collectively. By using mobile furnitures for drying laundry, drying vegetables and fruits, cooking, making tomato paste, preparing soap salt, and washing carpets
	Daily household Chores	Yalova PDTH Settlement (Rural and	outdoor and indoor spaces of housing units	lack of indoor and outdoor spaces for daily activities	Made additional spaces to organize indoor daily life. Built a garden, patio or balcony for resting, dinning, spending time individually or collectively.
		Malatya Teknokent Container City	indoor spaces of housing units	No problem, indoor spaces enough for daily house chores	There is no need to arrange inside of units. But used shading or flooring element to define the outdoor spaces from public spaces.
		Malatya Elemendik Container City	outdoor spaces of housing units	Lack of outdoor spaces for daily household chores or long-term activities	They arranged the outdoor spaces by using mobile furniture such as tables, chairs, or floor coverings. They fixed portable hangers or rope hangers mounted with screws or welding on the facades.
	Long Term Activities	Yalova PDTH Settlement (Rural and	at all side of a house unit	lack of outdoor spaces for winter preparation	They fixed portable hangers or rope hangers for drying vegetables and fruits, cooking, making tomato paste, preparing soap salt for winter.
		Malatya Teknokent Container City	on the wide (entrance) façade opening to the street.	There is no observation about long term activities	No arrangement for long term activities
		Malatya Elemendik Container City	on the wide (entrance) façade opening to the street.	lack of outdoor spaces for winter preparation, individually or collectively.	They use mobile furnitures for drying vegetables and fruits, cooking, making tomato paste, preparing soap salt.

2.4. Additions and Modifications According to Defensible Space

Defensive behavior is a natural response of individuals or groups against to physical and social factors. According to Landfield (1954), when individuals' sense of security and self-image are diminished by other people and external sources, defensive behavior increases [4].

Therefore, when individuals' sense of security and personal image decrease, the defensible spatial arrangements may appear as a relaxing mechanism. Within this theory, when we examine the temporary settlement areas within the scope of both two case studies, we can see different spatial arrangements.

In Yalova temporary housing settlement, the fact that the boundary of personal defensible space is unclear, it became a problem for everyone to solve. While city survivors tried to solve this problem with fences or material differences on the ground, rural survivors tried to make these boundaries clear with doghouses, flowerpots, or sheds.

Fig. 7 (a) Dog house, Yalova T-PDH ; (b) Additions, Elemendik T-PDH at Malatya; (c) Doors at Teknokent T-PDH at Malatya

When we examined both settlements at Malatya, we saw that the boundaries between the street and the housing unit are more distinct. This differentiation has reduced the need for a clear solution.

The rural survivors built additional closed, semi-closed spaces in front of the entrance and arranged front outdoor spaces to feel themselves in secure. They also tried to separate the indoor family spaces from public areas by constructing balconies, terraces or level differences.

However, city survivors did not make any arrangement. They left the entrance doors open during day for ventilation. According to the defensible space theory, people cannot provide their securities only by closing or locking doors. City survivors provided all neighbors' security against strangers by watching streets and controlling their outdoor spaces.

Table 4. Problems and solutions according to defensible space

BEHAVIOR	ELEMENTS	TEMPORARY HOUSE SETTLEMENT	PLACE OF ADDITIONS AND MODIFICATIONS	PROBLEM	SOLUTION
DEFENSIBLE SPACE	Security	Yalova PDTH Settlement (Rural are	outdoor spaces of housing units	boundary of personal defensible space was unclear	city survivors tried to solve this problem with fences or material differences on the ground, rural survivors tried to make these boundaries clear with doghouses, flowerpots, or sheds.
		Malatya Teknokent Container City	outdoor spaces of housing units	the boundaries between the street and the housing unit are more distinct. This differentiation has reduced the need for a clear solution.	city survivors did not make any additions for security.
		Malatya Elemendik Container City	outdoor spaces of housing units	the boundaries between the street and the housing unit are more distinct. This differentiation has reduced the need for a clear solution.	They built additional closed, semi-closed spaces in front of the entrance and arranged front outdoor spaces by constructing balconies, terraces or level differences.
	Controlling	Yalova PDTH Settlement (Rural are	outdoor and indoor spaces of housing units	They are afraid that they would be robbed by new crimal neighbors.	They changed the doors and locks. Always left one of the member at home.
		Malatya Teknokent Container City	outdoor and indoor spaces of housing units	They did not make any arrangement. They left the entrance doors open during day for ventilation.	City survivors provided all neighbors' security against strangers by watching streets and controlling their outdoor spaces .
		Malatya Elemendik Container City	outdoor and indoor spaces of housing units	Lack of clear separation between house indoor and outdoor spaces from public areas.	rural survivors built additional closed, semi-closed spaces in front of the entrance and arranged front outdoor spaces to feel themselves in secure

3. Conclusion and Recommendations

When we compared the data obtained from two different case studies conducted 24 years apart. We observed that survivors were facing to similar problems during post-disaster sheltering process about their temporary housing units before moving to their permanent houses. Due to delays on construction and depending on the requirements of socio-cultural life, survivors, lived in Yalova and Malatya, were forced to arrange their temporary post-disaster houses that cannot offer a comfortable space for their daily activities.

These results unfortunately show that we have not learned from our mistakes or there are deficiencies in the process of contributing the experiences for the next post-disaster housing application.

Therefore, with the help of these comparative studies, we try to list some important decisions that we should consider in managing of design/pre-design, construction and post-occupancy evaluation processes in temporary post disaster planning strategies as follows.

- The long duration on construction of permanent housing shows us that there is a need to plan temporary housing units and settlements intended for longer-term uses. The generally accepted period of 1 year is not sufficient for our country's post-disaster recovery dynamics. Therefore, we should consider the spatial use period for 2-3 years or more.
- We can prefer temporary housing solutions that allow longer-term use by choosing durable materials suitable for different seasons and climate conditions.
- When the occupancy extends, depending on socio-cultural characteristics, number of family members, daily life activities and the preferences of spaces cause to make additions and modifications on temporary housing units. To avoid structural deformations on temporary housing units, we have to consider about flexible design for indoor and outdoor spaces.
- Foreseeing possible additional spatial requirements or using experiences and feedback information, we can pre-design alternative additional spaces for different kind of expectations by using interior and exterior wall panels and/or light membrane covers.
- It is also important providing reserve areas between each temporary house units for possible requirement of expanding.
- We can say that the most common problem is regarding inside privacy of the house. The windows and doors are mostly at the eye level of the street. We can solve this problem by placing the windows above the street eye level, and by preventing direct view of the interior with separating walls.
- Especially rural disaster victims see the entrance doors opening directly to the street as an important privacy, territoriality and defensive space problem to solve. Building a gatehouse for entrance or placing the entrance parallel to the street may offer a solution.
- The clear boundaries between the streets and temporary housing units at Malatya temporary settlements revealed that the arrangements based on defensible space behavior have decreased compared to Yalova. Therefore, considering the defensible space behaviors of survivors towards the outdoor spaces, we can design recognizable boundaries between public, semi-public and private areas by using varied materials, colors or greenery.
- We can decide to arrange urban planning of temporary housing settlements by considering neighborhood life. Instead of determining the place where each disaster victim will stay by drawing lots, grouping the survivors who know each other from the same neighborhood or region will ensure to accept and adapt them into their new life much easier and make them feel in secure.
  We should not forget that the opportunity to know each other could reduce the security concerns.
- Temporary settlements should not only consist of residential units. It is important in planning to decide squares or gathering areas where survivors can come together, cafes and rest areas where they can socialize, and reference points where they can feel the sense of belonging. For example, the most important indicator of this is a buffet in Yalova and a coffee brand stand in Malatya, which are popular meeting points for survivors. These service spaces can help to reduce the post-disaster trauma on survivors.
- Disasters do not affect children psychology directly. However, negative behaviors from their parent or surroundings affect them. Children need to get away from this negative pressure and take a break. For this reason, it is very important to build children's playgrounds at temporary post-disaster settlements. Children's playgrounds should be located in places where their families can monitor and control them easily.
- When we looked at cultural aspects on behavioral patterns, we observed that rural survivors performed daily household chores or long-term activities collectively in common areas, but city survivors did their daily household activities inside of their house units. They just met to their neighbors in common areas for resting or hosting. We can conduct surveys and interviews to create housing units according to the socio-cultural structure at disaster areas and space requirements of daily life. With the help of this data, we can design alternative settlement planning. This will also make an increasement on the sense of belonging.
- It is obvious that disasters occur very frequently in our country. It will be valuable to use the experiences regarding to the design, construction and occupancy processes of temporary housing units as an information in the future. Therefore, surveys with design and construction teams and post-occupancy evaluations at different periods will be useful for feedback information.
- Finally, we need to organize a new “Post-disaster Recovery and Management Plan” by contributing to each step of process: a. pre-design/ developing temporary and permanent house alternatives, b. surveys, c. user-participations, d. self-construction/with technical assistance and e. post-occupancy evaluation/information feedback system.

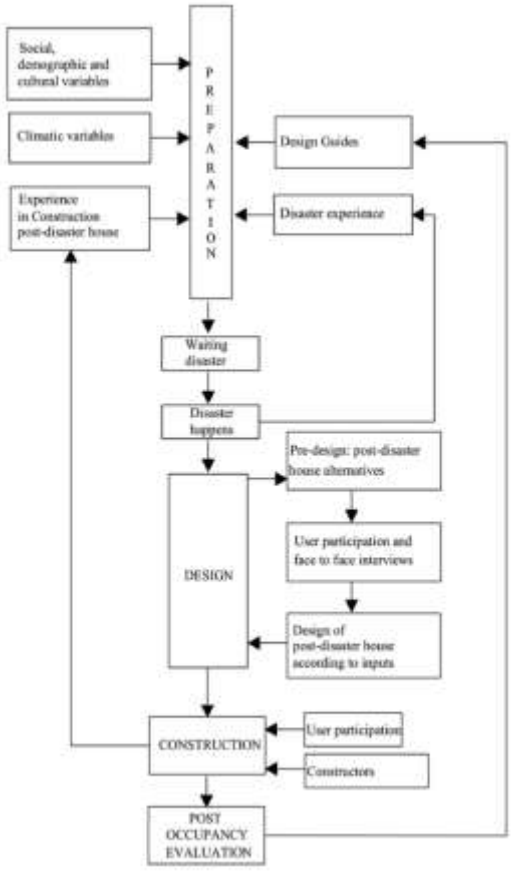

Fig. 8 A propose model for post-disaster recovery and management plan [5].

As a result, it is difficult to separate the stages of post-disaster: search and rescue, emergency shelter, construction of permanent housing, and redevelopment of cities from each other. The countries, which are faced with disasters very frequently, reorganizing each stage at every turn, are challenging in terms of economic sustainability. Because of this reason, there is an urgent need to create a "Post-disaster Recovery and Management Plan" in which all stages are considered together with a rational perspective and experiences and post-occupancy evaluations are used as feedback.

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THE EVOLUTION OF THE CONCEPT OF SHELTER – AN ASSESSMENT OF SUSTAINABLE MICRO-LIVING SPACES

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Abstract
This study examines the role of micro-housing within the context of sustainability, considering the historical development of housing and evolving living needs. While shelter constitutes the most fundamental level of Maslow's hierarchy of needs, over time, it has transcended its function as a mere physical refuge, acquiring social and cultural dimensions. Contemporary housing not only fulfills the fundamental need for shelter but also accommodates various functions such as work, education, and social life. However, rising housing prices and shifting family structures have made micro-housing an attractive solution. By offering a functional and cost-effective alternative within limited spaces, micro-housing aims to create comfortable living environments.
Designed in accordance with sustainability principles, micro-housing optimizes environmental factors such as energy efficiency, material usage, and water conservation. The design of these structures prioritizes maximizing functionality within small spaces and the use of environmentally friendly materials. Unlike traditional housing units, micro-living spaces provide both economically and environmentally sustainable solutions. Additionally, contemporary micro-housing designs effectively utilize functional spaces to enhance quality of life while promoting harmony with the environment.
This study explores the evolution of the concept of shelter in response to societal, cultural, and economic transformations, assesses micro-housing from a sustainability perspective, and evaluates strategies for minimizing its environmental impact. Sustainable micro-living environments integrate elements such as natural resource conservation, energy efficiency, material optimization, and water conservation, offering ecologically and economically efficient living spaces.
Key Words: *Sustainability, Micro Housing, Living Spaces, Housing, Ecology.*

1. Introduction

Throughout history, housing has undergone significant transformations in response to societal needs and evolving lifestyles. Despite these changes, it has consistently retained its fundamental function as the smallest unit of shelter. While the historical trajectory of residential spaces has occasionally led to profound shifts in their architectural and spatial planning, housing remains an indispensable component of human life. In this regard, residential structures have assumed a central role across civilizations and cultures [1]. Beyond fulfilling the fundamental necessity of shelter, housing has increasingly accommodated a range of functions integral to daily life. In particular, advancements in technology and shifts in contemporary living conditions have expanded the scope of residential spaces to encompass not only primary activities such as accommodation, nutrition, hygiene, and clothing but also professional, educational, and social functions.

This study aims to investigate the advantages and challenges of micro-living spaces in the context of sustainability. Increasing urban population density, rising housing costs, and the rapid depletion of natural resources have heightened the need for sustainable housing solutions. In this context, the study's primary research question is: How do micro-living spaces contribute to sustainability, and what are their advantages and limitations in terms of environmental, economic, and social sustainability?

Although existing literature discusses the spatial efficiency and economic accessibility of micro-living spaces research on their environmental footprint, energy consumption, and long-term impact on quality of life remains limited. This study seeks to analyze how micro-living spaces can be optimized in accordance with sustainable architectural principles and how these housing units can be effectively integrated into future urban development models. The research will evaluate material usage, energy efficiency, the environmental impact of compact living, and residents' perceptions of sustainability in micro living spaces. Based on the findings, recommendations will be provided for future housing designs.

Parallel to technological progress and changes in family structures, residential lifestyles have also undergone notable transformations. In modern housing, elements that enhance convenience and elevate living standards have transitioned from being luxuries to essential components of daily life. Consequently, expectations regarding comfort have risen significantly. Concurrently, the escalation in housing prices has prompted the exploration of alternative living arrangements, leading to the emergence of micro-housing as a viable solution, particularly for individuals and small households [2]. Micro-housing models prioritize the efficient utilization of limited space, integrating innovative design solutions to maximize functionality and enhance user satisfaction despite spatial constraints. These compact residential units are often developed within economic

parameters, addressing affordability concerns by reducing overall construction costs and offering a more accessible alternative to conventional housing.

2. Material and Methods

This study aims to examine the transformation of the concept of housing through micro sustainable living spaces and to evaluate these structures in terms of spatial efficiency, environmental impact, and user experience within the framework of sustainability principles. Accordingly, a comprehensive literature review has been conducted, and the sources obtained have been thoroughly analyzed to define sustainable interior design criteria.

Within the scope of sustainable design, key criteria have been identified to guide the interior design process, including energy efficiency, waste management and water conservation, indoor environmental quality, spatial organization and functionality, flexible and modular use, as well as social and economic benefits. To support the research, selected case studies from the literature have been examined in detail, with a focus on their design principles, implementation methods, and sustainability approaches. The study aims to provide an in-depth analysis of how these structures integrate sustainability considerations and to contribute to the development of more efficient and environmentally responsible design strategies for future housing models.

3. Limitations of the Study

Micro-living spaces can be categorized into two primary typologies. The first type encompasses fundamental residential functions, including dining, food preparation, sleeping, and resting, all of which are accommodated within the private living space. Following the identification of sustainable interior design criteria, relevant examples from the literature were analyzed to establish conceptual definitions. The selected micro-living space were examined in terms of their design principles, implementation strategies, and sustainability approaches, based on the predetermined criteria. These criteria were defined as follows: alignment with the micro living spaces scale, integration of sustainable design features, and the availability of documented.

4. Findings

From a long-term perspective, micro-housing presents a sustainable approach to urban living, both economically and functionally. By optimizing vertical spatial usage, these structures seek to provide the comfort and practicality associated with larger living environments within a more compact framework [2]. As urbanization accelerates and spatial limitations become increasingly pronounced, micro-housing emerges as a strategic response to contemporary housing challenges, facilitating the development of adaptable and resource-efficient living spaces.

Shelter is one of humanity's fundamental physiological needs and is positioned at the lowest level of Maslow's hierarchy of needs. Maslow's "Hierarchy of Needs" model suggests that human needs should be addressed in a structured order based on their priority. According to this model, shelter, along with nutrition, clothing, and reproduction, is among the most essential physiological needs, and fulfilling these needs is crucial for an individual's survival [3]. Furthermore, humans have inherent needs that guide their natural behaviors and shape their vital activities (Figure 1). In this model, needs form a complementary hierarchy, and once a need is met, the individual progresses to the next level. As individuals move up the hierarchy, their behaviors related to previous needs are influenced by the new stage they have reached. Consequently, the extent to which these needs are satisfied plays a significant role in shaping an individual's attitudes and behaviors [4].

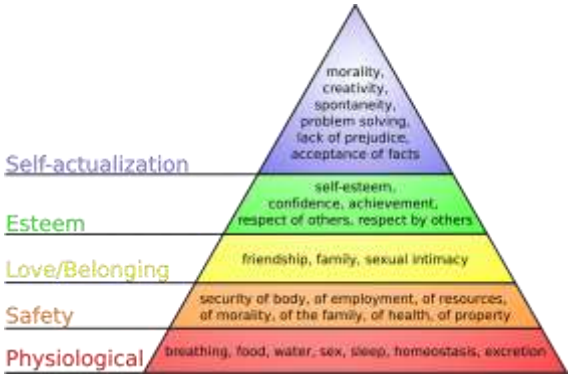

Fig. 1. Maslow's "hierarchy of needs"

4.1. The Evolution of the Concept of Shelter

Since the earliest architectural forms developed by humans to protect themselves from natural conditions, ensure security, and maintain personal privacy, the concept of shelter has evolved beyond being merely a physical refuge, gaining social and cultural significance. In this context, shelter is not only an individual necessity but also one of the fundamental building blocks of social order. Furthermore, housing serves as a space that reflects both individual and societal identities. While residences express individuals' lifestyles, socioeconomic status, and aesthetic preferences, they also offer spatial diversity shaped by local climate, geography, and culture. This perspective necessitates considering the concept of shelter not just as a basic need but also as a social and cultural phenomenon.

As one of the most fundamental human needs, shelter has led to various solutions across different societies throughout history. Caves represent one of the earliest examples of this need. Technological advancements, shifting cultural values, and transformations in social structures have significantly influenced the design of living spaces. Today, the evolved form of these shelters is referred to as "housing." Over time, various factors have led to the spatial differentiation, design, and implementation of housing units, yet their primary purpose—providing shelter—remains unchanged [5].

The shaping of housing has been influenced by social lifestyles, values, traditions, customs, and family structures. Over time, houses have evolved from merely serving as shelters to becoming multifunctional living spaces that accommodate activities such as dining, entertainment, gatherings, and hygiene. Particularly after World War II, changes in family structures and transformations in traditional social lifestyles increased the demand for single-person living spaces. Additionally, rising housing prices have intensified the demand for more cost-effective alternative solutions. In this context, micro-housing has emerged as a preferred solution, offering small-scale yet functional alternatives to meet these demands. The functions and definitions assigned to housing have expanded and diversified over time, leading to the transformation of housing design criteria in line with changing individual needs. Housing design, where personal comfort, security, and individuality have become priorities, plays a crucial role in directly influencing users' quality of life [6] In this regard, the relationship between the environment and housing is a critical factor that must be considered in the design process.

Moreover, demographic factors such as age, household size, gender, income level, and educational background should be regarded as integral components of the housing design process. Analyzing these factors plays a key role in shaping spatial organization and comfort conditions based on user needs [7] The impact of comfort and functional necessities on spatial organization has gained increasing importance in modern housing design.

The growing demand for housing due to population increases has resulted in the insufficiency of existing resources and spaces to meet these needs. This situation has encouraged users to seek more functional, economical, and small-scale spatial solutions. In this regard, micro-housing has emerged as a significant alternative in contemporary housing design by offering both economic and spatially innovative solutions.

The concept of micro-housing refers to living spaces designed on a smaller scale compared to traditional housing units [8]. While micro-housing is often regarded as a modern concept, small-scale living spaces such as bungalows and container homes have been built at various points in history. In this context, *The Not So Big House*, published by Sarah Susanka in 1998, is considered the starting point of the micro-housing concept in architectural literature [9] However, ideas supporting small-scale housing gained momentum as early as the late 1980s, particularly through the works of pioneering architects such as Frank Lloyd Wright. In the 21st century, these ideas have evolved into a widespread movement. As emphasized in Wright's *The Natural House*, architectural principles during this period emphasized simplification, the use of natural materials, and functionality. In line with this approach, the small, cost-effective housing units designed by Wright diverged from traditional housing models, introducing an innovative architectural perspective [10].

American writer, poet, and philosopher Henry David Thoreau's wooden cabin in the forest is regarded as a symbolic example of the modern *Tiny House* concept (Figure 2). This structure, which represents a simple and nature-oriented way of living, laid the foundation for an intellectual approach known as the *Thoreauvian Dream*, which has gained widespread acceptance (Figure 3) [11].

Fig. 2. Interior of Henry David Thoreau's iconic tiny house [12]

Fig. 3. Henry David Thoreau's iconic tiny house [12]

The micro-house *Cabanon*, designed by Le Corbusier in 1952, was built in Cote d'Azur, Roquebrune-Cap-Martin, as a primitive holiday retreat. This structure holds the distinction of being the first and only building designed exclusively for Le Corbusier's personal use. In its interior design, the fundamental principles of Le Corbusier's *Modulor* system were applied, with an emphasis on wooden materials. Additionally, a minimalist approach was adopted, minimizing the use of furniture (Figure 4) [13]

Fig. 4. Cabanon interior [13]

5. Discussion

Throughout history, housing has undergone continuous change and transformation alongside human civilization. Beyond serving as a shelter, housing has played a fundamental role in shaping living spaces by fostering a strong sense of belonging and being considered a valuable asset for future generations. Traditionally, housing was defined as a basic refuge that protected people from environmental conditions. However, in contemporary society, housing has evolved into multifunctional living spaces that adapt to diverse lifestyles. This transformation is closely linked to the principles of sustainability. Sustainability emphasizes the conservation of natural resources, the adoption of environmentally friendly construction techniques, and the prioritization of energy efficiency. In modern housing design, these approaches aim to reduce environmental impact while enhancing the quality of life for users.

The housing sector is considered one of the largest contributors to environmental issues, including natural resource consumption, carbon emissions, and waste production. Today, the concept of housing is being reinterpreted through the lens of sustainability. Design strategies focusing on energy efficiency, water conservation, the use of recyclable materials, and the integration of eco-friendly technologies are key efforts to minimize the environmental footprint of living spaces. When housing is viewed from a sustainability perspective, it extends beyond merely providing a place to live it also encompasses environmental, economic, and social impacts. Sustainable housing aims to maintain ecological balance, optimize energy and resource consumption, and uphold social equity. This approach seeks to integrate housing into the broader ecological system rather than treating it solely as a space that fulfills individual needs.

5.1. The Relationship Between Housing and Sustainability

The concept of creating a sustainable interior environment focuses on minimizing energy and material consumption while prioritizing user comfort and ensuring harmony with the surrounding environment. In this context, key factors in sustainable housing design include spatial organization, the balance between filled and empty volumes, flexibility principles, and the selection of appropriate materials. Additionally, incorporating adaptability, minimalist design approaches, and functionality into the process not only ensures environmental sustainability but also contributes to creating spaces that enhance users' quality of life. The proper adaptation of these factors into the design process enables the creation of comfortable, functional, and environmentally compatible spaces without incurring excessive costs.

The changing perception of housing has also led to the emergence of alternative solutions such as micro-housing, which aligns with the trend of reducing living spaces and utilizing economic resources more efficiently. Micro-housing integrates functionality, cost-effectiveness, and eco-friendly design within a limited space, offering a sustainable housing solution. These compact housing models not only reduce energy and material consumption but also support individuals in embracing a

minimalist lifestyle. The relationship between housing and sustainability extends beyond eco-friendly initiatives to include the spatial reflections of changes in individual lifestyles and social structures.

5.2.Sustainable Micro Living Spaces

Sustainability is defined as meeting the needs of the present without compromising the ability of future generations to meet their own needs. In micro structures, sustainability is built on key principles such as the conservation of natural resources, energy management, improving indoor air quality, using flexible furniture, and optimizing spatial organization. This approach aims not only to use existing resources efficiently but also to minimize the environmental impact of living spaces.

Micro living spaces prioritize environmental sensitivity and economic efficiency while ensuring maximum functionality in limited areas. In this context, the integration of energy-efficient systems, optimized water consumption, and the adoption of flexible design solutions form the cornerstone of sustainability in micro spaces. These living spaces support sustainability both environmentally and economically. They meet sustainable design criteria through reduced energy consumption, low carbon footprints, and the use of local materials.

The increasing demand for sustainable and energy-efficient housing solutions has led to the development of innovative micro-housing models. Ecocapsule, designed by Nice Architects, represents a fully self-sustaining and off-grid living unit that integrates renewable energy sources, water collection systems, and efficient spatial organization. Rapid urbanization and environmental concerns have increased the need for alternative housing solutions that minimize ecological footprints while maintaining functionality and comfort. Micro-housing has emerged as a viable response to these challenges, with Ecocapsule standing out as a fully sustainable model. This study explores the key sustainability aspects of Ecocapsule and evaluates its effectiveness as a self-sufficient living unit.

5.2.2. Energy Efficiency

Developing strategies and techniques to reduce the consumption of non-renewable resources is a core goal of effective resource management. Resource management aims to conserve energy, water, and materials, while enhancing their efficiency. In this context, the goal is to reduce the use of non-renewable resources during production and consumption processes, ensuring that these resources do not harm the environment at the end of their life cycle and, if possible, are reintegrated into the system. Energy-efficient design practices include passive heating, cooling, and insulation systems, which aim to maximize the effective use of energy. Furthermore, methods such as utilizing daylight for lighting serve as a strong example of incorporating renewable energy sources.

Micro homes are designed to optimize energy efficiency. Solar panels, insulated wall systems, and passive climate control techniques are frequently used solutions. In this context, solar panels, which can be installed on roofs and façades, not only support environmental sustainability but also provide economic benefits to micro-home users by reducing costs. Heating or cooling a smaller area consumes less energy compared to traditional homes. The use of renewable energy sources, such as solar power, plays a critical role in meeting the energy needs of these homes.

Ecocapsule is an egg-shaped micro-housing unit that offers complete autonomy in terms of energy, water, and waste management. The design incorporates several key sustainability features [14].

Fig.5.Wind and Solar-Powered Ecocapsule [14]

The unit is equipped with solar panels (880W) and a retractable wind turbine (750W), allowing it to generate sufficient energy without reliance on external power sources [14].

5.2.3.Material Usage

At the core of sustainable design is the efficient and effective use of materials. Materials are raw, semi-processed, or fully processed substances that contribute to the formation of a design and its usage process, ensuring the health and comfort of its users. In this regard, reducing the energy required to produce materials used in building design or preferring materials produced with low energy consumption plays a crucial role in ensuring sustainability. These structures favor environmentally friendly materials that support recycling and have low carbon emissions. Additionally, using recyclable and reusable materials is a critical approach for resource conservation. Furthermore, selecting materials that can be adapted for different functions

and can meet multiple needs when necessary stands out as an effective strategy in sustainable design. Wood, bamboo, hempcrete, and recycled metal are commonly used materials in this field.

5.2.4. Waste Management and Water Conservation

Water, as one of the fundamental elements of human life, is also a critical natural resource that ensures the balanced functioning of ecosystems. Especially in densely populated cities, water scarcity has made it necessary to develop various strategies for more efficient water usage in buildings. In this context, reducing water consumption, using low-flow fixtures, and collecting and purifying rainwater for reuse are prominent practices. Micro living spaces are often equipped with gray water recycling systems and composting toilets. These approaches support both water conservation and waste reduction.

A built-in rainwater collection system gathers and filters water, making it suitable for drinking and daily use [14].

5.2.5. Indoor Environmental Quality

Maintaining comfort levels for users requires ensuring that thermal values stay within an ideal range. Any deviation from this range can lead to performance loss and psychological discomfort. Providing proper humidity and thermal conditions is a key component of spatial comfort. Additionally, natural lighting should be used in living and working spaces whenever possible, with proper attention to light adjustments for human health and productivity. In this regard, avoiding excessive light reflections and designing with consideration for the movement of daylight throughout the day is of great importance.

High-performance insulation materials were used in the building to minimize energy consumption and maintain internal temperature balance. Climate control system, combined with a reliable water supply, make home incredibly comfortable all year round [14].

Fig.6. Climate Control System [14]

5.2.6. Spatial Organization and Functionality

The geometric form, width, circulation areas, and balance of solid and void spaces within a space play a significant role in determining the characteristics of the furniture used. When the concept of micro spaces is integrated into interior design, it often creates a perception of limited usability. However, designers can overcome these limitations by offering flexible furniture solutions and considering various spatial arrangements. This allows for maximum functionality within minimal spaces. As urban populations grow, housing sizes continue to shrink, necessitating the design of spaces that enable multifunctional use. These spaces aim to meet users' essential needs while providing a comfortable and peaceful living environment.

5.2.7. Flexibility and Modular Use

The size of a living space does not necessarily determine its quality of life. Flexibility and modularity allow for the creation of designs that can respond to users' needs. Therefore, square footage is not an essential parameter in housing selection. Flexible and modular furniture designs support sustainable approaches by allowing multiple functions to coexist in the same space. Modularity refers to a system composed of independent and interchangeable units (modules). This approach enables the reconfiguration of a space according to user needs by combining different functional modules. For example, a module can serve as both a seating area and a storage unit.

Maximizing functionality in a limited space and ensuring that necessary functions are available only when needed provides a crucial solution for efficiently utilizing living spaces in densely populated cities. This approach not only conserves space but also enhances users' quality of life. Foldable beds, modular furniture, multifunctional storage units, and transformable wall systems allow for maximum functionality in minimal spaces. In micro-homes, modular design is used to create more flexible and adaptable living environments.

These strategies enable users to customize their living spaces according to individual needs while improving space efficiency. Additionally, producing flexible and modular furniture from durable and reusable materials further reduces the environmental impact of these designs. By promoting efficient space usage, flexible design solutions contribute to conserving natural resources and minimizing environmental impact.

The unit includes a multifunctional interior layout with a kitchenette, sleeping area, and bathroom, ensuring efficient use of space without compromising comfort [14].

5.2.8. Social and Economic Benefits

The economic advantages of micro-homes are evident through lower construction costs and reduced energy expenses. The construction process requires fewer materials, which significantly lowers costs. Micro-homes not only provide individual living spaces but also contribute to community-based living models. Shared areas such as kitchens, gardens, and social spaces promote social interaction and foster a more inclusive lifestyle. These structures also support urban living by reducing traffic and transportation needs.

The Ecocapsule concept aligns with contemporary environmental policies and urban sustainability goals. Its off-grid capabilities reduce dependence on municipal resources, making it an ideal solution for remote areas, disaster relief, and eco-tourism. Moreover, its small ecological footprint and use of renewable materials contribute to global sustainability efforts.

6. Conclusion and Recomendations

Technological advancements have led to the emergence of new spatial concepts and the introduction of alternative spatial approaches in today's world. Especially global-scale crises, such as pandemics that affect large populations, have forced individuals to gain unconventional experiences, resulting in the development of new needs. This process has led to the reshaping of residential living and highlighted the need for clearer boundaries in personal spaces. In this context, individuality and privacy-focused approaches have taken the forefront in interior design, leading to more user-sensitive planning and design processes.

The rapid population growth in large cities and changing family structures have caused shifts in housing use and user behaviors, paving the way for the emergence of the micro-housing concept. In densely populated urban areas, the efficient use of resources has become increasingly important, leading to a trend towards smaller housing units. Particularly, as a large portion of individuals spend their time outside the home and the time lost due to transportation in crowded cities, users have sought solutions to meet their basic needs within minimal space usage in their homes. In this regard, micro-homes have emerged as a model that responds to the needs of modern urban living. Changing conditions have shifted the perspective of housing users on their living spaces. Specifically, in the design of small homes, blurring the boundaries between indoor and outdoor spaces allows people to make more use of their natural surroundings. Thus, with the pandemic, a raised awareness has emerged about the need for individuals to pay more attention to sustainable living models, their environmental impact, and the overall quality of their homes, proving that micro-sized homes can meet these requirements.

Ecocapsule serves as a pioneering example of fully sustainable micro-housing, demonstrating the potential of integrating renewable energy, water conservation, and space optimization into a single self-sufficient unit. While some challenges remain, this model presents a promising pathway toward eco-friendly urban living and off-grid housing solutions. Further research and technological advancements can enhance its scalability, making sustainable micro-housing more accessible to a broader population [14].

Table.1. Ecocapsule Sustainable Design Criteria

Criteria	Ecocapsule Evaluation
Material Usage	Lightweight, durable, and sustainable materials (fiberglass, aluminum, and insulated composite panels) are used to ensure longevity and recyclability.
Energy Efficiency	Fully off-grid system powered by solar panels and a wind turbine; energy storage via high-capacity battery ensures continuous power supply.
Environmental Impact of Compact Living	Significantly reduced ecological footprint through minimal land use, rainwater collection, and waste filtration systems, promoting self-sufficiency.
Residents' Perceptions of Sustainability	Perceived as a highly sustainable alternative, offering independence and environmental responsibility while maintaining modern living standards.

Micro-homes stand out as an effective model for integrating sustainability principles into urban life. These structures, focusing on functionality and flexibility in limited spaces, reduce energy and resource consumption, thereby minimizing environmental impact. The use of renewable energy systems, low-carbon footprint materials, and water recycling methods in micro-homes promote a sustainable lifestyle. Furthermore, design approaches that incorporate multiple functions in small areas increase spatial efficiency, providing solutions to the growing population density. Micro-homes contribute not only to

enhancing individual quality of life but also to achieving environmental, economic, and social sustainability goals. In this context, micro-homes areconsidered as sustainable living spaces that will play an essential role in future urbanization policies.

The rational solutions developed in this context contribute to the creation of environmentally conscious, resource-efficient, and comfortable living spaces that are in harmony with nature. Additionally, the concept of micro-scale housing is becoming increasingly prevalent with advancements in technology, addressing the growing demand for housing while adapting to economic and social transformations. This trend underscores the significance of designing living environments that promote sustainability, foster ecological awareness, and provide individuals with the right to reside in well-designed, comfortable, and functional spaces.

Compared to conventional housing typologies, these compact living units offer a viable solution for meeting contemporary housing needs within a sustainable framework. Their spatial efficiency and environmentally responsible design approach ensure both the preservation of ecological balance and the provision of high-quality living conditions, reinforcing their potential as an alternative housing model that aligns with modern urban demands.

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UNDERSTANDING THE VIOLENCE OF SPACE IN THE BERLIN JEWISH MUSEUM

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Abstract
This study focuses on the concept of spatial violence. Bernard Tschumi defines every relationship between the user and space as a relationship of violence. This is because the relationship between space and the user inherently involves the interpenetration of two given orders. Therefore, space and the user influence, define, and transform each other. From this perspective, the impact of space on the user, the user's perception of space, and the type of spatial experience that emerges are all related to this concept. This study specifically aims to examine the concept of spatial violence through the case of the Jewish Museum Berlin. The museum is a significant example in terms of its meaning, function, and corresponding spatial configuration. It incorporates spatial elements that can create intense emotional experiences for visitors. The organization of space, sharp angles, voids, and variations in the way light is admitted all contribute to a design that prioritizes sensory perception and experience. For this reason, understanding the perspectives of users who have experienced the Jewish Museum Berlin is considered essential for analyzing spatial violence.
In this study, a user-centered approach was adopted to understand the impact of space on its users. A content analysis was conducted based on visitor reviews of the Jewish Museum Berlin posted on Tripadvisor, an online platform with a vast database where users share their travel and spatial experiences. The analysis focused on reviews from the past two years. The findings indicate that visitors frequently describe their experience as shocking, intense, and deeply moving. These emotions are often associated with architectural elements such as voids, slanted walls, and the difficulty of navigating the space, which are linked to the traumas that the museum seeks to convey. Within this framework, it is evident that the Jewish Museum Berlin establishes a strong connection with the concept of spatial violence due to its meaning, spatial organization, and the intense sensory experiences it offers.
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Key Words: (Times New Roman, 8pt, Bold-Italic) *Experience, Spatial Violence, Jewish Museum Berlin, Tripadvisor, Content Analysis*

1. Introduction

1.1. Aim

This study aims to examine the impact of space on its users and the concept of spatial violence through the case of the Jewish Museum in Berlin. Building on Bernard Tschumi's understanding of the relationship between space and user as a violent interaction, it argues that the interaction between space and its users is reciprocal, with both shaping and transforming each other. From this perspective, the impact of space on its users, the users' perception of space, and the resulting spatial experience are closely related to the concept of spatial violence. Specifically, this study seeks to understand how spatial violence manifests in the case of the Jewish Museum Berlin and how spatial arrangements affect visitors emotionally. In this context, understanding the impact of space on its users plays a fundamental role in analyzing the concept of spatial violence.

1.2. Method

In this study, a literature review was conducted to define the concept of spatial violence. Additionally, a user-centered approach was adopted to better understand the impact of space on its users by analyzing user experiences. The Jewish Museum Berlin was selected as a case study due to its strong symbolic significance and its distinctive spatial organization. To gain insights into user experiences, the study aimed to collect the opinions of individuals who had previously visited the museum. Given its extensive data network, the online platform Tripadvisor was chosen for analysis, and reviews from the past two years were examined. Comments specifically related to spatial aspects were selected for content analysis. This analysis categorized frequently mentioned expressions, emotional intensities, and references to spatial elements (such as voids, slanted walls, and the way light enters the space) to identify aspects of the museum associated with spatial violence. Through this method, the study explored how visitors' descriptions of their experiences as intense, unsettling, and deeply affecting correspond to architectural elements, linking them to concrete manifestations of spatial violence.

2. The Violence of Space

2.1. The Violence of Space According to Bernard Tschumi

Tschumi defines the intense relationship between individuals and the spaces surrounding them as violence. According to Tschumi, every relationship between a building and its user is a relationship of violence because every act of use involves the insertion of the human body into a given space—that is, the imposition of one order onto another (Tschumi, 1996). For this reason, the violence inherent in architecture is fundamental and inevitable. The violence referred to here is not a destructive force that harms the other party; rather, it signifies the power to influence the other party through interaction.

Tschumi begins defining violence by explaining the relationship between space and its user. The relationship between space and humans can be seen as a process of mutual influence. While space determines the actions that take place within it, actions, in turn, define the space. The first thing to determine here is whether the relationship between action and space is symmetrical or asymmetrical. A symmetrical relationship implies that both sides influence each other in a similar way, while an asymmetrical relationship suggests that one side explicitly dominates the other. Tschumi categorizes these asymmetrical relationships into two: bodies that harass space and spaces that harass bodies.

First, he discusses the dominance of the user through the concept of "bodies that harass space." He argues that every individual exerts a form of violence on a space simply by being present within it. Even if a person enters a space in a refined and planned manner, such as walking through a door, their presence disrupts the rigid geometry of the programmed spatial order. Here, Tschumi poses the question: “Are there ever people running, fighting, or making love in architectural photographs?” Through this, he highlights how the flawless presentation of space often excludes the presence of humans.

Secondly, he refers to "spaces that harass bodies." The violence imposed on a large crowd by a narrow corridor, or the physical or symbolic violence a building exerts on its users, reveals the profound impact of space on humans.

Formless spaces, anechoic white rooms, steep and dangerous staircases—all represent instances of spatial violence exerted on users in different contexts. Essentially, this study primarily explores the idea of space becoming a force over the body.

2.2. The Violence of Space in the Literature

Stoner (2012) also discusses violence produced through design, addressing the power and role of the architect. He argues that beyond merely producing space, architecture can become a tool of violence by generating specific effects on its users. Leopold Lambert (2013) directly associates violence with architectural production processes, viewing the transformation of a line into a wall not merely as a physical change but also as a mechanism of control. According to him, architecture inherently contains violence, and every intervention that divides a space imposes a form of dominance over bodies.

Lebbeus Woods exemplifies post-war cities, emphasizing that war and disasters do not only cause physical destruction but also create profound impacts on memory and identity. Similarly, Byung-Chul Han (2015), like Tschumi, underscores the inevitability of violence. Han argues that violence exists in every era but manifests in different forms depending on the conditions of its time. For instance, in the modern era and before, the dominant form of violence was the "violence of negativity," whereas in the postmodern period, the "violence of positivity" has become more prominent.

Bourdieu introduces the concept of symbolic violence, which does not rely on physical intervention. Instead, it emerges through mechanisms such as language, culture, education, and social values. Symbolic violence is closely related to Bourdieu’s concept of habitus, which refers to the patterns of thought and behavior that individuals develop under the influence of social structures. Within this framework, individuals internalize the effects of symbolic violence, shaping their identities and actions according to certain norms.

2.3. The Violence of Space within the Scope of the Study

Firstly, violence arises from the relationships between space and its users. These relationships are dynamic and constantly changing. Tschumi discusses the mutual interactions between space and the body, such as space harassing the body or the body harassing space. In this context, it is inevitable that space becomes dominant over the user or that the user transforms the space. This results from the intensity of the space-user relationship: the effect of space on the user depends on the intensity of their interaction. The longer a user remains in a space or the more they are exposed to its characteristics, the more pronounced the space’s dominating and coercive qualities become. In this sense, elements such as the form, light, color, and sound of space can have strong effects on the user.

Violence is inevitable. Space and the user interlock as two systems, each possessing its own order. This creates possibilities for conflict, harmony, transformation, and manipulation. Thus, violence is always present, though its intensity may vary. Byung-Chul Han states that violence has not disappeared throughout history but has instead transformed according to the conditions of each era. This means that the relationship between space and its user always contains a form of violence.

Being in a place is related to experiencing it: the violence of space is not limited to its physical characteristics but is also connected to how it is experienced and perceived. Tschumi argues that when we enter a space, we are influenced by it through our senses before we even think about it. Space exerts a powerful impact on the user through the sensory perception of the body.

It can develop through physical or non-physical conditions: spatial violence does not stem solely from physical features; it can also arise from past experiences of the space, its meaning in memory, ideological perspectives, time, and the way the space was produced. Therefore, the effects of space on the user vary according to individual and contextual factors. The social and cultural meaning of space can also create elements of pressure or violence on the user.

It can be associated with positivity or negativity: spatial violence is not limited to negative effects. Any strong emotional presence can be linked to spatial violence. For instance, emotions such as excitement, exhilaration, or tranquility created by space can also be considered part of spatial violence. Violence encompasses both positive and negative intense emotional interactions.

It can be an object of pleasure and desire: spatial violence can sometimes become a source of pleasure and desire for the user. This is related to the curiosity a space evokes or the unique experience it offers. Spaces associated with dark tourism exemplify how violence can be experienced as an intriguing and pleasurable phenomenon. Such spaces make the experience of violence desirable.

3. Interpretation of the Jewish Museum Berlin in the Context of Violence

3.1. Jewish Museum Berlin

Looking at the design process, it is evident that the plan form of the building originates from an abstracted Star of David. The structure's form was shaped by drawing lines between locations where significant historical events occurred. By connecting these lines, a framework for the building was established, and ultimately, the literal extrusion of these lines resulted in the zig-zag form of the structure.

Fig. 1. Berlin Jewish Museum (Url – 1)

Although Libeskind's design appears to be a standalone structure, it does not have a direct exterior entrance. To enter the new museum extension, visitors must pass through an underground corridor from the original Baroque museum. During this transition, visitors experience a sense of concealment and disorientation. Eventually, they arrive at a crossroads where three different paths intersect. These three paths are intended to showcase the Jewish experience from three different perspectives:

1. Continuity with German history
2. Emigration from Germany
3. The Holocaust

Libeskind designed a promenade that follows the zig-zag formation of the building, allowing visitors to move through the space and engage with the architectural experience.

From the exterior, it may appear that the interior layout follows the same structured pattern as the building's outer form. However, the interior is highly complex. Libeskind's carefully designed pathway leads visitors through galleries, voids, and dead ends, creating an intense spatial experience.

The interior is composed of reinforced concrete, a material that amplifies the emotional impact of the voids and dead-end spaces. Only a thin sliver of light seeps into these areas, further emphasizing the gloomy and oppressive atmosphere. Through this approach, Libeskind aims to make visitors experience a sense of despair. Even in the darkest moments, when escape seems impossible, a small trace of light can rekindle hope—a powerful symbolic expression in his design.

Fig. 2. Berlin Jewish Museum (Url – 1)

One of the most emotional and striking spaces in the building is a 66-foot (approximately 20-meter) tall void that runs through the entire structure. The concrete walls create a cold and overwhelming atmosphere, with the only light coming from a narrow slit at the top. Covering the floor are over 10,000 coarse iron faces, symbolizing those who perished during the Holocaust. Through all these elements and similar architectural details, this building becomes an intensely sensory spatial narrative that evokes deep historical and emotional connections.

3.2. Tripadvisor Reviews of the Jewish Museum Berlin

For this study, all comments made on the TripAdvisor platform about this museum in the years 2023, 2024, and January 2025 were reviewed, and those related to the space were identified and assessed. During the specified period, 78 comments were made about the museum, of which 64 were directly related to the space. Even this information indicates that the space exerts a significant impact on the users.

Classification of comments	Concepts Associated with the Classifications	Total Use of Related Concepts
Physical	floor (6), wall angles (3), beating drums, etched steel disks (3), light (2)	15
Perceptual	assault on the senses (2), disorientated (21), feeling out of sorts, dizzy, confusing (11), Sensory experience	37
Emotional	Positive, uplifting, impressive experience (18), unexpected (7), Deeply moving (5), sobering, forces to think (9), felt lost, interesting (8), emotional (3), uncomfortable (8), striking (8), deeply chilling, feels isolated, feel like a foreigner, dark (2), depressive (4), disconcerting	80
Cognitive	Show struggles, provide an insight (3), informative (8), Provides an understanding (5), memorable informations,	18

Table 1. Content analysis of TripAdvisor (Url-3)

It has been observed that the participants predominantly expressed their emotions in their comments and also shared their perceptions of how they experienced the space. In the physical category, the focus is on which elements of the design were mentioned. In this context, comments were made regarding sloping floors, angles in the walls, lighting, and steel discs on the floor. In the perceptual group, statements related to the perception of the space were included. From a perceptual standpoint, the space was often described as disoriented and confusing. Additionally, the expression "assault on the senses" was found to be striking. In their emotional expressions, participants mostly used negative and pessimistic terms, while also emphasizing that the space was impressive and unexpected. The cognitive category is more related to how users interpret and make sense of the space in their minds. Most participants mentioned understanding the historical significance of the space and found it

informative in that regard. They considered the space strong in terms of understanding its historical process.

Physcial	Perceptual	Emotional	Cognitive
Spatial configuration Architectural elements Materiality and texture Spatial boundaries Tectonics Body-space interaction	Sensory perception Atmosphere Spatial awareness Environmental psychology Perceptual disorientation Kinesthetic experience Architectural experience	Emotional effect Psychological impact Atmosphere of discomfort Trauma and memort Empathic engagement	Meaning-making Historical interpretation Cognitive mapping Spatial memory Educational value of space Reflective thinking
Key elements from TripAdvisor			
Slooping floors Sharp wall angles Steel discs Işığın kırıklı açılarla alınması	Disorienting Confusing An assault on the senses	Enexpectedly powerful Haunted Unsettling Deeply moving	Understanding historical context Informative Interpreting trauma through space

Table 2. The Main Criteria of the Classifications and Their Reflections in TripAdvisor Reviews

First, comments in which participants referred to the space were selected. In these comments, some participants directly mentioned spatial elements, while others conveyed the impact the space had on them. To ensure more consistent interpretations in the subjective content analysis, these comments were classified into four main categories: physical, perceptual, emotional, and cognitive.

In the physical category, the focus was on comments where users directly referred to spatial elements and design decisions. In this context, sloping floors, wall angles, lighting, the use of fractured surfaces to diffuse natural light, and steel discs were frequently mentioned.

The perceptual category includes expressions that answer the question of how the user perceived the space. This section emphasizes elements perceived directly through the senses, regardless of meaning. The space was often described as disorienting and confusing. In addition, one participant's description of the space as "an assault on the senses" was considered particularly striking in the context of spatial violence.

Another category is the emotional category, which includes comments in which users expressed their personal feelings. This was the category with the highest number of statements among all. A significant portion of the comments evaluated focused on the feelings the space evoked in users. Themes such as pessimism, discomfort, and deep emotional impact were especially prominent. At the same time, users also highlighted that the experience was unexpected and powerful.

The cognitive category relates to how users mentally processed, interpreted, and made sense of the space. In this section, the majority of participants stated that they understood the historical significance of the space and found it informative in that regard. Overall, the space was found to be striking in terms of helping visitors comprehend the historical process and the traumatic nature of the subject matter.

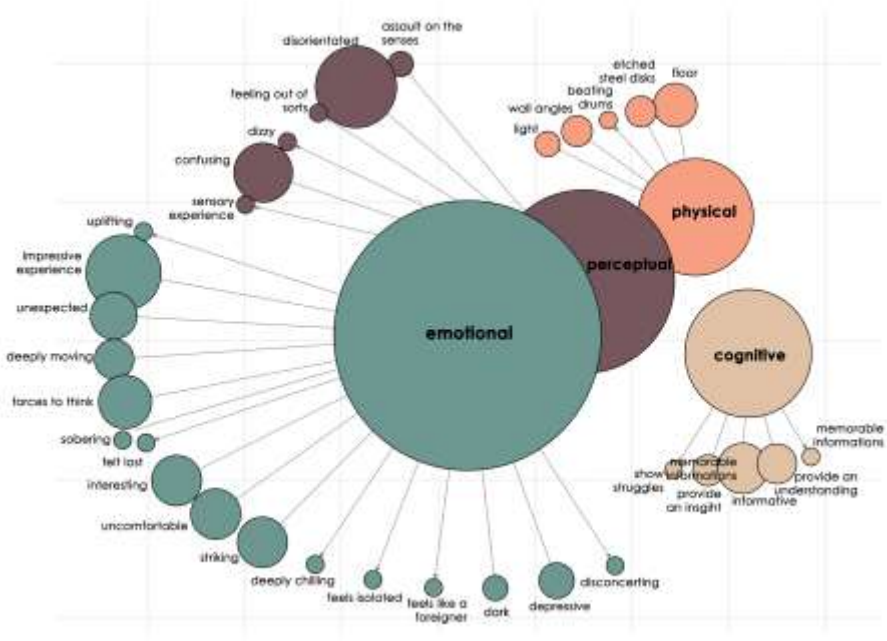

Figure 1. Representation of Categories and Expressions through a Diagram (3)

Some statements considered to be important are as follows:
“unexpected assault on the senses, and so it should be.”
“garden at the back left us feeling out of sorts and dizzy.”
“the space is set out to replicate a feeling of disorientation that displaced people would have felt”
“Haunted by this museum forever.”ur
“Visitors were permitted to walk along the corridor stepping on the faces, although my family found this upsetting and chose not to take part”
“It is not over the top or bluntly confrontational but still delivers the visitor with an overview of the history”
“This museum has changed my life, touched my soul – or no, actually the architecture did all of that”
“The contents of the museum are amazing; if you can find them”
“I noticed that there are however no images of people in the camps themselves, which I think is the right decision”
The expressions exemplified here are considered to be direct reflections of the participants' experiences and the relationships they formed with the space. Therefore, it has been emphasized in this section.

4. Conclusion and Discussion

The results obtained from content analysis make it easier to explain the full range of effects that the space has on its users when related to the concept of spatial violence. Many participants found the experience here striking, intense, and emotionally charged, and they mentioned that it was worth visiting. This supports Tschumi's view that space can provide pleasure by creating negative emotions.
In the physical category, concrete elements, structural features, and environmental details can be seen as elements that reflect the physical violence of the space. Features like sloping floors, wall angles, and steel discs show that the space has a strong effect on visitors and that the visual and physical perception can be challenging. These elements highlight the interaction between the organization of the space and the users' physical presence, revealing which elements predominantly have an impact on the user.
Comments related to perception reveal another dimension of spatial violence. In a powerful space, participants are challenged in terms of perception, and their efforts to understand the space take precedence over their thoughts. Visitors' experiences of disorientation, confusion, and discomfort show the disorienting and confusing effects of the space. The visitor is constantly faced with perceptual effort and difficulty while navigating the space, which leads to the space being described as a "violent" experience.
The comments in the emotional category indicate an even deeper level of spatial violence. Visitors’ emotional discomfort,

disappointment, and sometimes depressive feelings highlight the mental and emotional intensity of the space. This underscores that the space provides not only a physical challenge but also an internal, emotional experience. The statements of users who express a desire to leave and directly convey their feelings about the space show that the space is inherently directive and self-imposing in nature.

The cognitive category addresses the aspect of spatial violence related to the processes of learning, acquiring knowledge, and making sense of things. Visitors' efforts to understand the space in its historical and cultural context contribute to the power of the space in terms of meaning.

When all results and categories are examined—especially in consideration of the directly quoted user statements—it is observed that comments belonging predominantly to the emotional category are the most prominent. On the other hand, the reasons and underlying causes of the emotions mentioned here emerge through the details found in the other categories. Based on this, it can be said that users first experience the space through feelings, and then, by analyzing the reasons behind these feelings, they explain the effects the space has had on them.

In conclusion, the violence of the space creates various effects on visitors at physical, perceptual, emotional, and cognitive levels. These effects provide an in-depth understanding of the multiple dimensions of spatial violence and the relationships visitors form with the space. Spatial violence can be perceived as a strong impact due to one or several reasons, sometimes through a single aspect, and at other times simultaneously through multiple elements.

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FROM CRISIS TO CONNECTIVITY: COVID-19 IMPACT ON AWARENESS OF SMART APPLICATIONS ACCORDING TO EDUCATION LEVEL AND AGE GROUPS

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Abstract (Times New Roman, 9pt, Bold)
The early 2020 arrival of the COVID-19 pandemic significantly influenced individuals' interactions with technology, public services, and urban environments. This transition provoked significant debates over the pandemic's influence on the awareness and use of smart city technologies. The purpose of this study is to determine whether public perceptions of smart city applications have changed significantly as a result of the pandemic. The study conducted a citizen survey to assess awareness of smart applications and investigated citizen awareness, active citizenship, and government responsiveness in both 2019 and 2023. Furthermore, the study analyzed the survey data using SPSS to identify the factors influencing these engagements and understand the impact of the COVID-19 pandemic on smart city initiatives. The study finds that user behaviors have fundamentally altered following COVID-19, with heightened interest in digital technologies across all demographic segments. It reduced the disparities in use of digital technology across various educational and age demographics. It also highlighted the critical role of government-provided smart city applications in assuring public involvement and safety.
Key Words: Covid-19, Pandemic, Post-Pandemic, Smart City, Smart Mobility, Smart Citizen, Smart Governance

1. Introduction

The rapid urbanization of the 21st century has highlighted the necessity for cities to implement more intelligent and efficient systems to address with the challenges posed by increasing populations, resource management, and sustainability (1). Smart city applications, especially in transportation and communication, have emerged as essential elements through this process. These applications employ digital technologies and data-driven insights to improve citizens' quality of life, optimize urban infrastructure, and enhance the efficiency of public services (2) (3) (4). In transportation, smart technologies aim to create more responsive, sustainable, and resilient urban environments by using real-time monitoring, adaptive traffic systems, and intelligent communication channels to reduce traffic congestion, decrease carbon dioxide emissions, and provide accessible and sustainable mobility options (5) (6) (7) (8) (9). In communication, municipal smart city applications have become vital instruments for connecting citizens and local governments. These platforms increase civic involvement and accountability by improving access to public services, enabling real-time complaint tracking, and strengthening feedback channels, resulting in more engaged and informed urban populations (10) (11) (12) (13) (14).

The emergence of the COVID-19 pandemic in early 2020 greatly impacted how individuals interacted with technology, public services, and urban environments. Social separation, lockdowns, and changes in everyday routines required an increased dependence on digital means for communication, transportation, and other vital services. This changeover raised serious questions about the pandemic's impact on the awareness and use of smart city technologies. Did the rising demand for digital solutions during the pandemic lead to greater awareness and use of smart transportation and municipal communication applications? How did the disruption and uncertainty affect interactions with these systems?

This research examines whether pandemic has resulted in a significant shift in citizens' perceptions about smart city applications. The study examines the evolution of technological awareness, usage patterns, and public service interactions by analyzing survey data from residents in four major cities, comparing the periods before and after the pandemic. The article analyzes patterns to clarify the long-term effects of the pandemic on urban technology adoption and evaluate the capacity of smart cities to sustain innovation in post-pandemic urban environments.

2. Literature Review

The concept of smart cities has evolved significantly over the past two decades, with an increasing emphasis on the digitalization of urban services. Initially promoted by major corporations such as IBM and Cisco in the late 1990s and early 2000s, smart city initiatives have become integral to urban planning, covering sectors such as mobility, healthcare, governance, and education. The popularity of smart city concepts surged after 2015, driven by global sustainability goals such as the 2030 Agenda and the Paris Climate Agreement (15) (16)

The COVID-19 pandemic has played a crucial role in reshaping the development and deployment of smart city technologies worldwide. As cities faced uncommon problems, technological innovations became critical to maintaining urban resilience, effective governance, and the availability of crucial services. According to Sharifi et al. (2021), cities with existing smart infrastructures were better positioned to address the pandemic’s immediate challenges. Technologies such as IoT, AI, and real-time data analytics played pivotal roles in monitoring public spaces, managing mobility, and enforcing social distancing measures (17).

The urban transportation sector was among the most affected during the pandemic. Public transportation uses sharply declined due to safety concerns, prompting a shift toward alternative transportation modes (18). Meanwhile, smart city technologies were deployed to improve transportation services by providing real-time updates on public transit availability and safety measures. Troisi (2022) found that cities utilizing AI and data analytics in their transportation systems were able to adapt services based on real-time demand, increasing both performance and safety (19).

In addition to urban mobility, the pandemic underscored the importance of smart governance in maintaining effective communication between citizens and local governments. Digital governance tools, such as municipal apps and online communication platforms, became critical for ensuring the delivery of public services during lockdowns. Kunzmann (2020) argued that the public sector's involvement in smart city strategies increased during the pandemic, as governments took on more responsibilities in managing public health, mobility, and safety Municipal platforms were used extensively for reporting local issues, providing health updates, and coordinating public services.

The pandemic also had a profound impact on the concept of active citizenship in smart cities. Although active citizenship through digital municipal platforms enabled residents to report issues, monitor city events, and even participate in decision-making processes online, reinforcing the importance of citizen participation in the long-term sustainability of smart cities (20) (21), prior to the pandemic, concerns about privacy, data usage, and technical skills often led to negative emotions such as distrust toward technology. However, during the pandemic, these emotions shifted to feelings of fear and uncertainty, especially regarding the rapid integration of technology into daily life through lockdowns and remote services (22) (23) (24). With in-person engagements limited, digital platforms became essential for citizen participation in urban governance. Troisi (2022) observed that technology anxiety began to subside as more citizens became comfortable with using digital platforms for civic engagement.

The pandemic has also prompted new directions in research and practice for smart cities. The pandemic led to an intensified focus on urban services and digital infrastructure, especially in relation to urban mobility and healthcare systems. While the pandemic did not drastically alter the fundamental technological trends underlying smart cities, it accelerated the deployment of certain technologies, particularly in the realm of digital services and IoT. These technologies became vital in managing urban services, including healthcare and public safety, during lockdowns and restrictions (15).

Overall, the COVID-19 pandemic has acted as a critical juncture in the development and implementation of smart city applications. While it accelerated digitalization across sectors such as mobility, healthcare, and governance, the pandemic also revealed the growing importance of addressing concerns related to technology anxiety and citizen engagement. The changes brought on by the pandemic will likely continue to shape the future of smart cities, emphasizing resilience, efficiency, and active citizen participation.

3. Methodology

Smart cities rely heavily on technology, particularly in the domain of smart mobility, which is designed to benefit citizens by reducing the carbon footprint, saving time and energy, and most importantly, achieving the goal of zero waste. Since transportation is one of the largest contributors to CO_2 emissions (25) (26), smart mobility plays a crucial role in addressing environmental challenges. However, for the sustainability of smart cities, active citizenship is a critical factor (27) (28) (29) —not in the political sense, but in terms of physical engagement with city matters. Active citizenship depends on having an interactive and responsive government, consequently the truly sustainable smart city requires three key components: advanced technology, active citizen participation, and interactive governance (30).

As mentioned earlier, the COVID-19 pandemic brought significant changes to urban life and human behavior. At the end of 2019, a study was conducted to examine whether citizens were aware of the smart city applications designed for their use. Additionally, the study sought to investigate whether people embraced their urban responsibilities in the cities they lived in, and whether interactive governance was present, given that smart governance is another crucial factor in smart cities. After this initial study, another study was held in 2023, this time focusing on how the pandemic affected citizens in relation to these concerns.

To address these questions, the study conducted several analyses. First, smart technology capability analysis was performed to identify cities with multiple smart mobility and e-government applications. Following this, a citizen survey was applied to assess whether citizens were aware of these applications, how often they used them, how actively they engaged with municipalities on city matters, and whether they received feedback in return. In essence, the study analyzed the citizens' awareness, active citizenship, and government responsiveness both in 2019 and 2023. Additionally, SPSS was used to analyze the factors influencing these engagements to understand the impact of the COVID-19 pandemic on smart city actions according to education level and age groups.

Data collection involved extensive desktop research to evaluate the capabilities and awareness of smart technologies in selected cities. The study made a review of 115 municipal websites, assessing them based on the McMillan Interactivity Model (Table 1) (McMillan, 2002). A citizen survey was also conducted in four selected cities, with 1,141 respondents in 2019 and 613 respondents in 2023, to investigate citizens' awareness and usage of smart mobility applications, as well as their interaction with municipal services.

Table 1. McMillan Model of Interactivity

Model of Interactivity via the Internet

Direction of communication	One-way		Two-way	
	Monologue Sender → Receiver	Feedback Sender ← Receiver	Responsive Dialogue Sender ↔ Receiver	Mutual Discourse Participant ∩ Participant Sender/Receiver roles are interchangeable
	Informative	Interactive		
Level of citizen control	Low	High	Low	High

Source: McMillan, 2002; Evans-Cowley and Conroy, 2010

The case study focused on Istanbul, Ankara, Izmir, and Bursa, selected due to their relatively higher number of smart mobility and smart governance applications (Table 2), for examining smart governance and citizen engagement. Istanbul, with nearly 16 million residents, offers 20 smart city applications. Ankara, the capital city, with a population of about 6 million, has 10 smart city solutions. Izmir, home to 4 million people, has eight applications. Bursa, a city of 2 million and an automotive industry hub, offers three smart city applications. This study explores smart city implementations in these cities, emphasizing the role of citizen involvement and government responsiveness in successful smart city strategies.

Table 2. Smart Applications exists in Selected Cities

	Public Transportation Information Mobile Applications	Driver Information Mobile Applications	Digital Municipality
İSTANBUL	Mobiett	IBB Yol Gösteren, IBB Cep Trafik, Şehir Hatları, İSPARK, iTaksi, İSBİKE Smart Bike	IBB İstanbul, IBB Beyaz Masa
ANKARA	EGO Cep'te	ABB Trafik	ABB Ankara, Başkent Mobil, Mavi Masa
İZMİR	ESHOT Mobil	IZUM	IBB Mobile
BURSA	Burulas Ulaşım	Burulas Trafik	Bursa Cepte

4. Results

The demographic comparison (Fig.1.) between 2019 and 2023 reveals that the overall distribution of both education levels and age groups remains relatively consistent, with no significant changes. While there are some slight variations on higher educated groups, the general educational landscape remains stable.

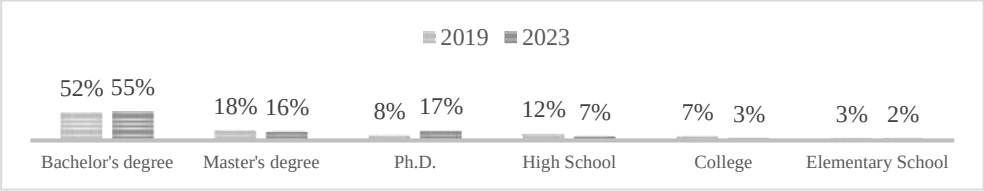

Fig. 1. Distribution of the education level among the respondents

In terms of age distribution (Fig. 2.), the 26-45 age group remains the largest, though there is seen minor variations weight of the age groups stay still suggesting that the respondent base remains consistent in terms of both educational attainment and age distribution across the surveyed periods. These small changes do not indicate significant shifts in the demographic profile of the surveyed population.

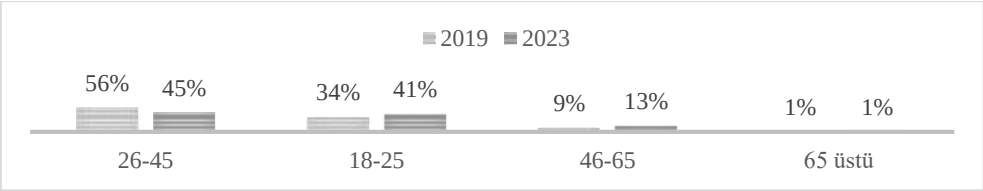

Fig. 2. Distribution of the age groups among the respondents

Surprisingly, despite expectations that public transportation usage would decline after the pandemic due to concerns about crowding and the risk of virus transmission, the opposite trend is observed (Fig. 3.). The most significant shift is in the category of daily use (5-7 days a week), which increased from 29% in 2019 to 43% in 2023, showing a substantial rise in regular, daily

public transport users. This shows that three years after the pandemic, public transportation usage has not declined, but rather exceeded pre-pandemic levels, with a bigger proportion of individuals relying on it for daily commute. Despite initial concerns about safety and health dangers, public transportation appears to be more integrated into daily life in 2023 than before the pandemic.

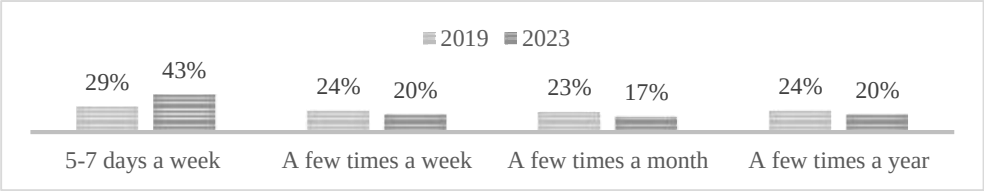

Fig. 3. Distribution of the public transportation use among the respondents

Fig. 4. compares different transportation modes between 2019 and 2023. Despite expectations that private vehicle usage would increase following the pandemic, there has been no significant change in this area. Private vehicle usage remained nearly constant, decreasing only 1%, indicating that the pandemic has not caused a major shift toward personal car use as anticipated. Overall, the pandemic does not appear to have significantly altered people's transportation preferences. This data suggests that the pandemic did not fundamentally change people's perceptions or choices regarding their preferred modes of transport.

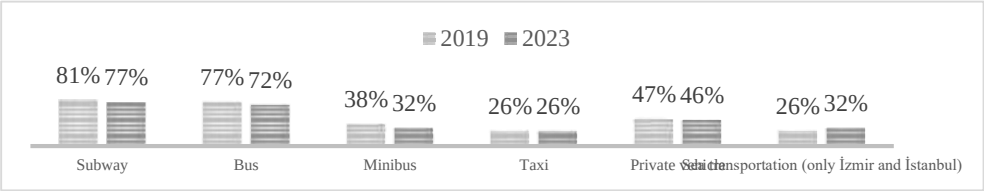

Fig. 4. Distribution of the transportation modes usage among the respondents

4.1. Smart Mobility Applications Awareness and Usage

Between 2019 (51%) and 2023 (73%), there is seen a clear increase in both awareness and use of public transit information apps. Over the course of four years, awareness of these apps increased dramatically across all respondents. Similarly, usage increased significantly, demonstrating widespread acceptance. Frequent public transportation users —those who use transit practically every day—showed an even greater increase in both awareness and consistent usage (Fig. 5.). Despite growing awareness, there is still a disconnect between knowing about the applications and frequently using them, even among frequent public transportation users, the ratio of consistently using the application is less than 40%.

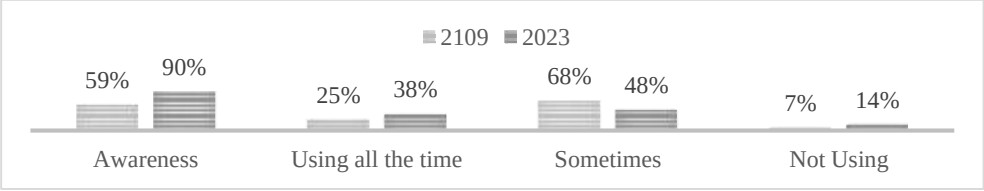

Fig. 5. Public Transportation Information App. Awareness and Usage Among the Frequently Public Transportation Users

The analysis of driver information application usage and awareness from 2019 to 2023 indicates significant changes in public engagement. Despite a slight rise in awareness across all respondents from 20% in 2019 to 27% in 2023, usage faced a loss of 10%, highlighting a disparity between awareness of these applications and their actual usage. However, the awareness and usage of these applications among the frequent users had decreased significantly after pandemic (Fig. 6.).

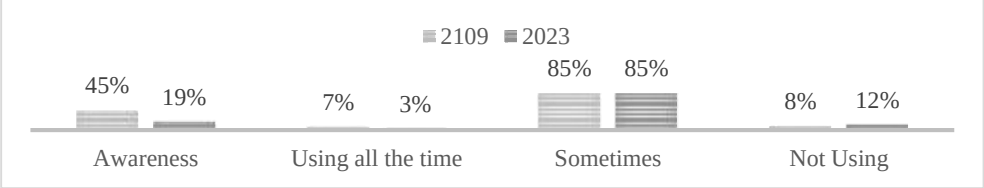

Fig. 6. Driver Information Application Awareness and Usage Among the Frequently Private Car Users

Fig. 7. and Fig. 8. is highlighting the potential impact of the pandemic on public perceptions of sustainable transportation alternatives which are cycling and commute sharing from 2019 to 2023. There has been a huge increase in the percentage of individuals who don't ride bicycles in 2023. The number of respondents reported an interest to ride bicycles, even with the availability of bike lanes, also decreased. The bicycle can be considered the safest mode of transportation in the post-pandemic period due to the absence of physical contact. Still, a decline is observed in interest toward cycling. However, this phenomenon cannot be solely attributed to the pandemic because the data collected from Turkey, where cities generally lack bicycle-friendly infrastructure.

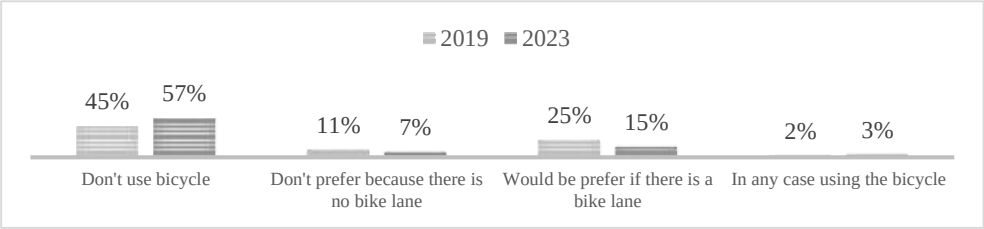

Fig. 7. Bicycle preference

Attitudes toward commute sharing is shifted contrary. Commute sharing represents another form of sustainable transportation. However, it inherently involves significant physical contact, often with strangers. Not surprisingly, due to the pandemic, the study has observed a notable increase in the tendency to avoid sharing rides with unknown people. After the pandemic, one might have expected a general increase in opposition to shared transportation, but the data shows a decrease even among those who view it as unsafe, with this rate remaining below 50%. This suggests that, despite the pandemic, people's overall positive attitude toward sustainable modes of transportation has not significantly changed.

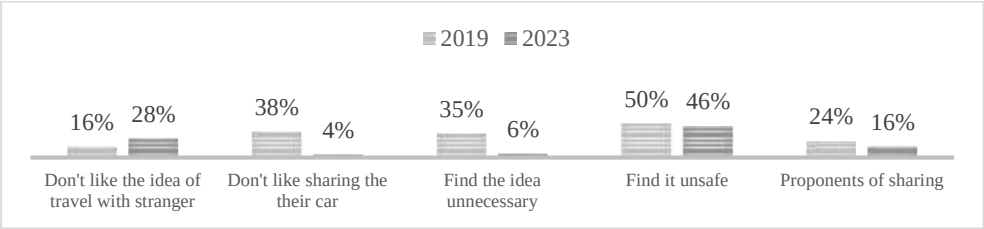

Fig. 8. Car-sharing preference

4.2. Smart (Active) Citizen and Smart (Mature) Governance

Fig. 9. compares the public's engagement with digital municipality services between 2019 and 2023. Over these years, there has been a notable increase in both awareness and usage of digital platforms provided by municipalities. Municipalities offer a range of services through various digital platforms, including websites, email services, call centers, mobile applications, and social media links. These platforms, especially the municipal websites, are praised for their ability to provide valuable information and facilitate interaction with citizens. During the pandemic, since all regulations were managed by the state, municipal websites became the most reliable source of information. The habit and trust developed during the pandemic have positively influenced the follow-up of digital government channels in the post-pandemic period.

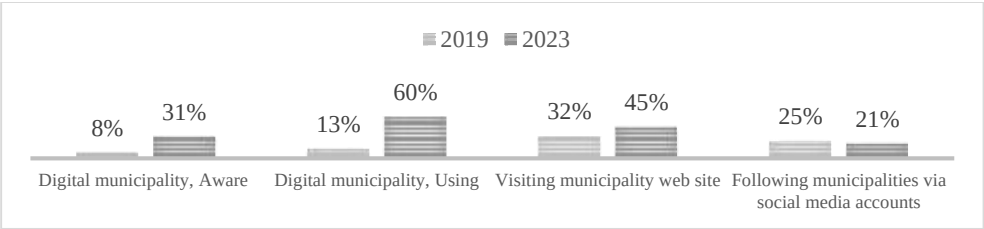

Fig. 9. Digital Municipality Awareness and Usage

Fig. 10. shows the government's responsiveness to citizen complaints and suggestions between 2019 and 2023. While there has been a little improvement in receiving responses with solutions, the percentage of respondents who received remedies does not exceed 40%. Furthermore, the percentage of those receiving no response has stayed constant throughout time. This data supports the reality that citizens do not use the interaction tools to express their concerns, and those who do receive no response from the government. The low level of government engagement in addressing public issues suggests that there is still need for improvement in terms of responsiveness and effective communication.

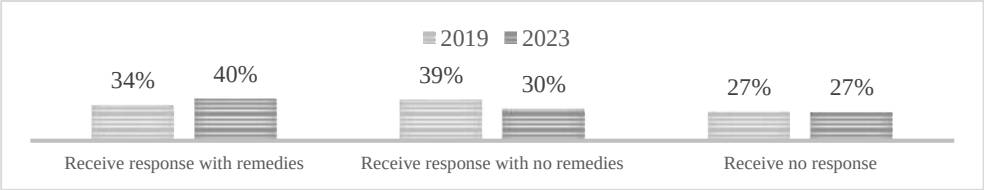

Fig. 10. Governmental response on governmental interaction tools

4.3. In-Depth Analysis of the Factors Effecting Awareness and Usage

This section digs into the factors that influence public awareness and usage of smart city applications, using survey data analyzed with SPSS. During the in-depth analysis, the applications were evaluated in three categories as shown in Table 2. In all three areas, the relationship between awareness and usage with education level and age was examined. The study investigated 12 relationships based on 19 mobile applications developed by metropolitan municipalities in four cities chosen as case studies to determine the factors influencing awareness and usage of smart mobility mobile applications and interaction tools used to communicate with metropolitan municipalities. Two types of statistical analysis were performed on the survey results to better understand the links between the elements that influence citizen awareness. The Chi Square of Independence and Binary Logistic Regression methods were employed in the analysis.

4.3.1. Education Level effects on awareness and usage

Respondents were classified in terms of whether they are aware and whether they are using of smart mobile applications or not and in terms of education level (having primary education and bachelor’s degree and postgraduate degree).

It is seen that both in 2019 and 2023 public transportation information mobile application awareness seems to be related to education level. It can be seen easily from the table that those who have bachelor’s degree are 1.958 times and who have postgraduates are 1.500 times more likely to be aware than those who have primary education degree, in 2019.

Table 3. Binary logistic regression; association between public trans. info. mobile app. awareness and education level, 2019

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Primary education			19.232	2	.000	
	Bachelor’s degree	.672	.154	18.953	1	.000	1.958
	Postgraduate	.405	.174	5.403	1	.020	1.500
	Constant	-.419	.130	10.378	1	.001	.658

a. Variable(s) entered on step 1: education level.

However, in 2023 specifically, individuals with a bachelor’s degree are significantly %52 less likely to be aware of the application compared to those with only primary education. However, postgraduates do not differ significantly from primary education in terms of awareness. This suggests that higher education does not necessarily increase awareness, and in the case of bachelor's degree holders, it may even be associated with lower awareness.

Table 4. Binary logistic regression; association between public trans. info. mobile app. awareness and education level, 2023

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1a	Primary education			10.679	2	.005	
	Bachelor's degree	-.733	.316	5.369	1	.020	.480
	Postgraduate	-.179	.325	.303	1	.582	.836
	Constant	-.521	.290	3.240	1	.072	.594
a. Variable(s) entered on step 1: education level							

It is seen that both in 2019 and 2023 usage of public transportation information mobile application is related to the participant's level of education. It can be easily seen from the table that those who have bachelor's degree are 1.350 times more likely to use the application than those who have primary education degree, in 2019.

Table 5. Binary logistic regression; association between public trans. info. mobile app. usage and education level, 2019

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1a	Primary education			11.634	2	.003	
	Bachelor's degree	.300	.157	3.652	1	.046	1.350
	Postgraduate	-.183	.179	1.046	1	.306	.833
	Constant	-.061	.132	.214	1	.644	.941
a. Variable(s) entered on step 1: education level							

On the other hand, in 2023, it seems that postgraduates are 2.5 times more likely to use public transportation mobile applications compared to primary education holders and this result is statistically significant and bachelor's degree does not significantly increase usage compared to primary education.

Table 6. Binary logistic regression; association between public trans. info. mobile app. usage and education level, 2023

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1a	Primary education			55.414	2	<.001	
	Bachelor's degree	-.461	.307	2.260	1	.133	.630
	Postgraduate	.914	.319	8.204	1	.004	2.495
	Constant	-.357	.285	1.572	1	.210	.700
a. Variable(s) entered on step 1: education level.							

Driver information mobile application awareness also seems to be related to education level in both before and after covid-19. It can be seen easily from the table that those who have bachelor's degree are 1411 times and who have postgraduates are 1.846 times more likely to be aware than those who have primary education degree, in 2019.

Table 7. Binary logistic regression; association between driver info. mobile app. awareness and education level, 2019

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Primary education			6.663	2	.036	
	Bachelor's degree	.344	.221	2.414	1	.120	1.411
	Postgraduate	.613	.239	6.561	1	.010	1.846
	Constant	-1.941	.192	102.164	1	.000	.144
a. Variable(s) entered on step 1: education level							

In 2023, the results show that both bachelor's and postgraduates are significantly less likely to aware the driver information mobile application compared to those with only primary education. Bachelor's users are about 83% less likely, and postgraduate users are about 87% less likely to aware relative to primary-educated individuals.

Table 8. Binary logistic regression; association between driver info. mobile app. awareness and education level, 2023

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Primary education			8.397	2	.015	
	Bachelor's degree	-1.755	.734	5.720	1	.017	.173
	Postgraduate	-2.041	.740	7.610	1	.006	.130
	Constant	3.199	.721	19.661	1	<.001	24.500
a. Variable(s) entered on step 1: education level.							

It is seen that driver information mobile application usage seems to be related to education level in both before and after covid-19. It can be easily seen from the table that those who have bachelor's degree are %32,6 less likely to use driver information mobile applications and those who have postgraduate degree are %43,4 less likely to use the applications than those who have primary education degree, in 2019.

Table 9. Binary logistic regression; association between driver info. mobile app. usage and education level, 2019

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Primary education			7.803	2	.020	
	Bachelor's degree	-.395	.180	4.792	1	.029	.674
	Postgraduate	-.569	.214	7.047	1	.008	.566
	Constant	-1.012	.146	48.029	1	.000	.364

a. Variable(s) entered on step 1: education level.

In 2023, postgraduate degree holders are significantly (%80,7) less likely to use driver information mobile apps compared to primary education holders. The trend suggests that individuals with lower education levels use driver information mobile apps more than those with higher education. Higher education increases awareness but does not necessarily lead to more usage.

Table 10. Binary logistic regression; association between driver info. mobile app. usage and education level, 2023

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Primary education			5.659	2	.059	
	Bachelor's degree	-1.340	.738	3.297	1	.069	.262
	Postgraduate	-1.646	.744	4.892	1	.027	.193
	Constant	3.199	.721	19.661	1	<.001	24.500

a. Variable(s) entered on step 1: education level.

Before pandemic, in 2019, there is no real evidence that the digital municipality awareness is different for people who have different education levels. On the other hand, after pandemic, in 2023, the model is indicating that education level significantly affects awareness of digital municipality mobile applications. Bachelor's degree holders are 53.3% less likely to aware the application than primary education holders and postgraduate degree holders are 62.7% less likely to aware the applications than primary education holders.

Table 11. Binary logistic regression; association between digital municipality mobile app. awareness and education level, 2023

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Primary education			7.373	2	.025	
	Bachelor's degree	-.762	.358	4.540	1	.033	.467
	Postgraduate	-.986	.369	7.158	1	.007	.373
	Constant	1.291	.340	14.379	1	<.001	3.636

a. Variable(s) entered on step 1: education level.

Usage of digital municipality mobile application is also related to the participant's level of education in both 2019 and 2023. It can be easily seen from the table that those who have bachelor's degree are %62,1 and those who have postgraduate degree are %66,7 less likely to use digital municipality than those who have primary education degree, in 2019.

Table 12. Binary logistic regression; association between digital municipality mobile app. usage and education level, 2019

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Primary education			23.117	2	.000	
	Bachelor's degree	-.969	.228	18.061	1	.000	.379
	Postgraduate	-1.100	.286	14.827	1	.000	.333
	Constant	-1.484	.167	78.950	1	.000	.227

a. Variable(s) entered on step 1: education level.

In 2023, on the other hand, although the overall model is statistically significant ($p < 0.001$), meaning education level has a significant effect on the digital municipality mobile application usage. There is no clear trend showing that higher education leads to application usage. The overall logistic regression model indicates that education level has a significant effect on mobile application usage ($p < .001$). However, when examining individual comparisons, neither bachelor's nor postgraduate degree levels differed significantly from primary education. This suggests that the influence of education on app usage is distributed across categories and may reflect a general trend rather than sharp contrasts between levels.

Table 13. Binary logistic regression; association between digital municipality mobile app. usage and education level, 2023

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Primary education			14.486	2	<.001	
	Bachelor's degree	-.500	.320	2.438	1	.118	.607
	Postgraduate	.203	.340	.355	1	.551	1.224
	Constant	.783	.302	6.728	1	.009	2.187

a. Variable(s) entered on step 1: education level.

4.3.2. Age groups effects on awareness and usage

Respondents were classified in terms of whether they are aware and whether they are using smart mobile applications or not and in terms of age groups (18-25, 26-45, 46-65, 65 and over).

Public transportation information mobile applications awareness seems to vary from age to age meaning the relationship between public transportation mobile app awareness and age group is statistically significant both before and after pandemic. Before pandemic, it seems that people who are between 26-45 and 46-65 years old are less likely to be aware of public transportation information mobile applications than those who are between 18-25 years old, before pandemic.

Table 14. Binary logistic regression; association between public trans. info. mobile app. awareness and age groups, 2019

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	18-25			9.782	3	.021	
	26-45	-.253	.129	3.840	1	.050	.776
	46-65	-.680	.231	8.636	1	.003	.506
	65 over	-.423	.614	.474	1	.491	.655
	Constant	.240	.102	5.594	1	.018	1.272

a. Variable(s) entered on step 1: age groups

However, after pandemic, the model shows that age group significantly affects public transportation information mobile applications usage overall (p = .003), but none of the individual age groups differ significantly from the 65+ age group in usage.

Table 15. Binary logistic regression; association between public trans. info. mobile app. awareness and age groups, 2023

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	18-25			13.845	3	.003	
	26-45	.213	1.107	.037	1	.847	1.238
	46-65	.954	1.103	.748	1	.387	2.596
	65 over	.580	1.126	.265	1	.607	1.786
	Constant	-1.609	1.095	2.159	1	.142	.200

a. Variable(s) entered on step 1: age groups

Usage of public transportation mobile application is related to the participant's age both in 2019 and 2023. It seems that people who are between 26-45 and 46-65 years old are less likely to use public transportation information applications mobile application than those who are between 18-25 years old, in 2019.

Table 16. Binary logistic regression; association between public trans. info. mobile app. usage and age groups, 2019

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	18-25			23.253	3	.000	
	26-45	-.413	.132	9.795	1	.002	.661
	46-65	-1.134	.255	19.802	1	.000	.322
	65 over	-.551	.614	.806	1	.369	.576
	Constant	.369	.103	12.813	1	.000	1.447

a. Variable(s) entered on step 1: age groups

In 2023, while younger age groups still tend to use the public transportation app more than older ones. Individuals aged 18–25 were significantly more likely to use the application compared to those aged 65+, with an odds ratio (Exp(B)) of 0.068 (p = .015). This means they are approximately 14.7 times more likely to use the app than individuals aged 65 and over. This suggests that younger users, particularly those aged 18–25, are the most active users of the app, whereas usage decreases significantly in the 65+ population.

Table 17. Binary logistic regression; association between public trans. info. mobile app. usage and age groups, 2023

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	18-25			50.681	3	<.001	
	26-45	-2.687	1.105	5.913	1	.015	.068
	46-65	-1.436	1.102	1.699	1	.192	.238
	65 over	-1.479	1.119	1.748	1	.186	.228
	Constant	1.609	1.095	2.159	1	.142	5.000

a. Variable(s) entered on step 1: age groups

In 2019 driver information mobile application awareness seems to be related to age, people who are between 26-45 and 46-65 years old are more likely to be aware of driver information mobile application than those who are between 18-25 years

old. However, in 2023, there is no real evidence that the driver information mobile application awareness is different for people who have different age.

Table 18. Binary logistic regression; association between driver info. mobile app. awareness and age groups, 2019

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	18-25			13.355	3	.004	
	26-45	.426	.183	5.421	1	.020	1.532
	46-65	.973	.272	12.754	1	.000	2.646
	65 over	-19.277	12118.636	.000	1	.999	.000
	Constant	-1.926	.151	161.827	1	.000	.146

a. Variable(s) entered on step 1: age groups

Both before and after pandemic it seen that there is no real evidence that the driver information mobile application usage is different for people who have different age.

Digital municipality mobile applications awareness seems to be related to age before pandemic, it seems that people who are between 46-65 years old are more likely to be aware of digital municipality than those who are between 18-25 years old. However, after pandemic there is no real evidence that the digital municipality awareness is different for people who have different age.

Table 19. Binary logistic regression; association between digital municipality. mobile app. awareness and age groups, 2019

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	18-25			11.216	3	.011	
	26-45	.349	.260	1.799	1	.180	1.417
	46-65	1.156	.348	11.045	1	.001	3.178
	65 over	-18.425	12118.636	.000	1	.999	.000
	Constant	-2.778	.215	167.111	1	.000	.062

a. Variable(s) entered on step 1: age groups

While before pandemic there is no real evidence that the digital municipality usage is different for people who have different age, after pandemic it is seen that usage of digital municipality mobile application is related to the participant's age. The overall logistic regression model indicates that age level has a significant effect on digital municipality mobile app usage ($p < .001$). when examining individual comparisons, individuals with a 26-45 (1.644 times) and 45-65 (2.317 times) age group are significantly more likely to use the digital municipality mobile app compared to those on 18-25 age group.

Table 20. Binary logistic regression; association between digital municipality. mobile app. usage and age groups, 2023

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	18-25			12.302	3	.006	
	26-45	.497	.180	7.646	1	.006	1.644
	46-65	.840	.289	8.446	1	.004	2.317
	65 over	20.996	16408.711	.000	1	.999	1313299692.390
	Constant	.207	.127	2.673	1	.102	1.230

a. Variable(s) entered on step 1: age groups

5. Conclusion

This study looks at how people in Turkish cities interact with smart city technologies, especially how COVID-19 changed these digital habits. As cities increasingly rely on digital tools for transportation and government services, the pandemic made people adopt these technologies faster. However, not everyone used them equally - some groups still faced difficulties in accessing or using these digital services. To analyze these dynamics, the research implemented a comparative survey approach, collecting data from 1,141 respondents in 2019 and 613 respondents in 2023 across Istanbul, Ankara, Izmir, and Bursa - cities selected for their advanced smart city infrastructures. The analytical framework incorporated Chi-Square tests and Binary Logistic Regression models using SPSS, enabling robust examination of usage patterns across education levels and age cohorts during this transformative period. This methodological approach provides empirical evidence of how a global health crisis can serve as catalyst for digital transformation while simultaneously revealing enduring inequalities in technology adoption. Three key trends emerged from the analysis of public transportation, driver information, and municipal applications.

First, public transportation applications experienced a substantial increase in awareness, rising from 51% to 73%. Interestingly, while educated users demonstrated greater awareness, primary school graduates showed higher actual usage. This suggests that lower-income groups, who relied more heavily on public transport during the pandemic, adopted these applications out of necessity, whereas educated users with remote work options used them less frequently.

Second, driver information applications declined in usage by 10%, reflecting reduced commuting during the pandemic. However, essential workers, particularly those with basic education, continued using these applications more than other groups. This indicates that occupation played a more significant role than education in sustaining usage.

Third, municipal applications demonstrated a complex pattern. While awareness decreased among educated users, middle-aged adults (26-65 years) increased their usage by 2.3 times. This shift likely resulted from the growing preference for online municipal services to avoid in-person visits during the pandemic. Three major pandemic effects stand out: 1- Digital tools became essential rather than optional, 2- Age and occupation became stronger predictors of usage than education level, 3- Government applications temporarily overshadowed municipal services during the health crisis.

These findings suggest that cities must now design inclusive digital services that accommodate diverse user needs shaped by the pandemic experience. The crisis accelerated digital adoption, but lasting success requires addressing persistent disparities in access and usability.

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ZERO CO2 AND ENERGY PLUS BUILDINGS: THE CONVERSION OF EMU FACULTY OF ARCHITECTURE BUILDING TO ZERO CO2 BUILDING BY CONSIDERING SOLAR ENERGY TO ACHIEVE CARBON NEUTRALITY

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Abstract
In recent decades, carbon emissions have risen sharply, significantly influenced by the construction industry's impact on the environment. This investigation seeks to transform the Eastern Mediterranean University faculty of architecture building into a zero CO2 structure through innovative technologies like solar energy and modern design methodologies. The initiative aims to demonstrate how existing structures can be retrofitted to meet sustainable design standards, creating efficiently functioning buildings. The study emphasizes that educational facilities can generate more energy than they consume by employing advanced technologies and sustainable materials, thus contributing to a carbon-neutral future. Alongside recommending interventions such as photovoltaic systems, enhanced insulation, and dynamic shading devices, the analysis identifies inefficiencies in the current building—including high operational energy demands, inadequate insulation, and suboptimal fenestration. A lifecycle assessment reveals the escalating costs and emissions associated with the building, suggesting policy incentives to promote sustainable practices. This work not only aims to improve the faculty building's quality of life but also proposes a replicable strategy for retrofitting educational facilities globally, enriching the discourse on carbon-neutral architecture to address the pressing issue of carbon emissions.

Key Words: *Carbon Neutrality; Sustainable Design; Retrofitting; Photovoltaic Systems; Lifecycle Assessment*

1. Introduction

Climate change stands as one of the most urgent global issues, mainly driven by carbon emissions from various sectors, especially within the construction industry. More importantly, the construction and functioning of buildings account for around 40% of global carbon dioxide emissions. This significant impact highlights the urgent need to shift towards sustainable construction practices that focus on energy efficiency and the integration of renewable energy resources. Buildings with zero CO_2 emissions are designed to minimize both operational and embodied carbon emissions and they are increasingly seen as a crucial solution for achieving long-term climate goals. These systems help lessen environmental harm while also providing economic and social benefits such as lower energy costs, improved indoor air quality and enhanced well-being for various user profiles.

Zero CO_2 buildings can therefore be defined as proposals that aim for net-zero carbon emissions throughout their entire lifespan. This includes both operational carbon due to energy use and embodied carbon from the materials and processes employed in construction. The ideologies sustaining this method of designing implies that buildings that enhance this idea by generating more energy than they consume, often sending the excess back to the grid or storing it in various systems for later use. Both concepts align with global sustainability frameworks, such as the United Nations Sustainable Development Goals (SDGs) and the Paris Agreement, which aim to limit global warming to below 2°C.

Regarding the given context of this investigation, particularly the EMU coloured building situated on campus grounds, they often provide unique opportunities to implement zero CO_2 and energy-plus strategies. These facilities often consume a significant amount of energy due to their diverse functions, which include use of classrooms, laboratories and administrative offices. Modifying these structures not only minimizes their ecological footprint but also serves as a valuable educational tool, showcasing sustainable practices to future generations. The Eastern Mediterranean University (EMU) in Famagusta, Cyprus, stands as a prime example where these concepts can be explored in a tangible way.

The Faculty Building on campus, with its outdated design and inefficiencies, represents the difficulties and opportunities of renovating current structures.

The study primarily focuses on Famagusta and Cyprus's Sustainability Goals. Famagusta, located in a Mediterranean climate area, experiences hot, dry summers and gentle, wet winters. These conditions present challenges as well as opportunities for sustainable design. The abundant solar energy potential in the region offers a reliable renewable energy source; nevertheless, high temperatures require effective cooling methods, emphasizing the need for energy-efficient building facades and HVAC systems. Cyprus' national energy plans are increasingly emphasizing the integration of renewable energy, in line with the European Union's climate and energy policies. Enhancing EMU Faculty of Architecture Building to meet

these goals not only strengthens the sustainability effort but also supports broader national and regional initiatives to combat climate change.

Fig 1. Position of coloured building in site plan of Architecture Faculty. http://i-rep.emu.edu.tr:8080/jspui/bitstream/11129/4668/1/soleimanipirmoradsoheil.pdf

Challenges associated with retrofitting for Zero CO_2 encompass:

- Operational Energy Consumption: Outdated HVAC systems, inefficient lighting, and poor insulation lead to high energy use.
- Embodied Carbon: Older buildings often use materials with high carbon footprints, requiring careful material selection during retrofitting.
- Financial Constraints: While retrofitting can lead to long-term savings, it often requires significant upfront investment.
- Stakeholder Engagement: Gaining insights from building occupants and administrators is essential for the success of sustainability initiatives.

The importance of solar energy in achieving carbon neutrality is a critical component of zero CO_2 initiatives, especially in temperate regions such as Cyprus. Photovoltaic (PV) systems can be integrated into roofs, facades, and shading structures, providing a versatile solution for producing renewable energy. Additionally, solar technologies support passive design strategies, improving the use of natural light and reducing reliance on artificial lighting. The EMU Faculty Building can therefore incorporate Building-Integrated Photovoltaics (BIPVs), which generate clean energy and enhance the building's aesthetic appeal. Suggestions also highlight the implementation of Adaptive facades, designed to respond dynamically to changes in the environment and are crucial for reducing operational energy needs. These systems can manage solar gain, improve natural ventilation and boost thermal comfort. For example, incorporating dynamic shading systems along with low-emissivity glass can significantly lessen cooling needs during Cyprus' scorching summers. These facades enhance occupant comfort and productivity, thus aligning with the broader goals of sustainable architecture.

Choosing the right materials is essential for achieving zero CO_2 targets. Sustainable options such as recycled steel, aerogel insulation, and bamboo materials can lower embodied carbon and enhance building efficiency. Renovating the EMU Faculty Building with these materials addresses environmental concerns while extending the building's longevity, reducing waste, and promoting circular economy concepts.

This study therefore aims to:

- Assess the current inefficiencies of the EMU Faculty Building in terms of energy consumption and carbon emissions.
- Propose targeted interventions, including solar energy integration, adaptive facades, and sustainable materials, to achieve zero CO_2 status.
- Evaluate the environmental and economic impacts of these interventions through lifecycle assessments.
- Provide a replicable framework for retrofitting educational buildings worldwide, emphasizing the synergies between renewable energy, adaptive design, and stakeholder engagement.

2. Literature review

The concept of zero CO_2 structures is closely linked to sustainable development, aiming to minimize both operational and embodied carbon footprints. Operational carbon primarily is the emissions generated from the energy utilized by a building during its functioning lifespan, whereas embodied carbon encompasses the emissions produced during the extraction,

production and assembly of materials (United Nations Environment Programme [UNEP], 2020). Collectively, these elements emphasize the significance of how successful these approaches can improve energy efficiency and incorporate renewable energy across a building's lifespan.

Energy efficiency, as an essential element of this study, is a fundamental aspect of zero CO_2 design. This can be accomplished by combining passive design concepts with modern construction technologies. Passive design strategies, including optimizing a building's orientation, utilizing natural ventilation, and enhancing thermal insulation, can greatly reduce energy requirements. Studies by Aksamija (2013) and Attia et al. (2020) highlight the essential function of low-emissivity glass, advanced insulation materials, and thermal mass in achieving superior energy performance standards. These approaches are particularly useful in the context of Mediterranean climates, where the demand for cooling energy typically constitutes the greatest share of overall energy use.

Table 1. Comparative table showing zero CO_2 buildings versus traditional buildings in terms of energy usage

Aspect	Zero CO_2 Buildings	Traditional Buildings
Energy Source	Primarily renewable (e.g., solar, wind)	Predominantly non-renewable (e.g., coal, natural gas)
Operational Energy Use	Low due to efficient HVAC systems and insulation	High, due to outdated systems and poor insulation
Embodied Carbon	Minimized by using sustainable materials (e.g., recycled steel, bamboo)	High, due to conventional materials like cement and steel
Thermal Efficiency	High, due to advanced insulation and adaptive facades	Low, with significant heat loss or gain
Use of Renewable Energy	Extensive use of PV systems and solar thermal energy	Limited or no integration of renewable energy sources
Lifecycle Emissions	Near-zero emissions over the building's lifecycle	Significant emissions throughout the lifecycle
Energy Costs	Lower long-term costs due to energy savings	Higher operational costs over time
Overall Environmental Impact	Minimal environmental impact, aligned with carbon neutrality goals	High environmental impact, contributing to carbon emissions

A thorough examination of renewable energy systems, especially photovoltaic (PV) technologies, is essential for transforming traditional buildings into energy-plus structures. Building-Integrated Photovoltaics (BIPVs) elegantly blend photovoltaic panels into the facades of buildings, offering energy production along with visual attractiveness. A study conducted by Rezaei and Mazloomian (2019) indicates that BIPVs can assist in meeting operational energy requirements while decreasing reliance on grid power. Hybrid renewable systems, integrating PV with solar thermal technologies, improve energy generation and effectively meet heating and cooling needs.

Adaptive facades as a solution also offers an innovative approach to reaching zero CO_2 goals. These systems adjust dynamically to environmental conditions, improving thermal comfort, reducing solar heat gain and optimizing natural daylighting. Research by Favoino et al. (2014) and Velikov and Thun (2013) categorizes adaptive facade technologies into various solutions including shading devices, energy-harvesting systems and advanced glazing options. For example, dynamic shading systems such as motorized louvers and smart glass have been shown to decrease cooling energy consumption by up to 30% in hot climates (Loonen et al., 2015).

Embodied carbon often overlooked in traditional design practices, makes up a substantial portion of a building's total carbon footprint. Choosing sustainable materials—such as recycled steel, bamboo and aerogel—addresses this issue and helps lower carbon intensity. Velikov and Thun (2013) highlight the importance of lightweight, high-performance materials that can minimize embodied emissions while maintaining structural integrity. Lifecycle assessments (LCA) provide valuable insights into the environmental impacts of materials, enabling architects to prioritize low-carbon options when retrofitting buildings.

An inclusive look by examining case studies of zero CO_2 buildings from around the world reveals best practices and technological advancements. The Freiburg Town Hall in Germany as an example integrates vertical PV panels into its facade, generating surplus energy while enhancing its visual appeal (Aksamija, 2013).

In Abu Dhabi, the Al Bahr Towers incorporate kinetic facades inspired by traditional Mashrabiya screens, significantly reducing cooling loads (Attia et al., 2020).

Fig. 2. Freiburg Town Hall in Germany https://www.archdaily.com/885885/freiburg-town-hall-ingenhoven- architects/5a3b3aefb22e384b3a000144-freiburg-town-hall-ingenhoven-architects-image.

Fig. 3. Al Bahr Towers https://www.archdaily.com/270592/al-bahar-towers-responsive-facade-aedas/5d5311e8284dd1737600009a-al-bahar-towers-responsive-facade-aedas-image

These examples illustrate the potential of combining renewable energy systems with adaptive design to achieve carbon neutrality.

In summary, the research reviewed emphasizes the complex nature of sustainable architecture and its pursuit to achieve carbon neutrality, incorporating elements of energy efficiency, renewable energy integration, adaptive facades and sustainable materials. Transitioning to carbon-neutral buildings demands a comprehensive approach that balances environmental, economic and social factors. By merging theoretical insights with practical applications, this study aims to contribute to the conversation around sustainable architecture, providing replicable strategies for retrofitting educational buildings across various climatic contexts.

3. Methodology

This study employs a mixed-methodology approach, integrating qualitative and quantitative methods to evaluate the present state of the EMU Faculty Building (Architecture Coloured Building) and propose specific interventions. The methodology is structured into three primary stages: examining the current situation, simulating and modelling proposed solutions, and performing a lifecycle assessment (LCA) to assess the environmental and economic effects.

The initial stage consists of a comprehensive qualitative assessment of the design and functionality of the building. These includes:

- Site Observations: On-site evaluations to be carried out to pinpoint inefficiencies such as in insulation, windows, and HVAC systems.
- User profile Interviews: Feedback from faculty, students, and administrative staff to be collected to understand the building's operational challenges and occupant comfort issues.

In the second phase, advanced BIM tools such as Revit, are utilized to model energy performance under various retrofitting scenarios.

Key parameters considered include:

- The potential for solar energy from photovoltaic (PV) installations.
- The thermal performance of proposed insulation and glazing systems.
- Energy savings from adaptive shading devices and HVAC upgrades.

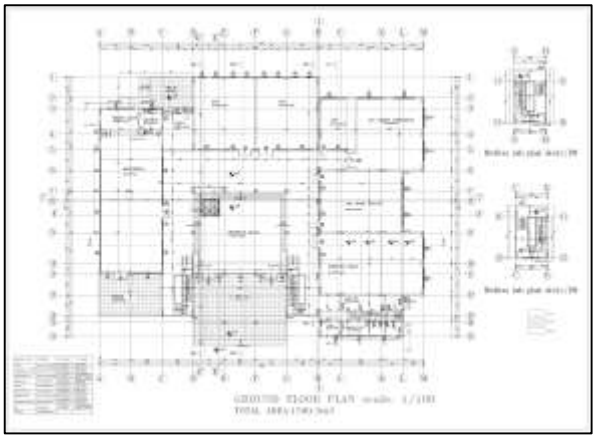

Fig. 4. Ground floor plan of the Architecture Coloured Building (Source: Department of Architecture)

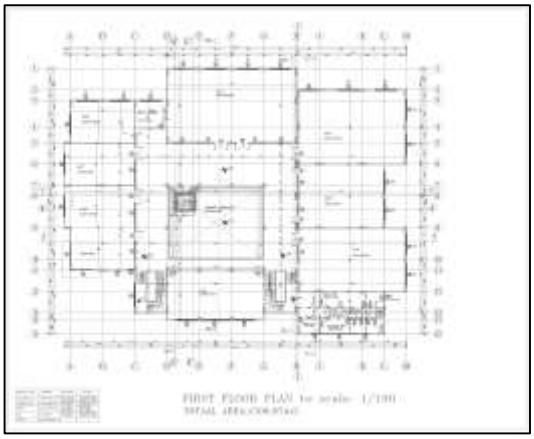

Fig. 5. First floor plan of the Architecture Coloured Building (Source: Department of Architecture)

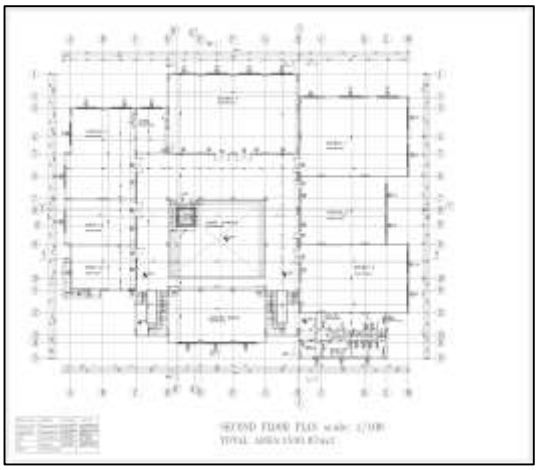

Fig. 6. Second floor plan of the Architecture Coloured Building (Source: Department of Architecture)

Fig. 7. Photo of the Architecture Coloured Building (author)

Fig. 8. South elevation of the Architecture Coloured Building (Source: Department of Architecture)

Fig. 9. West elevation of the Architecture Coloured Building (Source: Department of Architecture)

Fig. 10: East elevation of the Architecture Coloured Building (Source: Department of Architecture)

Fig. 11. North elevation of the Architecture Coloured Building (Source: Department of Architecture)

The final phase involves a Lifecycle assessment to assess the environmental and economic impacts of the proposed interventions. Key metrics include:

- Carbon Footprint: The reduction in both operational and embodied carbon emissions.
- Energy Payback Period: The time it takes to recover the initial investment through energy savings.
- Material Sustainability: The impact of material choices on lifecycle emissions.

Table 2. Mixed-Methodology Approach

Stage	Methodology	Details	Tools/Resources
1. Qualitative Assessment	Site Observations	On-site evaluations to identify inefficiencies in insulation, fenestration, and HVAC systems.	Field notes, thermal imaging, cameras.
	User Profile Interviews	Collecting feedback from faculty, students, and administrators on operational challenges.	Surveys, structured interviews.
2. Simulation & Modeling	BIM Tools	Modeling the building's energy performance under various retrofitting scenarios.	Revit, EnergyPlus, DesignBuilder.
	Key Parameters	Assessing solar energy potential, thermal performance of materials, and energy savings.	Simulation software, architectural models.
3. Lifecycle Assessment	Environmental Impacts	Measuring reductions in operational and embodied carbon emissions post-retrofitting.	Lifecycle assessment tools, carbon calculators.
	Economic Impacts	Estimating energy payback periods and cost savings from retrofitting.	Economic analysis models, project budgets.

3.1. . Findings and Results

The qualitative and quantitative assessments uncover several inefficiencies in the EMU Faculty Building:

- High Operational Energy Use: Outdated HVAC systems and inadequate insulation led to excessive energy consumption, especially during the summer months.
- Suboptimal Fenestration: Large and inadequately unshaded windows allowed too much solar heat gain, increasing cooling loads.
- Lack of Renewable Energy Systems: The building had no existing solar installations, despite the region's high solar irradiance.
- Material Inefficiencies: The use of conventional construction materials contributed to a high embodied carbon footprint.

Fig. 12. Air conditioning of A18 classroom showcases an outed Air conditioning model (taken by author)

Fig. 13. A typical portrayal of blinds used internally due to lack of exterior shading devices to protect from glare and overheating. (taken by author)

Based on these findings, the following retrofitting measures are suggested proposals as reliable suggestions:

- Rooftop Photovoltaics: Installing PV panels, which could offset approximately 70% of the building's annual electricity consumption.
- High-Performance Envelope: Retrofitting walls with advanced insulation materials like aerogel and replacing existing windows with low-emissivity glazing.
- Adaptive Facades: Adding dynamic shading devices to control solar heat gain and improve daylighting.
- Efficient HVAC Systems: Replacing outdated units with variable refrigerant flow (VRF) systems for enhanced energy efficiency.

Simulations using Energy Plus indicated significant improvements in energy performance after the retrofitting:

- Energy Savings: A 50% reduction in cooling energy demand and a 30% decrease in overall operational energy consumption.
- Carbon Emissions: A 60% reduction in operational carbon emissions, aligning with zero CO_2 goals.
- Solar Energy Generation: The PV systems produced surplus energy, qualifying the building as an energy-plus facility.

The Lifecycle Assessment Findings revealed some important insights:

- Carbon Payback Period: The embodied carbon from the retrofitting materials was offset within three years of operation.
- Cost Efficiency: The energy payback period for the PV installations was estimated at 5.5 years, leading to substantial long-term savings.
- Material Impact: Using sustainable materials, like recycled steel and bamboo, reduced embodied carbon by 40% compared to conventional options.

3.2. *Discussion*

The results of this proposal highlight the necessary procedures of retrofitting the Faculty Building with a comprehensive assessment of zero CO_2 and energy-plus levels. The suggested measures—incorporating diverse techniques such as photovoltaic systems, adaptive facades and eco-friendly materials—illustrate the practicality and essential significance of this conversion. The simulations for example demonstrated that specific actions, such as the installation of rooftop photovoltaic (PV) panels, can greatly enhance energy efficiency. Nonetheless, the collective application of all measures, impact of PV systems, dynamic facades and advanced materials yield even more significant outcomes. For instance, the energy savings obtained by minimizing cooling demands via adaptive shading solutions augments the excess energy produced by the PV systems. This synergy emphasizes the significance of comprehensive design approaches, in which the advantages of each intervention support and boost the others.

The Mediterranean climate significantly influences the suggested interventions. The area's intense solar radiation presents a significant chance to capture solar energy via these recommended photovoltaic systems.

Table 3. Simulated energy performance visualizations of proposed retrofitting solution

Retrofitting Measure	Simulated Energy Savings (%)	Visualization Description	Visualization Tool/Source
Rooftop Photovoltaics (PV)	50% of annual electricity needs	A bar chart comparing electricity consumption before and after PV installation.	EnergyPlus simulation, modeled by author
High-Performance Envelope	40% reduction in thermal losses	Heat maps showing reduced heat loss and improved thermal insulation efficiency.	Thermal simulation tools (e.g., Revit).
Adaptive Facades	30% reduction in cooling demand	Diagrams showing reduced solar heat gain due to dynamic shading devices.	BIM tools like DesignBuilder.
Efficient HVAC Systems	20% operational energy reduction	Line graphs of energy consumption trends with upgraded HVAC systems.	EnergyPlus or eQuest simulations.
Integrated Measures (Combined)	60% reduction in operational CO_2 emissions	Pie chart or stacked bar showing combined energy savings across all interventions.	Summarized from EnergyPlus results.
Lifecycle Emissions Reduction	3-year carbon payback period	Sankey diagram showing flow and offset of embodied vs. operational emissions	Lifecycle assessment tools.

Table 4. Summary chart/table illustrating the synergies of interventions (PV systems, facades, HVAC)

Intervention	Primary Benefit	Secondary Synergies	Overall Impact
Photovoltaic (PV) Systems	Generates renewable energy, offsetting up to 70% of electricity demand	Reduces reliance on grid electricity, supports energy-plus classification	Significant operational energy savings; qualifies the building as energy-plus
Adaptive Facades	Reduces solar heat gain by up to 30%, improving thermal comfort	Lowers cooling demand, enhancing HVAC efficiency; optimizes daylighting, reducing artificial lighting needs	Decreases cooling energy demand and improves occupant comfort
Efficient HVAC Systems	Lowers operational energy use by 20% through advanced technology	Benefits from reduced cooling loads due to adaptive facades, requiring less energy to maintain indoor climate	Overall operational energy savings, with improved indoor air quality
Integrated Approach	Combines renewable energy generation, thermal control, and efficient systems	Synergistic reduction in cooling demand and operational emissions	Achieves up to 60% reduction in operational CO_2 emissions and significant energy savings

The sweltering, arid summers however require sophisticated thermal management systems to maintain occupant comfort and reduce energy usage. The adaptive facade systems, designed for the unique climatic conditions, successfully reduced solar heat gain while enhancing daylighting. This dual advantage highlights the significance of creating strategies that are attuned to local climate and operational conditions. Comparable strategies can be utilized in other areas with similar climate conditions, rendering this framework widely applicable. Engaging the specific user profile is identified as a vital success factor in this research.

The engagement of faculty, students, and administrators in recognizing challenges and crafting solutions guarantees that the suggested interventions matched user needs and expectations. This cooperative method not only nurtured a feeling of ownership among participants but also aided in the project's long-term sustainability. For example, faculty and students play a key role in emphasizing the demand for improved thermal comfort and daylighting, which influenced the design of the adaptive facades.

Additionally, their involvement promotes the implementation of sustainable methods, establishing the retrofitted structure as an active laboratory for education and innovation in carbon-neutral design. The results of this research emphasize the essential importance of policy structures and financial motivations in facilitating sustainable retrofitting. Retrofitting initiatives, particularly those that utilize cutting-edge technologies and materials, frequently necessitate significant initial financial outlays. In the regards to the EMU architecture Faculty Building, the upfront expenses for PV systems and high-efficiency materials were balanced by future energy savings and lower operational costs. Nonetheless, wider implementation of these practices would greatly gain from encouraging policies, including incentives for renewable energy systems and tax deductions for eco-friendly materials. Governments and organizations can significantly contribute by establishing supportive conditions that reduce financial obstacles and promote the integration of sustainable retrofitting methods. The lifecycle

assessment (LCA) performed in this study indicated significant environmental and economic advantages linked to the suggested retrofitting actions. The 60% decrease in operational carbon emissions and the offsetting of embodied carbon in three years showcase the success of the measures taken. These results highlight that retrofitting can provide not only environmental benefits but also considerable cost reductions throughout the building's life, presenting an appealing choice for organizations aiming to harmonize sustainability with financial factors. This research adds to the wider conversation about sustainable architecture by showing the practicality and importance of upgrading current structures. Educational institutions, specifically, provide distinctive chances to act as exemplars of sustainability and creativity.

By converting the building into a net zero facility, this project establishes a benchmark for universities and institutions globally. The knowledge acquired from this case study can guide comparable retrofitting initiatives, highlighting the significance of localized approaches, stakeholder involvement and cohesive design strategies. Although the results of this research are encouraging, they also underscore various difficulties linked to sustainable retrofitting. The substantial initial expenses associated with advanced materials and technologies can be perceived to be a major obstacle, especially for organizations with constrained financial means. Moreover, the effectiveness of retrofitting initiatives relies on the presence of qualified experts and the readiness of the needed investments. Future studies should emphasize creating affordable solutions and adaptable models that can be utilized across various building types and locations. Additionally, progress in building information modelling (BIM) and simulation tools can significantly improve the precision and effectiveness of retrofitting initiatives. The conversation emphasizes the transformative possibilities of retrofitting as a means to attain carbon neutrality and energy efficiency in current structures. Through the incorporation of creative design approaches, renewable energy solutions, and eco-friendly materials, this research illustrates that moving towards zero CO_2 and energy-positive structures is not only possible but also crucial for tackling worldwide climate issues. The key takes aways garnered from the EMU Faculty Building case study provide a model that can be duplicated for comparable projects globally, leading to a more sustainable and robust built environment.

4. Conclusion

In conclusion, the results from the research on the social transformation of the Eastern Mediterranean University (EMU) Faculty Building into an energy-plus and Zero CO_2 facility demonstrate the attainability of carbon neutrality through inventive design approaches and renewable energy technologies. This research demonstrates that by tackling both operational and embodied carbon emissions through specific retrofitting actions, we can realize substantial ecological and financial advantages. The suggested measures, such as installing solar panels, using adaptive facades, and incorporating sustainable materials, reduce energy usage while also increasing occupant comfort and boosting the building's overall efficiency.

A significant takeaway from this study is the importance of tailored solutions for specific contexts. Famagusta's Mediterranean climate provides significant solar energy potential, which we have successfully harnessed with the suggested rooftop and vertical photovoltaic systems. In addition, the adaptive facade technologies were specifically tailored to meet local conditions, enhancing thermal comfort and visual aesthetics while reducing cooling requirements.

Through the use of materials that have low embodied carbon—such as aerogel insulation and recycled steel—we embraced sustainable practices and the circular economy, emphasizing how our material selections can greatly influence the building’s carbon footprint.

Interacting with stakeholders was crucial for the project's success. Faculty, students, and administrators were actively involved in defining priorities and influencing design choices, making sure that the retrofitting process genuinely addressed user needs and expectations. Their participation not only aided the project's success but also promoted a culture of sustainability at the university, transforming the building into a living lab for education and innovation in carbon-neutral design.

From a policy perspective, this case study highlights the necessity for supportive systems that promote sustainable practices. Monetary incentives, like subsidies for renewable energy installations and tax credits for eco-friendly materials, can assist in reducing the substantial initial expenses typically linked to retrofitting endeavours. Moreover, educational institutions can significantly contribute to promoting more robust environmental regulations and encouraging collaborations among academia, industry, and government. This study contributes to the expanding understanding of sustainable architecture, offering a replicable framework for upgrading educational facilities worldwide. Through the incorporation of renewable energy solutions, flexible design approaches, and sustainable materials, the EMU Faculty Building exemplifies a model for reaching carbon neutrality in current edifices. Future research may investigate the scalability of these strategies to different building types and locations, promoting the global transition to a low-carbon built environment.

To sum up, the path to Zero CO_2 and energy-plus buildings offers both difficulties and possibilities. It needs an integrated strategy that harmonizes environmental, economic, and social factors. The EMU Faculty Building exemplifies how creative design and cooperative stakeholder involvement can effectively address these issues, opening pathways to a more sustainable and resilient future.

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EVALUATION OF DAYLIGHT PERFORMANCE IN DOUBLE-SKIN FACADE SYSTEMS FOR BUILDINGS

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Abstract
In double skin facade (DSF) buildings, the amount of daylight entering the interior space varies depending on factors such as the characteristics of the exterior surface, the structure of the facade layers, architectural design details and shading elements. However, studies focusing on the effects of DSF systems on lighting are limited. This study aims to review previous academic research examining the daylighting performance of DSF in buildings and to analyze the effects of architectural design and detailing parameters (e.g. shading element, cavity depth, structure, surface materials and facade orientation) on daylighting. A literature search using the Scopus and Web of Science database initially yielded 503 publications, reduced to 24 publications based on specific criteria. The overall results reveal that DSF systems offer lower illumination levels but prevent glare and provide more homogeneous light distribution indoors compared to conventional facades. The study points to potential areas for future research.
Key Words: *Double skin facade; daylighting performance; energy efficiency; facade design; sustainable lighting*

1. Introduction

The Sustainability Guide (2020) states that daylight control is one of the key elements supporting sustainability in buildings. The use of daylight reduces energy consumption due to artificial lighting, improves the quality of space and visual perception of the environment, and provides visual continuity between indoor and outdoor spaces [1]. Moreover, natural lighting has positive effects on the health, well-being and cognitive performance of individuals. Therefore, the use of buildings with transparent facades has increased significantly and is expected to continue to increase in the future [2].

Lighting requirements based on building layout and orientation [3], task performance [4], glare risk [5], distribution of light on and around the work surface [6], and consistency of light throughout the day and between seasons should be considered. In addition, facade glazing can lead to significant heat loss or gain in buildings [7]. These factors can be influenced by factors such as building shape, location, terrain features (e.g. trees, water bodies, highly reflective surfaces) and glazing design. Therefore, efficient lighting in buildings requires a balance between the need for illumination and the control of undesirable effects.

In this context, the use of double skin facades (DSF) is gaining increasing attention in both hot [8] and temperate climates [9] with the aim of providing comfortable thermal conditions and giving buildings a transparent appearance. DSF consists of a standard facade, an air gap and an additional outer layer, usually made of glass. It is common to apply a shading system in the space between the facade layers [10]. In recent years, this technology has been used even in existing buildings [11].

Studies on the thermal performance of double skin facade (DSF) systems in buildings are available, but studies on daylight utilization are limited. Therefore, there is a need to assess the scope of existing research on the effects of DSF on natural daylight in buildings. In this context, the study aims to review previous studies addressing the effects of DSF on daylighting. Despite the limited number of studies, the study is important in identifying knowledge gaps in this area and highlighting potential uses of DSF in providing or regulating daylight.

1.1. Double Skin Facade Systems and Daylight Performance

In buildings with DSF systems, visible light is transmitted directly to the interior spaces through the facade layers. This depends on the reflection, transmission and absorption rates of direct and scattered radiation of each layer. In DSF systems, more reflection occurs than in conventional facades. The amount of light entering the interior depends on the characteristics of the facade architecture (size and shape of windows, size and position of shading elements) and the technical characteristics of the glazing layers (transparent, tinted and reflective glass).

Furthermore, other factors affecting daylight access indoors are layout (shading by existing buildings and vegetation, orientation), building geometry and opening parameters (size, position and configuration of windows and skylights).

Figure 1 shows how interior lighting is realized in double skin facade (DSF) systems. ‘direct sunlight’ from the sun first hits the outer layer of the facade system, from where it either enters directly or is reflected from the surface and reaches the interior as ‘externally reflected daylight’. In addition, ‘externally diffused daylight’ is diffused and scattered on the exterior surface and enters the interior. Light reflected from other buildings also contributes to the DSF system. The light entering the interior is homogeneously distributed as ‘internally reflected daylight’ and ‘material diffused daylight’ by reflections on the facade surfaces. Thus, DSF systems provide a controlled and balanced illumination to the interior.

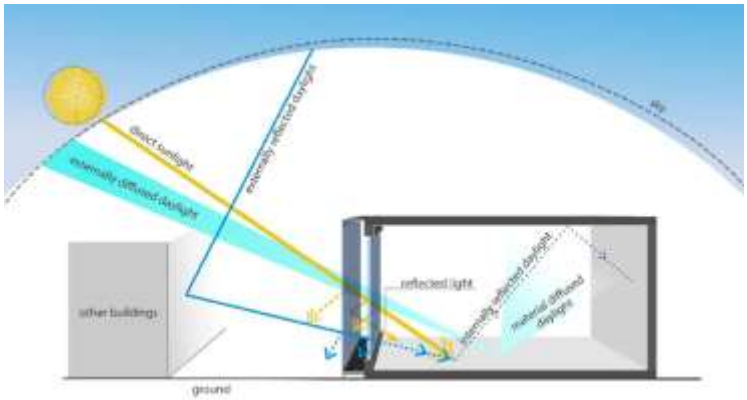

Fig. 1. Lighting sources and reflections in a building with double skin facade [12]

Double-skin facade (DSF) systems are categorized into different types based on their design characteristics and airflow principles, including box window, shaft-box, corridor, and multi-story façade systems [10] (Figure 2). The box window system provides independent air cavities for each floor, allowing localized control, which can enhance daylight distribution and visual comfort in individual spaces. Shaft-box systems, with vertical shafts extending throughout the building, support natural or mechanical ventilation and contribute to improved daylight penetration by reducing obstructions. Corridor-type systems optimize ventilation through horizontal airflow and are often preferred in buildings with larger openings, offering a balanced distribution of natural light across wider spaces. Multi-story facades, on the other hand, feature a continuous air cavity along the building's entire height, ensuring uniform airflow and improved energy performance. This uninterrupted cavity also facilitates better daylight autonomy and spatial uniformity by reducing light obstruction between floors, making multi-story DSFs particularly effective in enhancing both energy efficiency and daylighting performance.

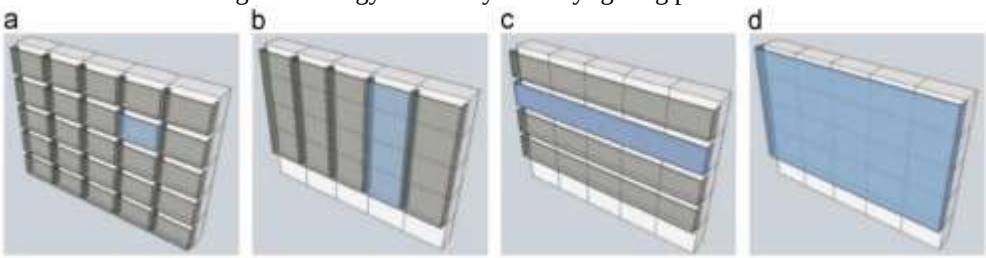

Fig. 2. DSF classification: (a) box, (b) shaft, (c) corridor and (d) multi-storey double skin facade [10]

1.2. Methodology

The literature review in this study was based on the PRISMA Protocol recommendations [13]. Data collection was done using the Scopus and Web of Science database. The keywords searched in the research were determined as follows: ("daylight" OR "natural light" OR "sunlight" OR "daytime") AND ("double-skin facades" OR "double facade" OR "double skin system" OR "dual-skin facade"). From the Scopus search, 458 records were found, this number decreased to 303 when limited as 'Engineering', decreased to 235 when limited as 'article', decreased to 232 when limited as 'English and Turkish', and decreased to 90 when re-limited by selecting the terms 'daylighting', 'daylight', 'double-skin facade' and 'double skin facade' as keywords. Also, using Scopus AI, 'Can you list the articles that examine the daylight effect on double-skin facades?' The question was asked, and 7 articles were reached as a point shot. From the Web of Science search 45 records were found and when limited as 'article', decreased to 27. 10 of them were selected as they met the keywords.3 of them are the same as those found in the Scopus search. Among 104 studies, all sources were scanned and 24 articles that seemed suitable for the study were considered, 4 of which were review articles (Figure 3).

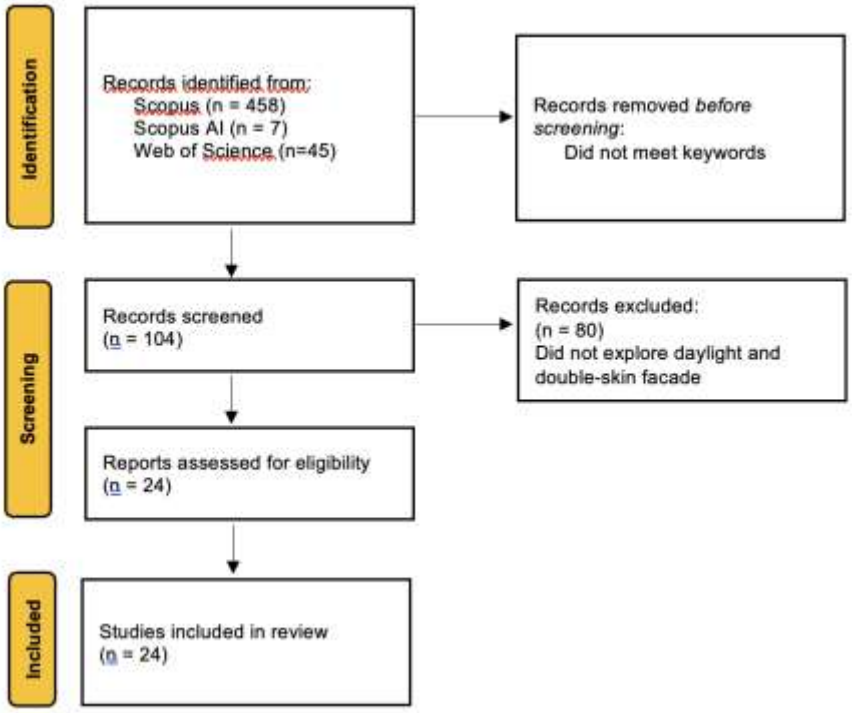

Fig. 3. Flow diagram of the literature search strategy

Scopus AI 'Can you list the articles that examine the daylight effect on double-skin facades?' A concept map was determined from the 7 articles he provided in response to the question (Figure 4).

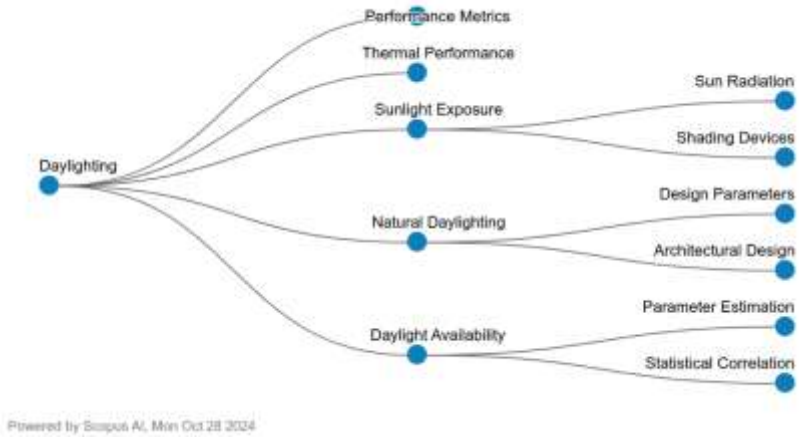

Fig. 4. Scopus AI concept map

A concept map was produced using the VOS viewer application from the initial 503 sources (Figure 5).

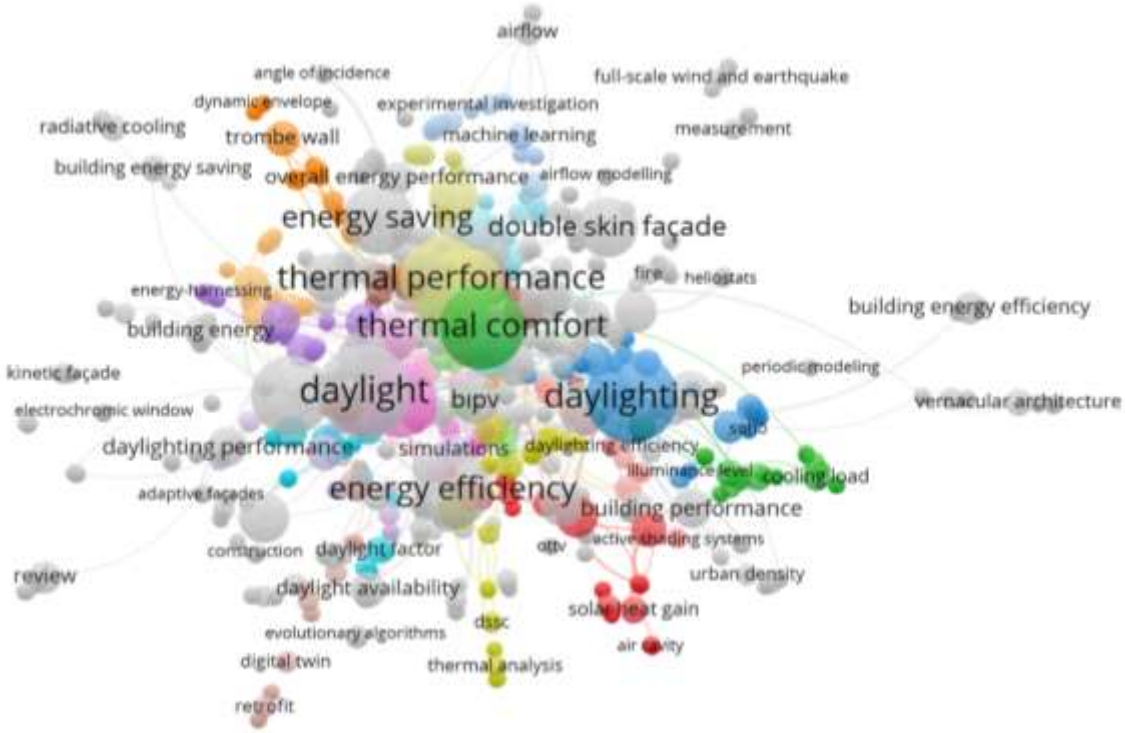

Fig. 5. Concept map obtained from 503 sources

2. Findings and Recommendations

In this study, the daylighting performance of buildings with double skin facades (DSF) is summarized in 24 articles (Table 1). The review analyzed various parameters such as building type and use, location, facade orientation, DSF geometry, facade layer depth, surface materials and shading devices. Research studies generally examine the effects of south-facing facade orientations, cavity depths between layers ranging from 5 cm to 1000 cm, materials such as glass, ETFE foil, photovoltaic and metal panels, and shading devices such as venetian blinds, perforated steel panels, photovoltaic panels and solar panels on daylight performance.

Table 1. Parameters that can affect the daylighting factor in double skin facade systems

Reference	Typology/ use	Location	Orientation	DSF geometry	Cavity depth (cm)	Skins materials	Shading device
Zheng et al., 2024 [14]	-	Xiamen, China	south-facing	multi-storey	-	aluminum alloy Venetian blinds with a high reflectivity coating, single-layer glass, and an external light shelf	Venetian blinds (VBs)
Flor et al., 2022 [15]	educational, commercial or office buildings	London, Barcelona and Shanghai	south-facing	corridor type	-	glazing and ETFE foil	ETFE foil
Zhang et al., 2022 [16]	residential buildings	Xi'an, China	south-facing	box type	100 cm	polycrystalline PV modules, solar thermal collectors, transparency double-glazed	PV modules and solar thermal collectors
M. ElBatran & Ismaeel, 2021 [17]	office buildings	Cairo, Egypt	south-facing	multi-storey	20-60 cm	glazed or tinted glass	perforated solar screens

Srisamranrungruang & Hiyama, 2021 [18]	office buildings	-	south and west facades	-	50 to 100 cm	glass and perforated steel screen	perforated steel screen
Barone et al., 2024 [19]	multi-story buildings	Mediterranean countries, notably Cyprus	east-to-west orientations	multi-storey	50-1000 cm	monocrystalline PV panels and double-glazed glass	-
Chi et al., 2017 [20]	office buildings	Seville, Spain	-	multi-storey	5 cm	perforated screens and glazing	perforated screens (white paint finish with 90% visible and solar reflectance
Gomes et al., 2022 [21]	commercial buildings	Lisbon, Portugal	south-facing, with a slight eastward deviation	box type	-	double tilted Venetian blinds and glazing	Venetian blinds
C. Wang et al., 2022 [22]	-	Hefei, China	south-facing	-	7 cm	CdTe PV glazing, clear glass	CdTe glazing
Huang et al., 2024 [23]	-	Wuhan, China	south-facing	multi-storey	5 cm	aluminum perforated screens and glazing	aluminum perforated screens
Gaspari et al., 2024 [24]	residential buildings	Bologna, Italy	west and south	multi-storey	-	glazing and metal panels	metal panels
Dewi et al., 2022 [25]	educational building	Depok, Indonesia	north and south	corridor type	135 cm	glazing and opaque brick	opaque brick
Gholami & Talaei, 2024 [26]	office buildings	Mashhad, Iran	south	box and corridor type	-	glazing and metal panels	metal panels
Aksamija, 2018 [27]	office buildings	Duluth, Chicago, San Francisco, Miami	north, south, east, west	box, corridor, multi-storey	60-90 cm	standard curtain wall and double-glazed panels	-
Chen et al., 2021 [28]	residential buildings	Guanghan, China	southeast, southwest	box	-	double glass glazing- PV modules	PV modules
M. Wang et al., 2017 [29]	office buildings	Hong Kong, China	south-facing	multi-storey	40 cm	tempered glass- PV layers	PV layers
Kim et al., 2015 [30]	residential buildings	South Korea	south, southeast, southwest-facing	-	90 cm	aluminum frame - glass	horizontal slats 20 cm width
Ioannidis et al., 2017 [31]	office buildings	Montreal, Canada	south-facing	-	10 cm 50 cm 60 cm	glass glazing- PV modules	automated roller shades
Roberts et al., 2023 [32]	commercial buildings	London, United Kingdom	south-facing	box	40 cm	semi-transparent a-Si PV glazing - double low-emissivity (Low-E) clear glazing	semi-transparent PV glazing
Khabir et al., 2024 [33]	office buildings	Ahvaz, Iran	south-facing	corridor	50 cm 100 cm 150 cm	double-clear and triple-clear glazing	louvers (0.5-1.5 m) and window blinds

Table 2 summarizes the main findings of research to improve daylighting performance in buildings with double skin facades (DSF). Studies show that with the proper configurations, DSF systems provide balanced indoor lighting, visual comfort and energy efficiency.

Table 2. Main findings of the studies

Reference	Main findings
Zheng et al., 2024 [14]	Mechanically ventilated double- skin facade systems combined with Venetian blinds and light shelves improve occupant comfort in hot climates by minimizing glare while increasing daylight utilization and energy efficiency in the interior.
Flor et al., 2022 [15]	Double- skin facades using adaptive ETFE foil reduce glare by distributing daylight homogeneously and increase energy efficiency indoors in different climatic conditions.
Zhang et al., 2022 [16]	The integration of a productive double-skin facade (PDSF) with photovoltaic and solar thermal modules significantly enhances indoor daylighting comfort while reducing outdoor light pollution, making it an effective solution for sustainable building design.
M. ElBatran & Ismaeel, 2021 [17]	Optimizing double skin facades (DSF) with selected perforation ratios of 50-60%, combined with depths of 40-60 cm and a 40 cm gap width, effectively enhances daylighting and visual comfort in office buildings by achieving sufficient natural light while minimizing glare in hot arid climates.
Srisamranrungruang & Hiyama, 2021 [18]	The study finds that a double-skin facade with 40% perforation on the south-facing facade and 10% on the west-facing facade provides optimal daylight access while minimizing glare.
Barone et al., 2024 [19]	The study finds that smaller DSF depths (less than 7 meters) are more effective for reducing heating demands, while larger DSF depths (greater than 6 meters) reduce cooling requirements.
Chi et al., 2017 [20]	The study concluded that an optimally configured perforated solar screen with a 37.5% perforation ratio could increase the 'actual daylit area' by 50% and reduce overlit areas by 50%, compared to a fully glazed facade without PSS, achieving a balanced daylight level of 300 lux for at least 50% of occupied hours.
Gomes et al., 2022 [21]	The study found that double tilted Venetian blinds (DTVB) significantly enhance daylighting in south-oriented spaces by increasing the average daylight factor (DF) up to 3.8 times compared to traditional Venetian blinds when the upper slats are tilted at 0° and lower slats at 90°, providing improved daylight distribution and reducing glare discomfort.
C. Wang et al., 2022 [22]	The CdTe-DSV window system improved daylighting performance by achieving a daylight factor of 0.6%, reduced daylight glare index (DGI) by maintaining levels below 24 for 99.2% of the occupied time with 80% PV coverage and enhanced useful daylight illuminance (UDI) over 70% for 82% of the occupied area, ensuring visual comfort and optimal daylight distribution.
Huang et al., 2024 [23]	The study identified the periphery-center pattern as the optimum variation for non-uniform perforated solar screens. This pattern achieved the highest overall performance by providing balanced daylighting with a useful daylight illuminance (UDI) of 78%, minimized glare with a daylight glare probability (DGP) below 10%, and improved daylight uniformity, making it suitable for both visual comfort and energy efficiency across orientations.
Gaspari et al., 2024 [24]	The study found that a perforated shading panel with a 15% openness factor (OF) optimized daylight distribution by maintaining 300 lux across 70% of the room, while limiting areas of glare over 1000 lux near windows.
Dewi et al., 2022 [25]	As a result, reflective glass with a window-to-wall ratio of 40% and a shading coefficient of 0.42 is recommended for the north facade and transparent glass with a window-to-wall ratio of 60% and a shading coefficient of 0.95 is recommended for the south facade; however, additional electric lighting will be required to meet minimum lighting standards, especially in overcast conditions.
Gholami & Talaei, 2024 [26]	The study found that adaptive shading strategies, particularly those adjusting shading angle and pattern geometry, improved daylight autonomy (sDA) by up to 26% in summer, reducing annual sunlight exposure (ASE) by 25.7% in high-glare conditions.
Aksamija, 2018 [27]	The study found that the multi-storey DSFs with a 0.6m cavity performed best in daylighting during the summer (July) for northern and eastern orientations, achieving up to 37% of floor area with illuminance levels of 500 lux or more in cities like Miami and Chicago.
Chen et al., 2021 [28]	The bifacial PV module system achieved a daylight autonomy (DA) of 93% and a useful daylight illuminance (UDI) of 69%, indicating sufficient natural lighting while maintaining visual comfort, with optimal power generation and daylighting performance occurring at 74% PV coverage.

M. Wang et al., 2017 [29]	The PV-DSF achieved daylight illuminance of up to 350 lux, fulfilling 70% of the office illuminance requirement.
Kim et al., 2015 [30]	The Double-Skin Facade achieved a 17% improvement in illuminance uniformity, reduced glare with maximum daylighting levels below 1000 lux at the front space, and enhanced daylight penetration into deeper spaces by secondary diffused light while maintaining optimal cavity depth at 90 cm and shading slat width at 20 cm.
Ioannidis et al., 2017 [31]	The study found that integrating semi-transparent photovoltaic (STPV) panels with 30% transmittance in a double-skin facade (DSF) with a 0.5-meter cavity depth can reduce incident solar radiation by up to 92% during summer while maintaining adequate daylight levels, highlighting the effectiveness of combining shading devices and PV technology for optimized energy and daylight performance.
Roberts et al., 2023 [32]	The study found that photovoltaic glazing in a double-skin facade reduced maximum indoor daylight illuminance by 73% and achieved an average daylight factor of 0.65%, failing to meet the BREEAM daylighting criteria for office environments, thereby necessitating supplementary artificial lighting.
Khabir et al., 2024 [33]	The study finds that single-skin facades provide higher spatial daylight autonomy, reaching up to 68%, but with higher risks of glare, with annual sunlight exposure up to 19%, while double-skin facades effectively reduce glare to as low as 2% but significantly lower spatial daylight autonomy to as low as 30%.
Dastoum et al., 2024 [34]	Geometric patterns in building facades, particularly tessellated designs, significantly enhance daylighting and thermal efficiency, but further research is needed to optimize their integration across varied climates and building types.
Barbosa et al., 2024 [12]	The main finding regarding daylighting in double-skin facades (DSFs) is that adding a second skin generally reduces daylight levels compared to single-skin facades but enhances uniform light distribution, prevents glare, and deepens natural light penetration into indoor spaces, making it an effective solution for balanced daylighting in buildings.
Unluturk & Kazanasmaz, 2024 [35]	The main finding related to daylighting in double-skin facades (DSFs) is that DSFs allow for effective control and distribution of natural light, enhancing indoor visual comfort by reducing glare and ensuring even light spread, making them a sustainable solution for daylight optimization in buildings
Tolba et al., 2023 [36]	The study found that integrating adaptive technologies such as electrochromic glazing and dynamic shading devices into curtain walls (CWs) can improve daylighting performance by reducing glare perception by 20% and increasing useful daylight illuminance by over 50% during working hours, while maintaining energy efficiency and visual comfort in office spaces.

Double-skin façade (DSF) systems offer numerous advantages in terms of daylight utilization and energy efficiency. Mechanically ventilated DSFs, combined with Venetian blinds and light shelves, reduce glare while enhancing daylight utilization and energy savings in hot climates. Adaptive materials like ETFE foil have been shown to distribute daylight homogeneously, improving indoor energy efficiency. Productive DSF systems integrated with photovoltaic and solar thermal modules significantly enhance indoor daylighting comfort and reduce outdoor light pollution. Optimized perforation ratios (50-60%) and cavity depths (40-60 cm) effectively provide daylighting and visual comfort while minimizing glare. Research indicates that smaller DSF depths (<7 meters) are effective in reducing heating demands, whereas larger depths (>6 meters) lower cooling requirements. Furthermore, the integration of various shading devices and photovoltaic glazing has improved both visual and energy performance. Overall, studies emphasize that DSFs are an effective solution for sustainable building design, particularly for their ability to ensure even light distribution, prevent glare, and enhance visual comfort.

In conclusion, DSF systems, when optimized with the proper design parameters, have the potential to improve indoor energy efficiency, provide visual comfort and offer balanced illumination. The studies highlight the importance of appropriate design strategies to maximize the lighting performance of DSF in different geographical regions and climatic conditions. These results provide important guidance for designers seeking to optimize daylight performance in future DSF applications.

This study highlights the need for further research on the daylight performance of double-skin facade systems. Future studies should explore strategies for integrating DSFs into building and interior design to optimize natural lighting while minimizing glare and improving spatial uniformity. These investigations should also evaluate the combined impact of daylight optimization on energy efficiency, interior aesthetics, and occupant satisfaction in office environments. Such efforts would not only fill a critical gap in the existing literature but also promote the design of more sustainable, functional, and user-friendly building and interior systems.

3. Challenges and Future Research Directions

Despite advancements in double-skin façade (DSF) systems, optimizing daylight performance remains a significant challenge. A critical issue involves balancing the maximization of natural light with the minimization of glare, particularly in regions with intense sunlight. Achieving uniform daylight distribution across interior spaces is further complicated by variations in building geometry, façade orientation, and external obstructions. Moreover, the integration of adaptive shading

devices and daylight-responsive technologies remains underdeveloped, limiting the dynamic regulation of daylight levels throughout the day. Additionally, the performance of DSF systems in diverse climatic conditions, particularly in overcast or high-latitude regions, requires further examination to ensure consistent daylight autonomy.

Future research should prioritize the development of advanced daylight simulation models that account for both spatial and temporal variations in light distribution. The exploration of innovative materials with superior light-transmitting properties, such as dynamic glazing and advanced coatings, is necessary to enhance daylight performance. Furthermore, empirical studies evaluating occupant perception and comfort related to daylight quality are essential to inform the design of more user-centered systems. Investigating hybrid systems that integrate DSFs with smart lighting technologies may also facilitate an optimal balance between natural and artificial lighting, improving both energy efficiency and visual comfort in building environments.

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QUANTIFYING BIOPHILIC DESIGN: DAYLIGHT AND CIRCADIAN RHYTHM IN OFFICE INTERIORS

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Abstract
Biophilic design, which emphasizes the integration of natural elements into built environments, has become a common approach in the field of interior architecture, architecture and design. Especially after the pandemic, the desire to add natural elements to interiors has increased with the desire to turn towards nature. Biophilic design and sustainability issues in interiors have thus become more effective. Light and natural lighting is one of the most important of these issues. However, due to the discrepancies and variations among definitions of biophilic design, most studies are qualitative and there are limited quantitative studies. This results in challenges regarding the generalizability as well as practical applications of interiors designed with daylight within the biophilic context. According to literature, the circadian rhythm is influenced by daylight and is a significant component of lifecycle, health, wellbeing, and productivity in the work environment. The aim of this study is to approach the relationship between the circadian rhythm, daylight, and biophilic design from a more objective and generalizable viewpoint with mobile technologies and to make it potentially more comparable within the research landscape. The data obtained in the study were analyzed using evidence-based research methods and appropriate technological tools. The findings reflect the characteristics, nature and effects of these connections between daylight in the office interior space and the circadian rhythms of inhabitants, providing paths to the future of both research and design applications. Moreover, the methods used in the study open up new grounds for discussion regarding new tools and instruments used to make biophilic design studies more impartial.

Keywords: *Biophilic interior design; Sustainability; Office design; Daylight; Circadian Rhythm*

1. Introduction

The Greek word "*Biophilia*", meaning "*love of nature*", was first introduced by the social psychologist Erich Fromm [1]. Wilson defined biophilia as "the innate emotional connection humans have with other living organisms" [2]. Biophilic design, which integrates natural elements into built environments, has gained significance in design, and specifically, interior design and architecture [3]. The COVID-19 pandemic has further intensified this tendency as inhabitants seek a connection with nature in their living and working spaces [4]. Research shows the positive effects of interaction with nature on people's psychological health [5]. As the primary place where most people spend their entire day, office environments have become the main place where they can receive a natural element such as daylight all day. Daylight, being the most accessible and fundamental part of nature in built environments, provides an effective medium through which biophilic principles can be applied. The controlled access of daylight in interior spaces contributes to indoor spaces mimicking the outdoors.

The benefits of daylight can also be felt during brief outdoor walks on sunny days or through the design of spaces that incorporate daylight and sunlight within the interior [6]. People physiologically and psychologically prefer daylight mainly through levels of serotonin over artificial lighting as their primary source of illumination and it affects the overall satisfaction levels of people [7]. Research has indicated that the physical conditions of an indoor environment can impact the health, well-being, comfort, satisfaction, and productivity of office workers. Therefore, adding natural elements such as light to interiors not only affects people psychologically and physiologically, but also contributes to sustainability, human health, and well-being.

Despite the importance of the daylight factor to human health mentioned in studies in the literature, although there are different definitions and interpretations of biophilic design, the practice remains in the minority and evidence-based data is limited, affecting generalization of findings, as well as and comparative studies. In 2008, Ulrich emphasized that research that was more effective primarily in hospitals and healthcare settings due to specific evidence-based research methods is now applicable in wider contexts thanks to new technologies [8]. The introduction of smartwatches has simplified data collection processes as well as expanding the settings in which evidence-based research may be planned. Although these findings may not be clinical, they facilitate faster knowledge creation and sharing by providing easily accessible information and contribute to the development of new methodologies in the field. The aim of this study is to explore the opportunities of new technologies

in contributing to the evidence-based literature. The study aimed to compare the relationship between the two by measuring the amount of daylight inhabitants of office interiors receive during the day and tracking their sleep levels, and to examine how this relationship relates to people's circadian rhythms.

1.1. Circadian rhythm and daylight

Daylight plays an important role in regulating the circadian rhythm, which is crucial for the life cycle, health and productivity, especially in office interiors [9]. A circadian rhythm or cycle, is a biological, internal process that regulates the sleep-wake cycle and repeats approximately every 24 hours. The human sleep cycle is an example of a circadian rhythm and is shifted based on light levels [10]. It is a system in the bodies of human beings that not only regulates sleep, but also programs many functions. However, the interaction between daylight and circadian rhythms in the context of biophilic design has not been adequately explored from a quantitative perspective. Studies have shown that adequate daylight exposure can help maintain the natural circadian cycle, leading to improved sleep quality and increased alertness during waking hours [11]. Such research is essential to develop standardized criteria and technologies. Research shows that, office workers situated near windows, who likely receive more natural light throughout the day compared to those in windowless offices, demonstrated greater overall activity and, on average, slept about 46 minutes longer at night. The human sleep cycle, which is a type of circadian rhythm, adjusts according to light exposure [12]. Figueiro et al. (2002) [13] and Heerwagen (1998) [14] assert that bright daylight possesses therapeutic benefits. It helps regulate circadian rhythms, boosts mood, supports neurological health, and influences alertness. Including daylight in the design of office interiors and raising awareness among interior designers can support the natural circadian rhythm and create a healthier and more productive environment for inhabitants.

2. Method: Case Study

The arrangement for the case study started with application for the ethical report and application for a “Scientific Research Project” (BAP 2024-03) processes to get the proper equipment for the tests after researching the instruments and the tools for the study. After the conducting the trials and set up of the smartwatches, the study was conducted in the selected office spaces of a university campus in İzmir, Turkey with the participation of 16 office inhabitants. Conducting this study in Turkey contributes to the study in terms of a country that experiences all four seasons, so that the study can be observed and evaluated more comprehensively in all four seasons. İzmir is under the influence of the Mediterranean climate in terms of vegetation [15]. In İzmir, the summer season is hot and dry, and the winter is warm and rainy [16]. During the study, the climatic conditions of İzmir is also be taken into account.

In order to obtain realistic data, evidence-based research methodology was used to collect data from inhabitants in real interiors. Six smartwatches were used as tools and participants were asked to wear these smartwatches during 5 working days and 5 evenings while sleeping. The smartwatches thus tracked the 5-day daylight intake and sleep cycles of these inhabitants. Tests were conducted with users over 18 years of age, as recommended by the smartwatch guidelines REM and deep sleep processes from sleep data and the amount of daylight they received all day were compared and analyzed with graphs. In the study, offices in 3 different buildings in the campus area were used. There are two types of offices within these offices: some are cell offices, while others are open offices. The office inhabitants surveyed all work the same working hours during the day and take their lunches and breaks at very similar times. All three office areas have windows (Fig. 1). Although there was a curtain in the interior where participants C was located, the users never closed the curtain on the days of the case study test with the smartwatches. In figure 1, top images belong to office D, bottom left image belongs to office c and bottom right image belongs to office E. There are some separators, intermediate cabinets or different systems in all three offices and are illuminated with both artificial light and daylight.

Fig. 1. Case study office interior views on a typical day (The top images belong to the two opposite views within office D, the bottom left image belongs to office C and bottom right image belongs to office E)

As seen in Table 1, the inhabitants of the three different office buildings are coded with different letters. First of all, the amount of daylight the participants received for 5 days was obtained and compared together (Table 1). The data appears to be in a cycle that increases towards noon and decreases towards evening. Depending on the amount of daylight coming into the office, the data appears to have varied depending on where the inhabitants sat.

Table 1. Daylight intake of the participant's (in minutes)

Day	C02	C03	D01	D02	D03	D05	D06	D07	D09	D10	D11	D12	D13	D14	D15	E02
Day 1	122	30	142	45	76	83	109	119	36	14	155	43	96	26	242	114
Day 2	277	36	71	123	104	117	117		35	47	128	62	82	82	119	65
Day 3	263	49	116	49	109	125	25	161	65	98	181	84	114	69	266	204
Day 4	30	48	53	81	57	155	115	192	48	123	203	66	90	81	128	183
Day 5		36	145	195	24	99	113	119	22	99	133	106	41	46	246	100

Daylight exposure plays a significant role in regulating the circadian rhythm, which is the body's internal clock that influences sleep-wake cycles [17]. Research has shown that natural light helps align circadian rhythms with the external environment, promoting better sleep quality and overall health [18]. According to studies, it has been revealed that vitamin D taken daily from the sun affects the level and quality of sleep at night. The effect of daily intake of vitamin D on sleep quality has been investigated with increasing interest in recent years. Research shows that vitamin D deficiency may be associated with sleep disorders and poor-quality sleep [19]. Vitamin D is thought to act on receptors in regions of the brain that regulate sleep, which may positively affect sleep cycles [20].

Additionally, it has been noted that adequate vitamin D levels can increase melatonin production and therefore the ability to fall asleep [21]. For this reason, the sleep levels of the participants were measured in this study. A lack of REM sleep can lead to cognitive dysfunctions and emotional imbalances, resulting in reduced sleep quality [22]. REM sleep is thought to improve both the mental and physical health of individuals, which contributes to the overall improvement of sleep quality.

As seen in Table 2, inhabitants from three different offices slept for 5 nights and the amount of REM in minutes of sleep is shown. The absence of data in some columns may be due to a technical problem with the watch or the respondent may not have worn the watch while sleeping that night (Table 2). As seen in Table 3, in order to perform adequate sleep analysis, participants were also monitored for the duration of deep sleep from the sleep test. The measurements shown in the table are all in minutes, some participants' deep sleep durations could not be monitored because of a technical malfunction or because the participant did not wear a watch that night or because the batteries ran out (Table 3).

Table 2. REM sleep duration of the participant's (in minutes)

Day	C02	C03	D01	D02	D03	D05	D06	D07	D09	D10	D11	D12	D13	D14	D15	E02
Day 1	106	55	111	121	49	55	118	68	114	78	79	98	74	123	53	110
Day 2	117	105	80	97		76		91	91	97	66	98	66	119	63	73
Day 3	145		75	121	53	87	114		116	50	101	138	95	103	63	94
Day 4	67	73	74	102			101	74	88	115	96	123		129	61	
Day 5			104	157	31	73				111		130	78	100	42	

Table 3. Deep sleep duration of the participant's (in minutes)

Day	C02	C03	D01	D02	D03	D05	D06	D07	D09	D10	D11	D12	D13	D14	D15	E02
Day 1	81	84	18	28	43	105	61	71	48	61	43	45	42	61	35	78
Day 2	79	51	35	18		82		52	67	50	55	19	71	38	36	81
Day 3	31		62	54	17	75	32		49	59	68	74	65	43	36	63
Day 4	13	22	42	0			48	17	56	54	73	32		68	24	
Day 5			32	45	23	65		56		67		48	38	44	37	

3. Findings and evaluation

The sample group was formed of 16 people who participated in the study, two of whom were male and the rest were female. Data were evaluated and graphs were prepared according to daily daylight intake and the sleep duration data for understand the effects of daylight on the circadian rhythm to the inhabitants. All data in the analyzed graphs are in minutes. The maroon color indicates REM sleep, dark blue color indicates deep sleep duration, and yellow color indicates daylight intake.

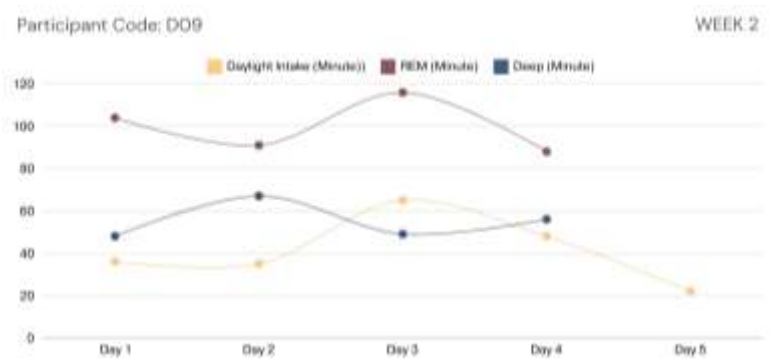

Fig. 2. Participant D09's daylight intake and sleep data

First, when the three examples from the sample selected for the study are examined, in the graph of participant D09 (Fig 2), it was observed that REM sleep increased as daylight increased and decreased as daylight decreased. This emphasizes that there is a relationship between daylight and sleep durations. Deep sleep minutes appear to mirror daylight for this participant.

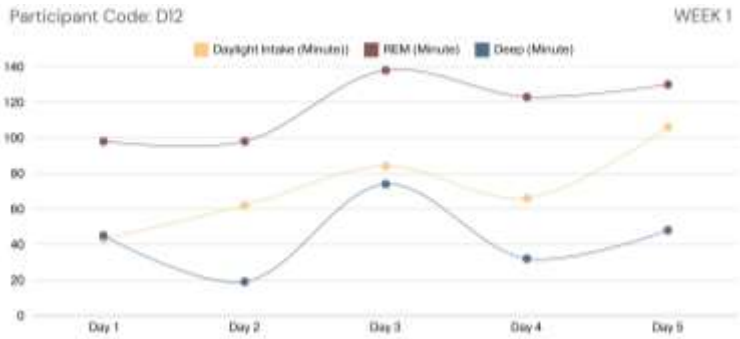

Fig. 3. Participant D12's daylight intake and sleep data

In the graph of participant D12 (Fig 3), daylight intake increased and decreased at the same rate as REM and deep sleep and increased again on the last day. Overall, the graph suggests a correlation between increased daylight exposure and improvements in REM and deep sleep. The participant's duration of REM sleep was consistently higher than deep sleep on all days. It is clear from the graph that daylight intake affects sleep patterns.

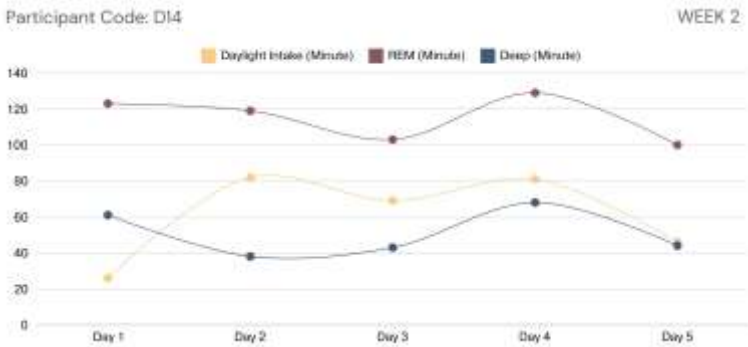

Fig. 4. Participant D14's daylight intake and sleep data

In the graph of participant D14 (Fig 4), daylight intake increased around day 2, decreased again on day 3, increased on day 4, and decreased significantly on day 5. The REM sleep pattern fluctuated in line with daylight exposure, indicating a potential link between higher daylight intake and enhanced REM sleep. Deep sleep stayed mostly stable with minor variations, peaking slightly near day 3, which suggests minimal impact from light changes. Overall, the graph illustrates that even though indoor light is consistent, variations in daylight intake led to increased and improved REM sleep, particularly mid-week.

In addition to the selected examples above, when 16 inhabitants' charts are examined, it can be observed that all the sleep durations (REM and deep) of 13 out of 16 participants were positively affected by daylight. The increase in the amount of daylight received by these participants is directly proportional and related to the increase in both REM and deep sleep processes. In one participant, the amount of light was only associated with REM sleep. In other words, in total, it was found that the sleep quality of 14 participants was related to daylight intake. This may indicate the need for balanced light exposure to maintain optimal sleep quality and well-being. It may also be evidence that light affects the circadian rhythm cycle.

4. Conclusion

This study aims to shed new light on the topic of biophilic design and related methods, introduces new instruments, promoting discourse on the use of technology to achieve objectivity in biophilic design research. These advancements could provide a more rigorous approach as well as a clear framework for designing sustainable and health-promoting environments, creating solutions for future studies and applications. This study stresses that incorporating daylight in office interiors can significantly enhance both the physical design and the psychological and physiological health of employees. The findings propose that daylight plays a crucial role in boosting regulating circadian rhythms, and promoting overall well-being. Utilizing wearable technology to track physiological indicators such as sleep monitoring offers a detailed understanding of daylight's impact on inhabitants.

By gathering data at various times during the day, the study emphasizes the dynamic effects of light exposure. This method not only increases the integrity of the results but also surfaces the way for future research in biophilic design and the well-being inhabitants in office interiors. Finally, this study underlines the significance of integrating nature into office interiors.

As the need for healthier and more stimulating offices grows, the findings from this study should guide future interior architectural and design practices. It is essential to keep researching and applying biophilic design strategies that emphasize the vital role of daylight in creating a flourishing office environment. The impact of this research goes beyond aesthetics, informing a more comprehensive approach to office environments design that prioritizes human health and the innate connection to nature.

Acknowledgements

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ABOUT HISTORICAL PLACE-VISITOR INTERACTION WITH ONLINE COMMENTS: TRABZON MEMİŞ AĞA MANSION

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Abstract
Historical structures are important elements reflecting cultural heritage and social dynamics, and changing conditions over time cause these structures to lose their functions. Reusing is necessary for the preservation of these structures and their integration into social life. Visitor satisfaction stands out as a critical element determining the success of the space during the reuse process. This study aims to reveal visitor experiences through online comments by addressing visitor satisfaction in the process of re-using historical spaces through Trabzon Memiş Ağa Mansion. For this purpose, a five-stage method was followed in the study. In the first stage, a theoretical infrastructure was created by examining existing research on the relationship between historical structures, re-using, visitor satisfaction, and online comments. In the second stage, a field study was conducted to collect spatial and visual data of the mansion, and information was obtained about the location, interiors, and surroundings of the structure. In the third stage, 1,708 comments made via the Google Maps platform were collected. In the fourth stage, online comments were analyzed using the content analysis method using the MAXQDA program; frequently used words were determined, and a word cloud was created. In the last stage, the words obtained were grouped and evaluated in terms of environmental, spatial, functional, emotional, and temporal features of Memiş Ağa Mansion. Thus, a data set was created to understand the factors affecting the perception and satisfaction of visitors. As a result, it is seen that visitor experiences receive positive feedback in terms of environmental, spatial, functional, emotional, and temporal aspects. Ensuring visitor satisfaction reveals the importance of considering visitor experiences for the protection of Trabzon Memiş Ağa Mansion and its integration into social life.
Key Words: *Re-using, visitor satisfaction, online comments, Memiş Ağa Mansion.*

1. Introduction

Historic buildings are critical elements that reflect the cultural heritage, social dynamics and historical development of a society. These buildings are valuable not only for their architectural aesthetics but also for providing deep insight into the history, traditions and lifestyles of the communities in which they are located. As Drury et al. [1] stated, historic buildings carry traces of the past, strengthening local identity and keeping social memory alive. In this context, historic buildings are not only physical assets but also play a vital role in the transmission and preservation of cultural values. However, changing social, economic and environmental conditions over time have caused these structures to lose their original functions. Industrialization, urbanization and modernization processes have reduced the functionality of traditional structures, leading to the abandonment or extinction of many historical structures. This situation brings to the fore the necessity of preserving and re-using historical buildings.

Re-using provides a new function to a structure that has lost its original function, thus extending the life of the structure and integrating it into social life [2][3]. This process ensures the preservation of architectural and cultural values, while also allowing the re-evaluation of structures in a way that meets social needs. For example, historical houses can be revived with different functions such as museums, libraries, art galleries or social activity areas. It is emphasized that the reuse process should not be limited to a physical transformation, but should preserve the spirit and social context of the space. In this context, reuse redefines the role of these structures in social life by increasing the interaction of visitors with the space.

Visitor satisfaction is one of the most critical elements that determine the success of a space. Visitors' interactions with the space are shaped by their expectations regarding the functionality and aesthetics of the space. Visitor satisfaction is affected by factors such as past experiences, advertising and word of mouth, and this situation becomes an important criterion to be taken into account in the process of re-using the space [4]. How visitors perceive the space, the design of the space, the services offered and the general atmosphere directly affect their satisfaction levels. Therefore, taking into account the views and experiences of visitors in the re-using process both increases the success of the space and contributes to the strengthening of social ties. In addition, ensuring visitor satisfaction is of critical importance for the sustainable preservation of historical structures. Therefore, meeting the expectations of visitors in the re-using process of the space stands out as an important requirement for future protection and functionality.

In the study, visitor satisfaction and evaluations will be analyzed through online comments. Today, online comment platforms have become an important source for sharing and evaluating visitor experiences. With the widespread use of the internet, online comments play a critical role in the decision-making processes of potential visitors. Research shows that 84% of internet users see online comments as personal recommendations and 68% make decisions by reading these comments [5].

Mathwick and Mosteller [6] state that online user reviews constitute an important data source for consumers and that these reviews are the main reason behind 20-50% of all purchasing decisions. This situation reveals how effective online reviews are in visitors' venue choices.

There are many studies in the literature examining the impact of online reviews on potential customers' decision-making processes. For example, Ak and Altunöz [7] analyzed online reviews on thermal hotels, while Ateş and Sunar [8] investigated the tourism values of a destination through online reviews. In addition, Çuhadar et al. [9] examined reviews on food and beverage venues, while Ateş and Sunar [10] addressed the role of online reviews in the evaluation of cultural landscape areas. Cengiz and Başaran [11] evaluated user experiences about a product through reviews. While Tunçalp [12] examined the effect of online reviews on hotel sales prices, Karaca and Gümüş [13] revealed the effects of these reviews on purchasing behavior. However, there are limited studies in the literature on the evaluation of visitor experiences after the re-using of historical buildings through online reviews. This situation presents an important research area in terms of understanding the visitor satisfaction of historical buildings such as Trabzon Memiş Ağa Mansion.

In this study, the visitor experiences of Trabzon Memiş Ağa Mansion will be analyzed through online comments. The comments collected through platforms such as Google Maps will contribute to the determination of visitor satisfaction as well as the necessary improvements for the sustainability of the structure. The interactions and experiences of the visitors with the space will provide important data for the future preservation and functionality of Memiş Ağa Mansion. The analysis of online comments plays a critical role in determining visitor satisfaction and identifying missing points in the process of re-using historical structures. Thus, it will allow the necessary steps to be taken for both the preservation and integration of Memiş Ağa Mansion into social life.

2. MATERIAL AND METHODS

Memiş Ağa Mansion, one of the important structures reflecting the historical texture of Trabzon, was built in the Balıklı village of Sürmene towards the end of the 18th century. Kastel Memiş Ağa Mansion is considered one of the best examples of Eastern Black Sea architecture. Its location in harmony with nature and its aesthetic features have made it an important part of the cultural heritage in the region. Today, it continues to exist as a cultural value by being preserved despite its changing environment (Table 1).

The mansion's two-story structure draws attention with its stone and woodwork. While the lower floors were designed as a police station and dungeon, the upper floors were arranged as living spaces. The mansion, which has a strong and reassuring structure with its external appearance, draws attention with its wide eaves. The interior layout is enriched with large rooms and aesthetic details. While the ground floor contains the kitchen, hearth and servant rooms, the upper floor houses a large sofa as well as the main room and other living spaces. Stonework and wood decorations are at the forefront in every room of the mansion. In addition, special areas such as bathrooms have been considered. Form, material, color, proportion and rhythm stand out among the mansion's aesthetic criteria. While stone and woodwork reflect the architectural character of the region, the colors and patterns used in the interior spaces are also striking. The revolving ceiling in particular was designed to provide air circulation in the mansion.

Table 1. The location of the Memiş Ağa Mansion and images of the current status

Memiş Ağa Mansion continues to be used today as a cafe/restaurant and sales function in accordance with the needs of modern life. During the restoration process, the original architectural features of the structure were preserved and brought into line with today's standards. In this way, the historical structure is not only a reflection of the past, but also a part of the cultural life of today's society. It attracts attention as a place that increases the touristic appeal of Trabzon with the historical atmosphere and modern functionality it offers to visitors. This structure creates a bridge between the past and the present, offering a meaningful experience for both locals and tourists.

In the study, the analysis of online comments regarding the Trabzon Memiş Ağa Mansion was carried out with a mixed research design in which qualitative and quantitative research methods were used together. The study was structured with a structure consisting of five stages. Each of these stages is explained in detail below.

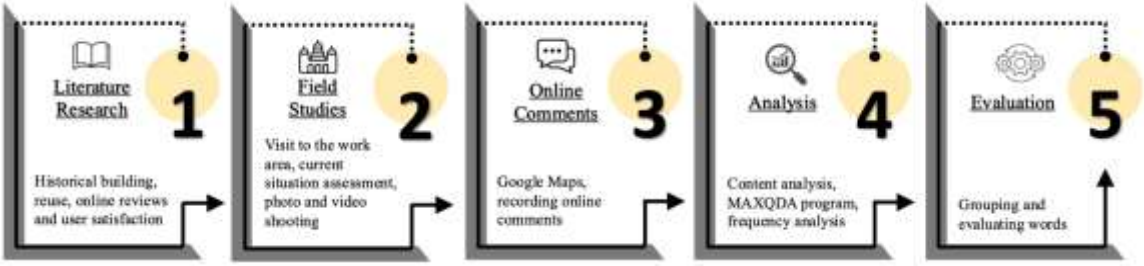

Fig. 1. Graph showing the stages of the study

The first stage is the information gathering stage where literature information on the relationship between historical buildings, re-using, online comments and visitor satisfaction is collected. In this stage, previous studies on online comments were reviewed, studies in the existing literature on the subject were examined and a theoretical infrastructure was created.

The second stage is the fieldwork stage where the study area is visited and spatial and visual data is collected. In this stage, data on the location of the Trabzon Memiş Ağa Mansion, the spaces within it, its relationship with its surroundings and its current usage status were collected. Visual data on the architectural features of the building and environmental features were obtained. This information provides an important basis for a better understanding and interpretation of the analysis results.

The third stage is the stage where the decision is made on which platforms the online comments will be collected and the comments on the places determined on these platforms are obtained. In this study, the Google Maps platform was preferred. Google Maps is a global online platform that allows visitors to comment on places, offers landmarks, maps and direction services [14]. This platform has been an effective tool in collecting online comments due to its large user base and high access rates. The scope of the study includes 1,708 comments that visited Memiş Ağa Mansion until January 8, 2025. Visitors who only gave a score and did not leave a comment were not taken into consideration in the study.

The fourth stage is the stage where the comments obtained are analyzed in detail. In this stage, frequently used words from online comments were determined and word clouds were created based on these words. The content analysis method is the main methodological tool used at this stage. Content analysis is a systematic reading and analysis method that aims to extract meaning from texts according to certain criteria [15][16]. Within the scope of this study, the data obtained from Google Maps were analyzed using the MAXQDA program. MAXQDA is a software that allows the systematic collection, organization and analysis of qualitative data. Based on the obtained data, the most frequently used words in the comments were determined and the terms that define the structure were revealed among them. Then, these data were visually presented in the form of word clouds.

The fifth stage of the study is the stage where the words obtained from the content analysis are grouped. In this stage, the words are grouped by considering the aspects in which they describe Memiş Ağa Mansion. Five basic groups are created, namely environmental, spatial, functional, emotional and temporal features. Then, evaluations are made for each group specific to the structure. Thus, it provides a critical data set in terms of understanding how visitors perceive the space and which elements affect their satisfaction.

3. FINDINGS AND EVALUATION

In the study, the word frequencies of the online comments of Memiş Ağa Mansion on Google Maps were obtained with the help of the MAXQDA program and the words were evaluated by grouping. There are 1,708 comments and evaluations about the mansion on Google Maps as of 08.01.2025. Within the scope of the study, only the frequencies of the words that describe the place and the actions in the place were examined.

It has been determined that there are 88 frequently used words related to the mansion in the comments that have a frequency of 10 or more occurrences. These words are in order: nice, place, mansion, history/historical, food, venue, recommended, view, restaurant, good, see, service, tour/trip, inside, price, sell/seller, sea, road, take, great, drink, tour/tourism/tourist, worth seeing, employees, business, go/don't go, park/parking lot, local/regional, stop by, Trabzon, Black Sea, magnificent, bad, visit, perfect, Sürmene, clean, quality, expensive, staff, floor, paid/free, affordable, building, old, top, time, architecture, wonderful, order, presentation/present, information, open, wood, room, house, pleasant, protect/preserved, customer, atmosphere comfortable/uncomfortable, super, cafe, restoration, unique, closed, table, ceiling, structure, workmanship, toilet, tell/explain, satisfied, smell, decent, area, garden, I liked it, door, reasonable, available, original, stone, high, texture, century. The list of words according to their frequency of occurrence and the word cloud visual prepared in this direction are given in Table 2. Due to the large number of comments and the use of words with various suffixes, some words were evaluated with their close meanings and added to the list. For example, the words history and historical were used in various ways with many suffixes and were added to the list together as they were seen as close meanings within the scope of the study.

Table 2. List of words in online reviews by frequency (frequency: F) and word cloud visual

Word	F	Word	F	Word	F	Word	F
nice	308	tour/tourism/tourist	50	building	25	unique	15
place	247	worth seeing	49	old	25	closed	15
mansion	243	employees	43	top	25	table	15
history/historical	177	business	40	time	25	ceiling	15
food	169	go/don't go	39	architecture	23	structure	15
venue	128	park/parking lot	37	womderful	22	workmanship	14
recommended	94	local/regional	37	order	22	toilet	14
view	93	Stop by	36	presentation/present	21	tell/explain	13
restaurant	89	Trabzon	35	information	21	satisfied	13
good	83	Black Sea	35	open	19	smell	13
see	74	magnificent	34	wood	19	decent	13
service	72	bad	33	room	19	area	12
tour/trip	85	visit	33	house	18	garden	12
inside	68	perfect	32	pleasant	18	i liked it	12
price	60	Sürmene	31	protect/preserved	18	door	12
sell/seller	58	clean	31	customer	17	reasonable	12
sea	54	quality	30	atmosphere	17	avaliable	12
road	53	expensive	29	comfortable/uncomfortable	17	orijinal	12
take	52	staff	29	super	17	stone	12
great	51	floor	28	top	17	high	11
drink	50	Paid/free	28	cafe	16	texture	10
service	50	affordablef	27	restaurant	16	century	10
Word Cloud							

The most frequently mentioned word in the comments regarding the place is “nice” with 308 repetitions. Other words with a frequency of occurrence over 100 are “place, mansion, history/historical, food, venue”. When looking at the words that were said 100 times and above, it is understood that there are many comments regarding personal comments, place descriptions, temporal descriptions and actions. When the entire list is examined, it is seen that there are words explaining the location of the Memiş Ağa Mansion, its surroundings, spatial structure, materials, restoration status, the functions it is used for, the units that serve the functions, the actions it contains, the feelings it evokes in people and the history of the mansion.

In the study, frequently used words related to space were divided into groups by considering the use of words in comments, their meanings in sentences and their contexts. It was seen that 5 features, namely environmental, spatial, functional, emotional and temporal features, came to the fore in the comments/words and the words were divided into groups based on the 5 mentioned titles.

Environmental features include comments/words that convey the location of the mansion and its relationship with the environment. Spatial features include comments/words conveying the building features, building material, restoration status, and interior of the mansion. Functional features include comments/words conveying the actions in the mansion, the features of the actions, and the requirements of the actions. Emotional features include comments/words conveying the personal opinions and impressions of the visitors based on their observations and experiences. Temporal features include comments/words conveying the construction date of the mansion, the construction process, and the known or heard historical information about the mansion. The list of words grouped under 5 headings in the study is shown in Figure 2, and evaluations were made specifically for the 5 groups mentioned. It was observed that the most comments/words appeared under the spatial and functional headings, with 9 words under the environmental heading, 27 under the spatial heading, 26 under the functional heading, 22 under the emotional heading and 4 under the temporal heading (Figure 2). This shows that people convey the space and their actions and experiences in the space more frequently and in different ways.

Fig. 2. Grouping of frequently used words

The environmental heading includes the words "place, view, sea, road, park/parking lot, region/local, Trabzon, Black Sea, Surmene". When the comments/words under the environmental heading are evaluated;

- The location of Memiş Ağa Mansion is a factor that directly affects visitors' experiences. It is seen that there are comments/words describing the location of the mansion, its relationship with the environment and transportation. In the comments, city-district information, the mansion's relationship with the sea and the road, information about the open space and parking lot around it are frequently explained. The ability of visitors to park their vehicles safely is a factor that directly affects the mansion experience. Sufficient parking space increases visitor satisfaction.
- The relationship established with the sea and the road is about transportation and landscape, while another relationship is about explaining location information. These comments explain the location of the mansion on the roadside on the Trabzon-Rize highway. Thus, it can be said that visitors give location information to other visitors to the mansion through comments.
- The natural beauties of Trabzon offer impressive views around the mansion. These views have been concepts that visitors often use when evaluating the place. The proximity of the Black Sea is an element that increases the environmental appeal of the mansion. The sea view can positively affect visitors' experiences.
- In addition, they convey information that the values specific to the region and the region are present in the mansion both in architecture and in various functions. Local elements are cultural elements that enrich the mansion experience. Visitors interact with the local culture and talk about the authentic structure of the place.

The spatial heading includes the words "mansion, place, inside, clean, floor, building, top, architecture, wood, room, house, protect/preserved, atmosphere, restoration, table, ceiling, structure, workmanship, toilet, smell, area, garden, door, stone, high, texture". When the comments/words under the spatial heading are evaluated;

- It is seen that there are comments/words describing the interior/exterior spaces of the mansion, the items in the spaces, the building components, the building materials and the restoration status. Visitors describe the interior and exterior spaces of the mansion used for different functions, the locations of the spaces relative to each other, their cleanliness and dirtiness and the striking elements in the spaces.
- In addition, they also provide information on topics such as the construction material of the historical building made of wood and stone, its restoration history and whether the essence of the building is preserved or not. Elements such as "door", "stone", "wood" and "height" affect the appearance and first impression of the mansion. The architectural details that attract the most attention of visitors are the number of floors, windows, ceiling decorations and ceiling heights of the building.
- "Clean" and "smell" are the elements that affect the general atmosphere of the mansion. A clean space, combined with pleasant smells, positively affects the visitors' experiences.
- The concepts of "floor" and "top" refer to the multi-storey structure of the mansion. The upper floors offer a different perspective, allowing visitors to experience the space better.
- "Restoration" and " protect/preserved " refer to efforts to preserve the historical significance and aesthetic value of the building. Good restoration and re-using increases the quality of the mansion and attracts visitors.

- "Texture" and "craftsmanship" enrich the aesthetic and visual experience of the mansion. Detailed craftsmanship creates the character of the space, while different textures attract the attention of visitors.

The functional heading includes the words "food, restaurant, see, service, traveling/trip, price, sell/sale/seller, buy, drink, tour/tourism/tourist, employees, business, go, stop by, visit, staff, paid/free, order, presentation/present, information, open, customer, tell/explanation, cafe, closed". When the comments/words under the functional heading are evaluated;

- It is seen that there are actions that people can perform in the mansion, details about the actions, comments about the prices of the actions, transportation methods, comments/words describing the times when the mansion is open and closed. The mansion, which was used as a residence in the past, serves three different functions today. The first of these is that it offers many visitors a tour opportunity due to its historical importance. The second function is the food and beverage activities originating from the restaurant located in the mansion. The third function is the sale of various local products in the mansion.
- In addition to these actions, there are other functions in the mansion that serve the main actions such as “presentation/presenting, telling/narration, open-closed, employees, staff”. The terms “service”, “staff”, and “employees” are also among the frequently used concepts and are elements that increase the customer experience in the mansion.
- The words “tour”, which is one of the methods of visitors coming to the mansion, and “tourism, tourist” used in related meanings also provide information about the mansion’s visitor base and transportation methods. “Tourism/tour” and “tour/tourism/tourist” express the discovery opportunities the mansion offers its visitors. Visitors can experience historical and cultural riches by touring the mansion.
- "Sell/sale/seller" and "buy" refer to the trade of the products offered by the mansion. The sale of local products increases the interaction of visitors with the venue. The concepts of "price" and "paid/free" are important factors affecting the reasons why visitors prefer the venue.

The emotional heading includes the words "nice, recommended, good, great, worth seeing, magnificent, bad, quality, expensive, excellent, affordable, wonderful, pleasant, comfortable/uncomfortable, super, unique, satisfied, decent, liked, reasonable, available, original". When the comments/words under the emotional heading are evaluated;

- It is seen that there are comments/words that describe the visitors' personal opinions and impressions formed as a result of their experiences. It is seen that positive opinions and impressions are more common in mansion.
- It is seen that visitors liked the place and made comments such as "nice, good, wonderful, worth seeing" and recommended the mansion to other visitors. In addition to these, there are comments that provide information about the functions in the mansion and their fees.
- Words such as “nice,” “wonderful,” “magnificent,” “unique,” “perfect,” “lovely” emphasize the aesthetic and visual appeal of the property. Visitors have positively evaluated the quality of experiences offered by the property with such expressions.
- Terms like “recommend,” “good,” “satisfied,” and “like” indicate visitors’ willingness to share their experiences with others and overall satisfaction. Positive feedback helps a venue attract more visitors.
- The terms "good quality," "expensive," and "pricey" indicate the value of the service and products provided. While quality service can justify high prices, reasonable prices also create satisfaction. Words such as "reasonable," "affordable" indicate the appropriateness of prices and services.
- Words like "bad" and "uncomfortable" express negative experiences. Visitors state that the location of the mansion causes excessive vehicle noise, the smell of cigarettes in the venue is disturbing, and functional problems inside the mansion are mentioned with such negative comments/words.

The words "history/historical, old, time, century" are included in the temporal heading. When the comments/words under the temporal heading are evaluated;

- It is seen that there are comments/words describing the processes that the mansion, which has historical value, has gone through from its construction to the present day. The comments mention that there are employees who give information about the mansion to the visitors. It is noteworthy that the visitors are curious about this subject and are doing research.
- The words "history" and "historical" emphasize the past and cultural heritage of the Memiş Ağa Mansion. This shows that visitors are interested in the historical background of the place. The word "old" similarly expresses the condition and historical structure of the mansion. Words such as "time" and "century" also support all of this and emphasize the past and history of the mansion.

Memiş Ağa Mansion offers a rich experience with its environmental, spatial, functional, emotional and temporal elements. Positive and negative comments of visitors should be evaluated as important factors determining the quality and attractiveness of the place.

4. CONCLUSION

This study analyzes visitor experiences through online comments of Trabzon Memiş Ağa Mansion, emphasizing the importance of visitor satisfaction in the process of re-using historical spaces. Online comments provide a valuable data source reflecting visitors' interactions and experiences with the space. The findings show how the environmental, spatial, functional, emotional and temporal elements of Memiş Ağa Mansion shape visitor experiences.

Positive comments from visitors highlight the aesthetic and historical value of the mansion, as well as the quality of the services it offers. Expressions such as "nice," "wonderful," and "magnificent" emphasize the visual appeal and atmosphere of the mansion, while words such as "food," "service," and "restaurant" reveal the value of its functionality and the experiences it provides. In addition, it has been determined that environmental factors, especially location and view, positively affect visitors' experiences. On the other hand, negative feedback also reveals the elements that need to be taken into consideration in terms of ensuring visitor satisfaction. Expressions such as "bad," "uncomfortable," and "expensive" indicate the negativity experienced by some visitors in their experiences. This situation shows that the services and experiences offered by the mansion need to be constantly reviewed and improved.

In conclusion, online comments of Trabzon Memiş Ağa Mansion play a critical role in determining visitor satisfaction in the process of re-using the historical structure. This study emphasizes the importance of considering visitor experiences in order to ensure the preservation and integration of historical structures with society. In the future, taking the necessary steps for both the preservation and integration of Memiş Ağa Mansion into social life will increase the sustainability of such structures and contribute to the survival of cultural heritage.

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REFLECTIONS ON DESIGN EDUCATION MODELS: OUTDOOR SPATIAL APPROACH

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Abstract
Remote learning using digital means is on the rise, with evidence that it has already reached higher education. Soon, this trend will undoubtedly extend to primary education and even preschools, resulting in children and teenagers spending more time indoors. Furthermore, with the evolution of technology and its use becoming increasingly earlier, the tendency of young people to close themselves at home and spend less and less time outside is notable and even worrying. In general, European and American citizens have adopted a lifestyle that leads them to spend around 90% of their time indoors, with the risk of this time increasing. A paradigm shift in people's lifestyles therefore appears necessary. This article aims to contribute to the in-depth reflection that this subject deserves, promoting outdoor teaching/learning, whose benefits (physical, cognitive, socio-community, emotional and well-being) are well known.
The aim is to provide conditions for new generations to experience and feel the benefits of contact with the natural environment, even if humanized, so that they can give it the importance it does not have today. The historical evolution of outdoor teaching models is revisited, identifying the main currents and modalities and their relationship with events that affect the entire population and not just the school population. Based on this evolution and to counteract the expected increase in sedentary lifestyle, it is proposed that the outdoor spaces of schools be used as promoters of outdoor teaching/learning, establishing a complementarity between indoors and outdoors that benefits children and young people. In addition to using the schools' outdoor spaces, there is also the possibility of appropriating the surrounding public space, where learning paths would be created dedicated to stimulating students' sense of autonomy and civic behavior. The proposed example of outdoor space presented in this article will certainly contribute to improving teaching/learning for new generations.
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Key Words: *Outdoor Teaching/Learning; Outdoor Artefacts; Outdoor Education; Open-Air Schools; Environmental Education*

1. Introduction

Remote learning has become increasingly common in the 21st century. The growth of this modality is mainly due to the COVID-19 pandemic which closed the world to the outside world, and the accelerated development of digital ICTs. There is already countless higher education courses taught in this modality. This trend will, surely and shortly, affect primary education and even early childhood education, increasingly enclosing children and young people in indoor spaces.

Added to this is the lifestyle that European and American citizens have adopted in recent decades, leading them to spend around 90% of their time indoors [1-2]. This means that populations are expected to become increasingly sedentary, with the consequent harmful effects on health and well-being.

The desirable paradigm shift in this population's lifestyle will only be possible through the new generations' experience of the outdoor benefits. In this sense, school appears to be the best place to initiate this change. This article seeks to show that schools' external spaces can be used as teaching/learning spaces, combined with contact with the external environment.

Although in ancient Greece Plato and Epicurus had already understood the importance of outdoor teaching/learning [3], and in the 17th and 18th centuries Locke, Rousseau and Pestalozzi [4-5] valued learning in a natural environment, were Robert Owen and Friedrich Fröbel (the father of *kindergarten*, the children's garden [6]) who at the beginning of the 19th century defended this teaching/learning modality. In the 1850s it was put into practice when the private The Frederick Gunn School in Washington, USA, took the entire student body for two weeks of camping, fishing, hiking, and working outdoors [7]. Fröbel believed that "children should learn through sensorial experiences and not through…the mere explanation of words" [8], and children were nourished and nurtured like plants with freedom, space, and light. At the beginning of the 20th century, this philosophy was also embraced and resumpted [6, 9] by Ernest Westlake (1855-1922), John Dewey (1859-1952), Rudolf Steiner (1861-1925), Maria Montessori (1870-1952) and Susan Isaacs (1885-1948), promoting outdoors for the holistic development of children [5].

This context provided the emergence and development of several teaching/learning methodologies (*e.g.* Waldorf, Montessori methods), alternatives to the traditional model, in which the outdoors was evident. One of the most successful examples was the forest schools, which started in 1927 in Wisconsin, USA [10]. Forest schools allowed preschoolers and students to learn in natural spaces. Forest schools were adopted in Europe in the 1950s [10] and mainly involved children in their preschool years.

However, the tuberculosis epidemic led to the introduction of the open-air school concept, which overall kept the traditional teaching/learning methods despite transforming the classrooms and the architecture of school buildings, as described below.

1.1. Outdoor and Open-Air Schools

Tuberculosis, which ravaged Europe and the USA, was the cause of more deaths than any other disease during the 19th and early 20th centuries [11]. By the late 19th century, 70 to 90% of the urban populations of Europe and North America were infected with the tuberculosis bacillus, and about 80% of those individuals who developed active tuberculosis died of it [11]. While tuberculosis deaths were not common in children, a discovery by Robert Koch revealed that tuberculosis was an airborne pathogen widening the public health risk [12]. Tuberculosis did not stop schools from teaching. Instead, schools went outside [12]. Open-air schools in the early 20th century were largely an attempt to limit child exposure to the disease, with the hope of keeping the public death toll down [12]. Also, in the UK the McMillan sisters in the early 20th century focused on outdoor camps for young children to promote and improve health by reducing exposure to illness [13-14].

On August 1, 1904, the world's first open-air school (*Waldschule für kränkliche Kinder*, school in the forest for sick children) held classes for delicate children from needy families in a pine forest in Charlottenburg, a prosperous city near Berlin, Germany (Fig. 1). The idea came from Jakob Bernhard Bendix, a pediatrician at Berlin's Charité Hospital, and Hermann Neufert, a local school inspector. They worked with Adolf Gottstein, an epidemiologist, and Charlottenburg's chief medical officer, to plan the school and secure municipal funding [17]. To cope with the weather too cold or rainy, the city architect Walter Spickendorff built in the heart of a forest outside of Berlin a simple wooden building to hold well-ventilated instruction [12], to maintain visibility for surveillance, to retain the irregular form of the existing landscape and the tall pines and to provide maximum exposure to the sun [18].

Fig. 1. The first school building of *Waldschule für kränkliche Kinder* in the borrough of Westend, Charlottenburg city, near Berlin, Germany (left) [15] and their students taking a snack in the forest (right) [16].

In 1905, when tuberculosis was raging in the United States, the American Academy of Medicine was asked to recommend changes in the nation's schools that would eliminate all possible causes that could make a child susceptible to tuberculosis during school life. To increase ventilation, traditional windows in school buildings were replaced with French-style windows (twice the height). S. Adolphus Knopf (a German tuberculosis expert and founder of the National Tuberculosis Association, which became the American Lung Association) also suggested that all schools have a playground, that classrooms be sanitized daily, and that curricula should include "as much outdoor instruction as possible." [17]. In 1915, Knopf argued that "open-air schools and as much open-air instruction as possible in *kindergarten*, school, and college should be the rule." [17].

Thus, at the beginning of the 20th century and because of tuberculosis, open-air schools proliferated, first in Germany and then worldwide [12]. The fear instilled in people was so great that the solution was to move the school outside, where children "learn to love fresh air", according to Knopf [17].

According to Blei [17], in 1908 open-air schools were operating in Great Britain, France, Belgium, Switzerland, Spain, and Italy. That same year, the first open-air school opened in the United States, in Providence, Rhode Island, in the middle of winter. Also, two doctors – Mary Packard, the first woman to graduate from the Johns Hopkins School of Medicine, and Ellen Stone, founder of Providence's League for the Suppression of Tuberculosis – created the Providence Open-Air School, Rhode Island, USA, in a former school building where a brick wall was removed and replaced with large windows that always remained open. With windows that stretched to the ceiling and were rarely closed, children kept warm in the winter with snuggly-like blankets known as "Eskimo sitting bags". Remarkably, none of the children got sick during the frigid New England winters – bolstering the open-air school even further [12].

Between 1910 and 1925, hundreds of open-air schools were opened around the world (Fig. 2) according to Anne-Marie Châtelet, an architectural historian at the University of Strasbourg, following the German model [17]. In the USA, many open-air schools (around 150) were also opened, in several cities (around 86), adopting a model in a densely urbanized context [17] – Fig. 3.

Fig. 2. The classroom of Uffculme Open-Air School (1911), Birmingham, Great Britain. Noted for its architecture, it allowed each class to occupy its own independent pavilion. Designed by F. Barry Peacock and Bewlay, it was instigated by Barrow and Geraldine Cadbury, the famous chocolate family because their son had contracted tuberculosis [18]. "Geraldine Cadbury is credited with the ingenious idea of the central heating system whereby underfloor hot water pipes ran around the sides of the classroom beneath a grille; the theory being that the cold air entering the room would be tempered by the rising heat." [18].

Fig. 3. An open-air classroom on a ferry in New York City, circa 1915 [12].

The open-air school movement that began in the woods of Germany proved that moving classes outside can save thousands of lives. The popularity of the effectiveness of these schools has expanded to such an extent that architects began constructing permanent open-air schools in Europe and the USA. This open-air concept affected the architecture of schools [18]. At the end of 1920s, Dutch architect Johannes Duiker designed an ambitious terraced glass and concrete open-air school in Amsterdam, Netherlands [12] – Fig. 4. Designed for children in good health, it was intended to extend the educational benefits to all school children and was to be built in the city on a 2000 m^2 plot in the middle of a housing block. Duiker responded to the challenge by designing classrooms in pairs, with a terrace between them for open-air activities. They were superimposed on one another to create three floors, with the blackboard in a corner recess. The concrete construction eradicated the need for bulky weight-bearing corner columns, all four sides had long continuous strips of windows, and heating was filtered through the ceiling [18].

The goal of making more open-air schools permanent was to ensure the health of all children, infected or not [12].

Fig. 4. Permanent open-air school (*Openluchtschool*) in Cliostraat, Amsterdam, Netherlands, was designed Dutch architect, Johannes Duiker for healthy children [19].

In the 1930s, classrooms could transform into outdoor terraces with clever sliding doors, and retractable roofs and were fitted with easily moveable, lightweight furniture. Opened in 1935, the Suresnes Open Air School, France (Fig. 5 left) stood out for its construction system (metal structure, concrete slabs embedded with pebbles stapled to the structure, glass, and fully retractable walls of pavilions, etc.) and for its perfect adaptation to the terrain. Access to the 8 pavilions, located in the park, was via the covered gallery. Each pavilion, measuring 8.80 x 6.00 m and 4.00 m high, accommodated 20 to 25 children, and had three glass sides (south, east, and west) that could be fully opened with folding doors (Fig. 5 right). In front of each building was a shaded space dedicated to outdoor education: the “green classroom”. The long building, located at the northern, housed the common services: food, gyms, workshops, showers, and the kindergarten in the middle. The two wings comprised on the ground floor the entrance, the medical room and waiting room for parents, the changing rooms, sinks and showers, practical work rooms, as well as a covered large patio with sliding doors to the outside and a ramp to the upper floor. On upper level there was a dining hall and office, dormitories, and staff quarters. To get around, the children only used ramps.

The nursery, in the center, included two classrooms, an indoor playground, a cafeteria, changing rooms and lavatories, and a central dormitory [20].

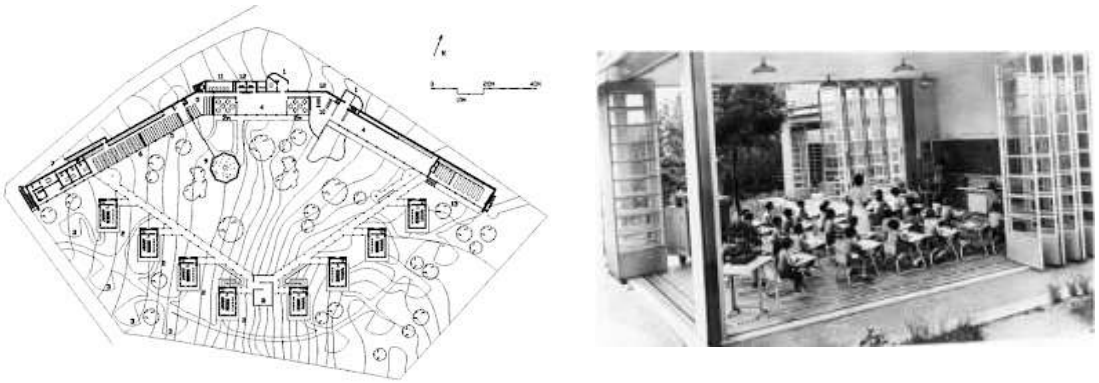

Fig. 5. Suresnes Open-Air School (1931-1935) in Paris [18, 20].

By the mid-1940s, increased sanitation efforts, and the discovery of effective antibiotics like streptomycin, caused tuberculosis to recede as a major health threat. After introducing antibiotics and improving social conditions at home, open-air schools were needed less and less after World War II and were gradually phased out. The 1960s land regulations in the Economic Commission for Europe (ECE) aggravated the situation reducing outdoor areas that had previously been required. So, the devaluation of outdoor activities had begun in the UK [21].

From the turn of the 20th to the 21st century, many schools lost sight of the importance of outdoor learning and outdoor playtime.

Since March 2020, the COVID-19 pandemic has brought many adjustments to human lives, including the learning way. In education, students, teachers, and families experienced virtual and hybrid classrooms, homeschooling, and learning pods. When schools reopened, the airborne virus led to more teaching and learning outdoors or with open windows [22], remembering the open-air schools like the epidemic tuberculosis period. Post worldwide COVID-19 pandemic schools turned back to outdoor learning, using outdoor classrooms, and many schools designated outdoor areas for learning, and others even built outdoor classrooms.

In 2021, even with the return to in-person learning, students and teachers were required to wear masks. Schools provided outdoor mask breaks and taught lessons outside where students could space out, take off their masks, and get fresh air. In 2022 when masks were optional in most schools, many teachers and students were longing for the outdoor time that they had grown accustomed to. That is why many teachers started planning outdoor lessons again and continued to use the outdoor classrooms. Currently, schools are very much technology-focused, so designated times to learn outside are needed. Many researchers believe that outdoor classrooms are the future. After the COVID-19 pandemic, many educators and schools believe that after seeing the benefits of taking students outside more, they should get back to doing so more often.

The recent history of outdoor and open-air schools reveals a reactive procedure to epidemics/pandemics that disappear when they attenuate. Outdoor teaching/learning should not depend on this cyclicality and should be regular practice given the proven benefits (physical, cognitive, socio-community, emotional, and well-being) that it provides to children and young people.

1.2. Outdoor and Environmental Education

The teaching/learning methodologies promoted before the tuberculosis epidemic reemerged in the early 1940s as “outdoor education” and in the late 1960s as “environmental education” [23] in countercurrent to the decline of open-air schools. Both new concepts share some common content and processes, although they are distinctive in other important ways [23]. Outdoor education involves the local surroundings and has also been referred to as taking field trips, excursions, journeys, or doing field studies [23]. On the other hand, environmental education [24] “is aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work towards their solution”. While outdoor education can be applied to any discipline that can be effectively taught and learned outside [23], environmental education, primarily advocates experiential (hands-on) learning strategies as contextual, direct, and unmediated experiences used in problem-based learning situations, maximizing active learning, focused on environment [23].

The more than sixty labels (*e.g.* earth education, bioregional education, expeditionary learning outward bound, etc.) for educational movements related to the outdoors and the environment demonstrate the importance and vitality of the fields. One promising development has been the identification of an eighth category of human multiple intelligences (the seven existing

ones are: visual-spatial, verbal-linguistic, musical-rhythmic, logical-mathematical, interpersonal, intrapersonal, naturalistic, and bodily-kinesthetic) by Harvard professor Howard Gardner – the naturalist intelligence. This way of demonstrating expertise in recognizing and classifying the flora, fauna, and other physical and cultural artifacts is important because it provides another justification for integrating outdoor and environmental education into curriculum and instruction [23].

2. Outdoor Spaces as Teaching/Learning Promoters

The response given to epidemics/pandemics through open-air schools and the most recent trends in outdoor and environmental education, despite bringing children and young people outdoors, still do not provide outdoor teaching/learning. It is necessary for schools to have external spaces equipped with artifacts that stimulate teaching/learning among children and young people.

Lackney [25] established a set of 33 educational design principles from which educators and architects can structure their educational facilities, from strategic and educational planning to design, construction, occupancy, and facilities management. The implementation of transition spaces and the variety of outdoor learning environments stand out, the more detailed characteristics of which are presented in Table 1.

Table 1. Adapted excerpt from principles of educational design [25]

Principles of educational design	Short description
Transition spaces between interior and exterior	The learning space within the building should connect with outdoor learning spaces, while simultaneously creating additional transitional spaces for school and community activities. There must be a transition space protected from the weather. Entry and exit views should be maximized.
Variety of outdoor learning environments	External and adjacent spaces to the building should be created, either on-site or in neighboring locations, that mirror the learning within the building. Leisure and outdoor activity areas should be located to the south, benefiting as much as possible from the sun and natural light, especially in the winter, spring, and autumn months. To maximize year-round outdoor use, favorable microclimates must be created that protect outdoor activity areas from prevailing winter winds and extreme summer temperatures while allowing sunlight penetration in winter. As much as possible, learning environments should allow for a variety of learning activities and experiences not available indoors, such as nature trails, gardens, fields, forest areas, ponds, and other natural outdoor learning environments. In schools where outdoor space is not available, or funding is not allowed, the school can take advantage of existing resources in the neighborhood and local community, such as parks, public spaces, walking paths, and community and business establishments. In these, the school can propose equipment that is intended for learning activities that can be used by both the school population and the public.

Also, Fielding [26], based on evidence from best practice examples, describes the six "essential elements" that contribute to defining the design of educational spaces, proposing a paradigm shift concerning traditional teaching (Fig. 6).

It is undeniable that outdoor teaching/learning struggles with a lack of physical and human resources [27-28], Gürdoğan et al. [29], Østern & Gjølme [30], Minero [31] and Learning Policy Institute and Turnaround for Children [32], etc., addressed this issue by proposing suitable spaces for outdoor teaching/learning for children and young people, *e.g.* Fig. 7. Dyment [33] and Azevedo & Ribeiro [34] addressed the issue from the new school building point of view with simultaneously environmental and educational concerns. Even in terms of student well-being it is essential to create pleasant spaces for leisure and socializing outdoors, stimulating this taste for being outdoors [35].

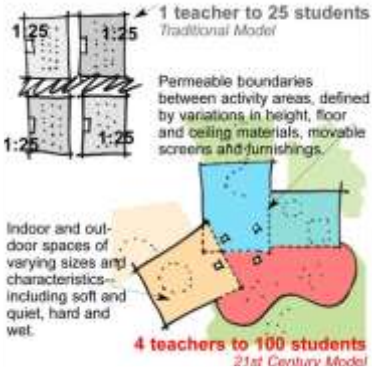

Fig. 6. Traditional model *vs*. 21st century model [26].

Fig. 7. The outdoor classroom is a multipurpose space used for play, teaching, creation, science experiments, and collaborative activities, Annie Purl Elementary School, a public school in Georgetown, Texas

[31]. Photo: T. Rogers/Courtesy of Huckabee

However, according to Jordet, Fiskum & Huseby (cited in [30]), outdoor education is a way of working where teaching is moved outside the regular classroom and where students and teachers get involved in the local community, using this resource to complement and expand classroom teaching. Schools can focus on "using places other than the classroom for teaching and learning" [36], emphasizing the need to provide more embodied learning through direct experience of the world outside the classroom, contributing to increasing skills (literacy) in different areas of knowledge and citizenship [37-38].

The focus on outdoor spaces is closely related to the environment [39] and to experiential learning, which consists of four processes (Kolb cited in [40]): (a) concrete experience with phenomena, (b) observation and reflection, (c) formation of new knowledge and (d) application and testing of new concepts in new situations (Fig. 8).

Phenomena experience | Observation and reflection | New knowledge | Testing new concepts

Fig. 8. Processos de aprendizagem experimental [41].

This model, aligned with the STEM (Science, Technology, Engineering, and Mathematics) teaching approach, suggests that direct contact/experience with the environment is essential for outdoor teaching/learning for children and young people, valuing Nature and providing concrete experiences. Sauvé (cited in [40]) reinforces this idea, stating that outdoor education is one of the most effective means of learning about/within the natural world and of imparting an understanding of Nature's inherent right to exist in itself – Humanity's place in Nature being definable only in the context of this ethos.

However, Inwood & Ashworth [42] following the STEAM (Science, Technology, Engineering, Arts and Mathematics) teaching approach, integrating the arts [43-45] in the STEM approach, add that "the arts offer a more holistic approach, which opens space for effective, creative and subjective approaches to learning (Fig. 9). They provide an alternative means of developing sustainable living skills, engaging the head (cognitive learning), hands (embodied learning), heart (affective learning) and spirit, which is believed to be a pathway to authentic and meaningful lasting learning (CE "Discover" section cited in [42].

Fig. 9. Including Arts and Nature [41, 46].

In addition to the declared benefits, the natural environment simultaneously provides some risks that must be assumed by children and young people. For Sandseter & Kennair [47], this is a natural coping mechanism that helps to reduce fears and combat phobias. In this sense, the same authors argue that taking risks while playing reflects many aspects of cognitive-behavioural therapy; thinking less negatively about anxieties can help reduce anxious behaviour.

In this context, it is suggested that outdoor spaces be more qualified and suitable for teaching/learning outdoors. For early childhood education, Gürdoğan et al. [29] propose shaded and uncovered spaces with artifacts that stimulate the act of playing, physical activities of self-knowledge/discovery, and motor stimulation, such as walking and following trails, sitting, jumping, sliding, balancing, etc. (Fig. 10).

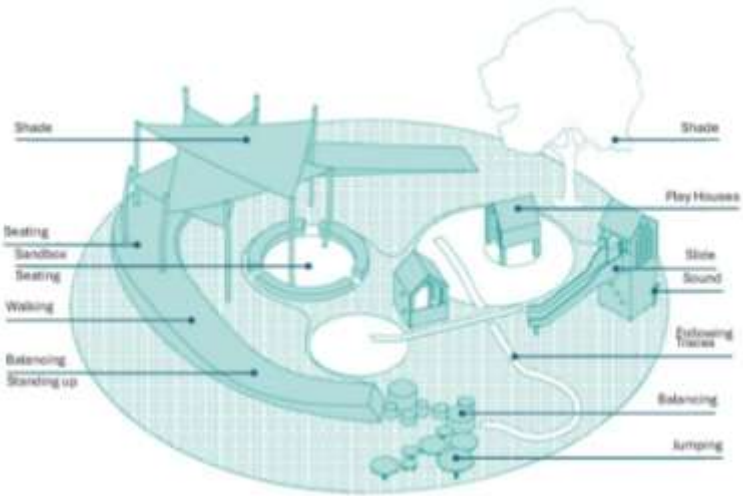

Fig. 10. Space suggestion with 175m^2 [29]. Design: T.C. Genç

For the most advanced levels of education, specific areas are proposed, even if they intercept, aimed at teaching and learning different subjects. Fig. 11 shows examples of artifacts for these spaces such as the Illusion Wall dedicated to optical illusion effects, the Geo Sector with shadow plays for the study of the Earth's movement around the Sun, the Bio Area aimed at the study of botany using digital technologies for identifying and characterizing plants, the Assemblage Site for geometric solids and their respective compositions, and the Calculus Sector to perform measurements and calculations of areas, volumes, and slopes.

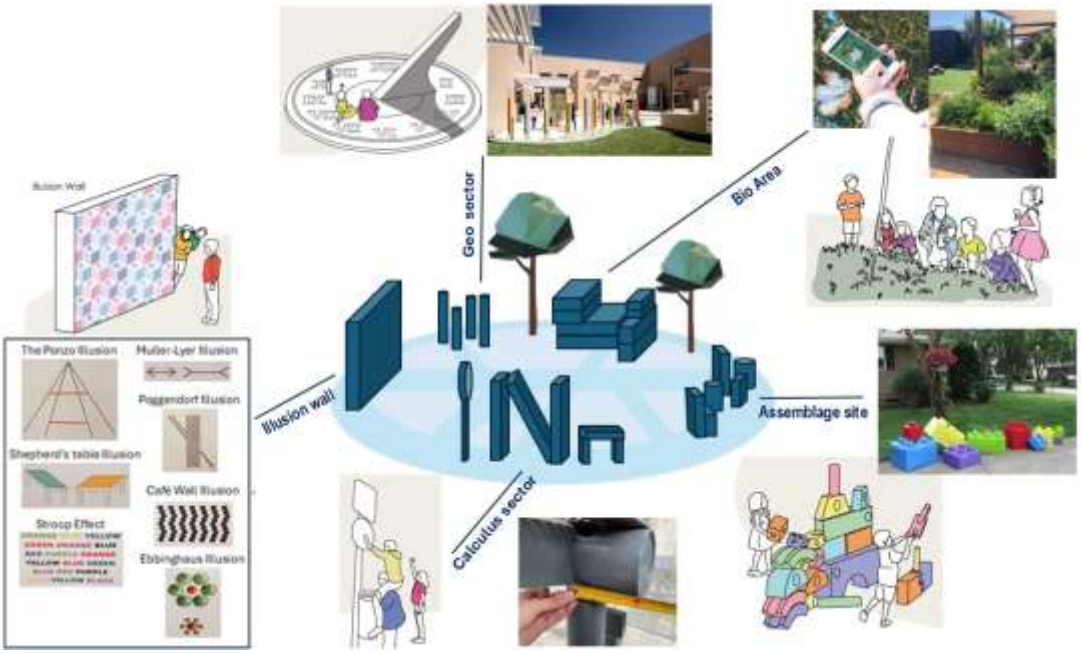

Fig. 11. Outdoor space with artefacts for teaching/learning different subjects.

3. Conclusions

The need to change the paradigm of populations' lifestyles, as well as the growth of remote teaching/learning methods, required reflection that focused on outdoor teaching/learning. The main teaching/learning modalities and trends that have occurred in recent decades were identified and discussed. As a way of countering the growing trend towards sedentarization and reflecting on how this objective can also contribute to increasing literacy and citizenship, it was proposed that the outdoor spaces of schools be used to promote teaching/learning for children and young people, through the construction of thematic artifacts on different areas of knowledge that would promote teaching/learning of different disciplines and that would benefit from the outside world. These ideas can be extended to the public space surrounding schools where learning pathways dedicated to stimulating students' sense of autonomy and civic behavior would be created.

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INNOVATIVE PEDAGOGICAL APPROACHES TO KINDERGARTEN ARCHITECTURE: EVALUATING DESIGN FEATURES IN ITALIAN SCHOOL BUILDINGS

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Abstract
Recent years have witnessed growing recognition of the significant impact of school architecture on educational outcomes, with the physical environment of educational spaces playing a key role in shaping students' learning experiences. This recognition is rooted in historical and contemporary educational theories that emphasise the role of spatial design in fostering engagement, inclusion, and adaptability. Italy, alongside other European nations, has initiated various programs to modernise and improve the quality of its educational buildings. In Italy, the Ministry of Education introduced new guidelines for school buildings in 2013 and launched the 'Scuole Innovative' program in 2016 to promote interdisciplinary collaboration between educators, architects, and policymakers in school design. Despite these initiatives, Italian schools still face significant challenges related to infrastructure. According to the '24th Report on the Quality of School Buildings', many buildings require urgent maintenance, particularly in southern regions, and progress on energy efficiency has been slow. These ongoing issues highlight the need for comprehensive reforms in school infrastructure. Recent initiatives, such as the 'Piano Scuola 4.0', aim to address these challenges by fostering digital transformation and sustainable design solutions. However, questions remain about the effectiveness of these efforts in addressing the specific needs of Italian schools. This study explored the key features for designing innovative kindergarten spaces in Italy, focusing on how these features are implemented in recent school projects. Aiming to place an architectural lens on the pedagogical environmental ecology of several recent schools, the study used a multi-case-study approach to analyse the link of child-friendly design characteristics with pedagogical practices in five recent kindergarten projects built between 2023 and 2025. The study employed a four-stage qualitative research design, starting with a review of scientific and grey literature to map the current state of Italian educational facilities. The second step involved a thematic analysis of reports and guidelines on school building design to identify key features for creating child-friendly learning environments. In the third stage, visual analysis was used to evaluate the selected projects, examining how well these projects incorporate the identified design features. The results of the visual analysis were presented through a bubble diagram, which offers a comparative overview of the prevalence and application of each design feature across the case studies. The findings were then critically discussed to assess the effectiveness of these innovative design features in meeting the educational needs of kindergarten spaces in Italy. This study can contribute to the understanding of current trends in kindergarten architecture in Italy, providing valuable insights into the application of innovative, child-centred design solutions.

Keywords: *Kindergarten Architecture; Child-Friendly Design; Pedagogical Approaches; Educational Buildings; Italian School Design*

1. Introduction

In recent years, there has been a growing interest in the role of school architecture in shaping educational outcomes and social well-being. The physical environment of schools is increasingly recognised as a crucial factor in pupils' and students' learning experiences. In the eighteenth century, Jean Jacques Rousseau identified the importance of physical spaces as the "third teacher" [1] and in more contemporary educational theories, an emphasis is placed on the importance of spatial design in fostering engagement, inclusion, and adaptability [2],[3-4-5]. Throughout European countries, governments have been taking action to modernise and improve the quality of their educational patrimony. For instance, in Flanders, governmental impulse funding since 2005 has triggered a construction boom around building new, more open schools [6]. In 2013 in Italy, the Ministry of Education, Universities, and Research (MIUR) introduced new guidelines for school building to promote safer, sustainable, and welcoming environments. In 2016, the 'Scuole Innovative' program launched by the same Institution, sought to reimagine school design through interdisciplinary collaboration between educators, architects, and policymakers [7]. These programs marked a significant departure from the outdated 'school-barracks' model, already criticised over a century earlier by Ellen Key, advocating for more flexible, student-centred learning environments [8]. As Italy faces longstanding challenges in school infrastructure, understanding and improving educational spaces has become a priority in national policies and academic research. Despite the increasing attention to school architecture, Italian buildings have historically suffered from significant inadequacies, as highlighted in the '24th Report on the Quality of School Buildings and Services' [9]. The report underscores a series of critical issues affecting Italian schools, including infrastructure deficiencies, where 1 in 3 buildings requires urgent maintenance, raising to 1 in 2 in the South and Islands; safety concerns, with approximately half of the buildings lacking essential certification, particularly in southern regions; slow progress in energy

efficiency improvements, with only 16.2% of schools having undergone interventions in the past five years; service disparities, with the South being the most underserved; and persistent environmental and digital challenges, with a 40% of schools not equipped with Wi-Fi [9].

Recent years have seen significant efforts to address these challenges, signalling a positive shift in educational infrastructure policies. Initiatives such as the 'Piano Scuola 4.0', introduced by the Ministry of Education in 2022 (Decree 161/2022) as part of the National Recovery and Resilience Plan (PNRR), aim to modernise schools' environments through digital transformation and sustainable architectural solutions [10]. The plan promotes innovative learning spaces (Next Generation Classrooms) and digital profession labs (Next Generation Labs), with a strong emphasis on making both teaching and learning effective. To this end, common guidelines have been laid down in the 'Futura - La scuola per l'Italia di domani' programme. The aim is to shape an innovative school that guarantees the right to study and promotes digital skills but at the same time is sustainable, safe and inclusive [11]. However, even though a lot has been done during the last few years thanks to all the mentioned initiatives, critical questions remain: Are we really advancing in the right direction? Are all these efforts working in the specific Italian context and needs?

Specifically, the research questions driving this paper are the following:

- RQ1: What are the key features for designing innovative school spaces in Italy?
- RQ2: Do Italian architects apply these features in the new kindergartens projects? If so, are they effective in the Italian context?

This study aims to answer these questions by investigating the key features underlying the design of innovative school spaces in Italy, assessing the extent to which Italian architects incorporate these features into new school projects, and evaluating the effectiveness of these implementations within the context of the Italian education system. Specifically, the present study tries to set a dual lens onto the educational environment, an architectural and a pedagogical one, by using a multi-case study and performing a thematic and visual analysis of the child-friendly design characteristics and pedagogical principles, and the alignment of both. Therein, this study presents a unique contribution to the field of educational architecture. By focusing on projects designed and built between 2023 and 2025, the study offers a recent and context-specific evaluation of early childhood educational spaces, thus providing scholars with a conceptual foundation for future research on innovative and child-centred architectural solutions in educational settings and professionals with a comprehensive knowledge on the current design directions in Italy.

2. Methodology

In the study, a four-stage qualitative research design was used, which is graphically presented in Fig. 1.

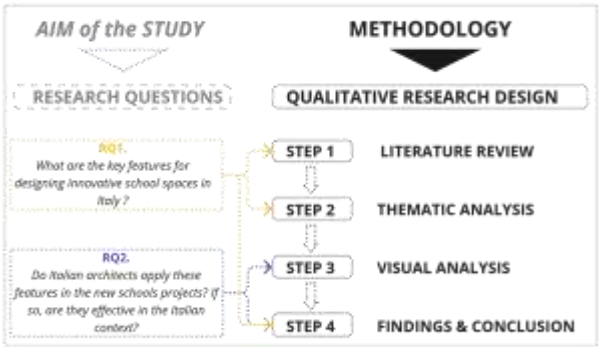


Fig. 1. Qualitative Research Design (Created by Authors)

First, both the scientific and grey literature were reviewed to provide an overview of the current situation of Italian schools and to report the suggested directions for designing innovative and student-friendly schools. In the second step, the main reports and guidelines published by official institutions in Italy regarding the design of educational buildings were analysed through a thematic analysis. Thematic analysis is a qualitative research method used to identify, analyse, and report patterns ('themes') within data [12]. It offers a systematic approach to interpreting textual data by coding and categorising key ideas [13]. This method is widely applied in studies examining policies, design guidelines, and user experiences, as it allows meaningful insights to be extracted from complex datasets [14]. Specifically, this method was applied to determine, by identifying the recurring themes in the reports and guidelines, the key features for designing more child-friendly learning environments. In the third step of the study, five projects implemented in Italy in the last 5 years, which form the sample, were examined through visual analysis to assess the extent to which these key features are met. Visual analysis is a systematic method used in research to examine photographs, architectural drawings, maps, videos, and other visual materials. This method is particularly useful in understanding spatial organisation, design features, and user experiences [15].

In this study, visual analysis was employed to make a first assessment of how preschool educational buildings in Italy incorporate child-friendly design criteria. Architectural plans, interior photographs, and project documents were examined to

evaluate the extent to which the identified design criteria were met. As a sample, five schools were selected with the following characteristics:

a) built in the last five years or under construction (conceptual projects for contest were excluded);
b) located in various regions of Italy;
c) built for the same level of education (i.e., kindergarten);
d) with innovative design;
e) schools with the appropriate amount of information available online.

The five identified projects, listed chronologically by their year of construction (Fig. 2), are the following: Sforzacosta Preschool (BDR Bureau, 2023), Inclusive Education Center (Enrico Molteni Architects, 2023), Kindergarten and Day-care Centre in Kiens (Ronald Baldi Architects, 2024), Rosso all'insù (LAP Architects, 2024), Arca di Noè (C+S Architects, 2025). These projects are located in the various regions of Italy: respectively, Marche, Emilia-Romagna, South Tyrol, Abruzzo, and Lombardia. The research team chose to select projects from different regions, seeing such diversification as an opportunity to examine the regional diversity and the influence of local educational policies in the design of preschool educational buildings in Italy. Indeed, this diversity highlights the spread and adaptation of innovative design strategies applied in different geographical and cultural contexts. The information on the selected projects was retrieved using written and electronic visual archives and resources.

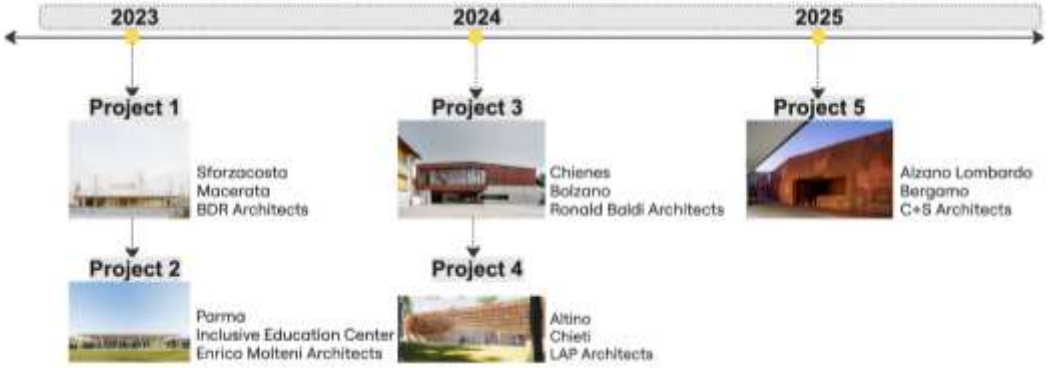


Fig. 2. Samples of the Study (Created by Authors)

The results of the visual analysis were subsequently illustrated through a bubble diagram to depict the extent to which each key feature was present, offering a comparative overview of their prevalence and application across the case studies. To minimise personal interpretation or bias, each case study was evaluated based on the available data (including written descriptions and photographic evidence), with the presence of each feature clearly indicated (refer to Section 4). Finally, the findings were critically discussed, offering reflections on the current state of preschool educational architecture in Italy and suggesting potential directions for future research and development in this field.

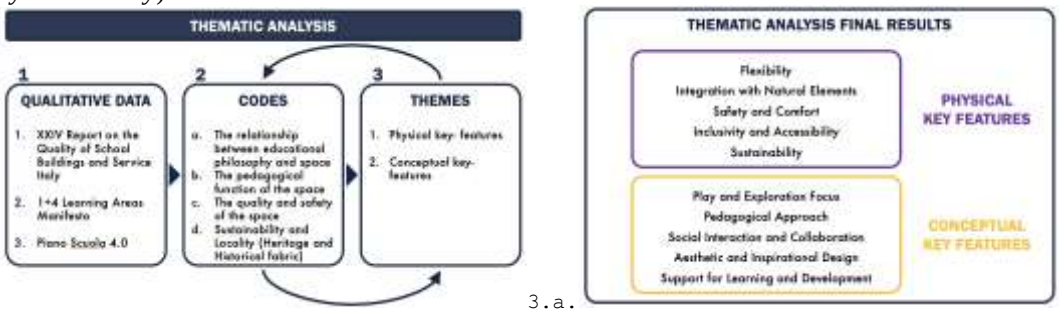
3. Findings

3.1. *Thematic analysis findings*

A thematic analysis was conducted to systematically examine qualitative data from three primary sources: the '24th Report on the Quality of School Buildings and Services in Italy', the '1+4 Learning Areas Manifesto', and 'Piano Scuola 4.0'. The report by Legambiente evaluates various parameters of Italian school buildings, such as security certifications, earthquake safety, energy efficiency, and school cafeterias, highlighting regional inequalities. The '1+4 Learning Areas Manifesto' drafted by INDIRE presents instead a new vision for spatial organisation in schools, in line with the concept of the space as a 'third teacher' [1], and proposes to transform the traditional classroom into a multifunctional space and integrate four key areas (i.e., Agora, Individual space, Informal space, Discovery laboratory) that support different learning activities. The 'Piano Scuola 4.0' is a national plan aimed at the digitalisation of Italian schools, intending to create new generation classrooms and laboratories for digital professions. The plan aims to improve teachers' digital skills, digitise administrative processes, and encourage innovative learning environments in schools. The analysis followed a structured three-step method (Fig.3), beginning with a detailed scan of the qualitative data to identify emerging relevant aspects. This initial phase allowed for the recognition of recurring patterns related to school infrastructure, spatial organisation, safety, sustainability, digitalisation, and pedagogical approaches. In the second phase, these recurring aspects were categorised into 'codes', each representing a specific characteristic of school design. In the final step, the identified codes were thematically grouped into broader 'themes' that represent the key features for designing contemporary school environments.

The thematic analysis process was iterative, requiring continuous refinement of codes and themes to ensure they accurately reflected the data. Multiple iterations were conducted to reassess the relationships between codes, merge overlapping categories, and refine definitions until data saturation was reached, meaning no new themes or insights emerged. Fig. 3.a shows not only the three-step analysis process, but also the initial identified codes (i.e., *a. The relationship between*

educational philosophy and space, *b. The pedagogical function of the space*, *c. The quality and safety of the space*, *d. Sustainability and locality*).



3.a. 3.b.

Fig. 3.a (on the left). Thematic Analysis process and initial codes and themes (first iteration). Fig. 3.b (on the right). Final Key Features (i.e., Thematic Analysis Findings) (Created by Authors)

Once data saturation was reached, we obtained the final themes and codes (Fig. 3.b), which represent the main key features, emerged from the analysed qualitative data, for designing inclusive, innovative, and sustainable school environments that align with contemporary educational needs. Specifically, the analysis resulted in two overarching thematic categories: "Physical key features" and "Conceptual key feature". The first theme embraces the following codes: *Flexibility*, *Integration with Natural Elements*, *Safety and Comfort*, *Inclusivity and Accessibility*, and *Sustainability*. The second theme includes: *Play and Exploration Focus*, *Pedagogical Approach*, *Social interaction and Collaboration*, *Aesthetic and Inspirational Design*, *Support for Learning and Development*. All the key features are represented and further described in Fig. 4.

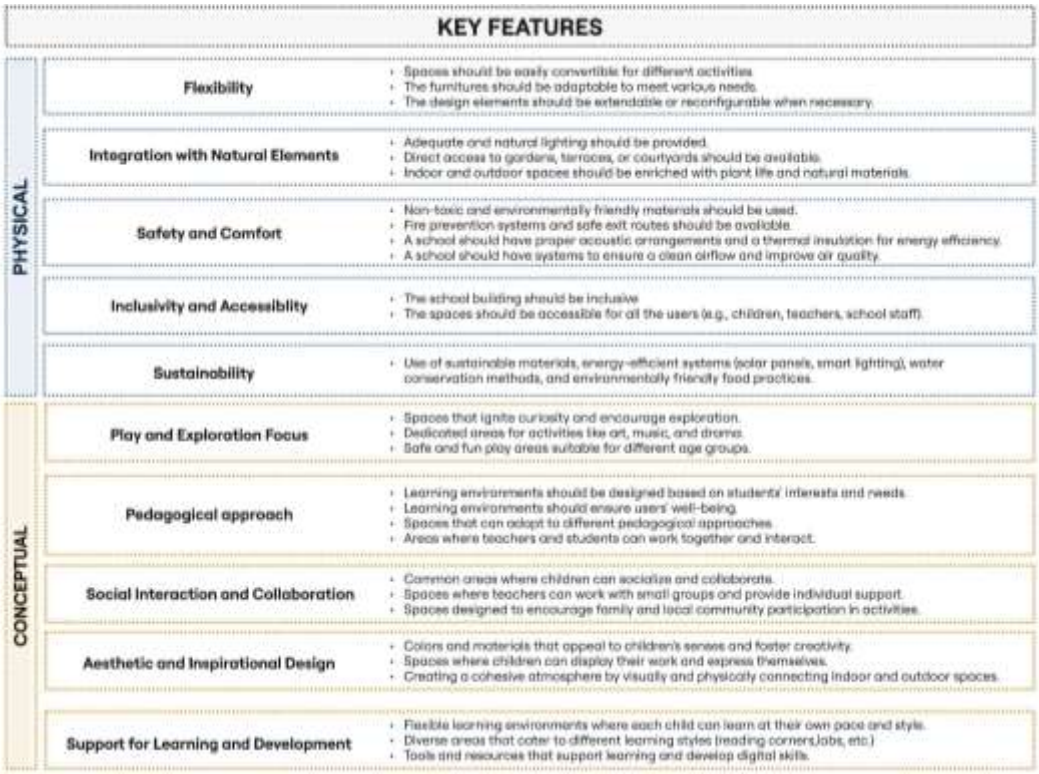


Fig. 4. Key Features (Created by Authors)

3.2. *Visual Analysis findings*

CASE 1. The 'Sforzacosta Preschool', designed by BDR Bureau and completed in 2023, is a 600-square-metre timber structure forming part of an educational redevelopment initiative in Macerata, Italy [16]. The building consists of three independent yet interconnected volumes beneath a unifying pitched roof, creating a flexible layout that accommodates classrooms, workshops, a library, and communal spaces (Fig. 5).

Fig. 5 (on the left). Sforzacosta Preschool (BDR Bureau, 2023) [17]; Fig. 6 (on the right). Inclusive Education Centre (Enrico Molteni Architects, 2023) [19]

Natural elements are integrated into the design, with ample natural light and garden views enhancing the learning environment. Sustainability is prioritised through the use of recyclable materials, timber construction, and energy-efficient solutions [16]. The preschool ensures accessibility and safety with barrier-free circulation and non-toxic materials. It also fosters creativity and social interaction through dedicated spaces for music and sensory workshops, encouraging collaboration and play among children.

CASE2. The University of Parma and the 'Accademia dei Giorni Straordinari' Foundation collaborated on a project that embodies unity and equality in architecture [18]. The 'Inclusive Education Centre' features two identical buildings: a public early childhood education centre and a private institution for disadvantaged adolescents, symbolising Janus' duality. Positioned in alignment with the campus grid yet distinct in design, the pavilion integrates interlocking geometric forms to create 72 interconnected spaces with glass doors, promoting flexibility and natural light (Fig. 6). Spanning 900 m², the structure employs dry construction using a timber framework and CLT panels, with a 5-metre-high portico reinforcing its public presence [18]. The interior provides a warm, neutral setting designed to support education and social interaction. Accessibility and inclusivity are prioritised through adaptable spaces that can be reconfigured to meet diverse needs, encouraging play, exploration, and collaboration. Natural light and green areas establish a strong connection between indoor and outdoor environments, enhancing the learning experience. Sustainability is achieved through energy-efficient systems, environmentally friendly materials, and water conservation strategies. The use of non-toxic materials, effective ventilation, and thermal insulation ensures safety and comfort. Aesthetic elements are incorporated to inspire creativity, while diverse learning areas accommodate different educational styles and foster a supportive, inclusive environment [18].

CASE 3. The newly constructed 'Kindergarten and Day-care Centre' in Chienes (Alto Adige), designed by Roland Baldi Architects and completed in 2024, exemplifies sustainable architectural practices in educational design [20]. The two-storey building, constructed primarily from wood with a reddish-brown façade inspired by the local church tower, blends harmoniously with its alpine surroundings (Fig. 7). Adhering to the 'Do No Significant Harm' (DNSH) principles, the project prioritises environmental sustainability and responsible use of materials, supported by EU funding and the PNRR. Certified 'CasaClima A,' the building incorporates eco-friendly materials and energy-efficient systems, including a green roof, photovoltaic panels, an air-to-water heat pump, and a heat recovery ventilation system [20]. Reinforced concrete, radon-proof membranes, and fire safety systems ensure long-term durability and occupant safety. Expansive windows flood the interior with natural light, fostering a strong connection between indoor and outdoor spaces and reinforcing the concept of the educational environment as a 'third educator.'

Fig. 7. Kindergarten and Day-care Centre in Chienes (Ronald Baldi Architects, 2024) [21]

The school accommodates two kindergarten classes and a day-care centre for up to 20 children, providing a safe and accessible environment. A zigzag ramp ensures step-free access, enhancing connectivity with the upper section of the village. The interior features a central atrium for multifunctional activities and adaptable classrooms, supporting diverse learning experiences. Natural materials and a warm colour palette create a comfortable and inspiring atmosphere, while shared spaces encourage social interaction and collaboration. The project reflects a forward-thinking approach to educational architecture, aligning with both environmental and developmental goals [20].

CASE 4. The 'Rosso all'insù' school, designed by LAP Architettura and funded through the PNRR, is an innovative educational facility under construction in a small mountain community, with completion expected in November 2025 [22]. The design features a linear layout with a central corridor symbolising students' educational journeys, leading to a multifunctional indoor square that serves as a hub for collaborative activities, illuminated by extensive glazing (Fig. 8).

Fig. 8 (on the left). Rosso all'insù (LAP Architects, 2024) [23]; Fig. 9 (on the right). Arca di Noè (C+S Architects, 2025) [26]

The project reflects contemporary educational principles by prioritising flexibility and adaptability through modular interiors and a multifunctional central square that accommodates diverse learning activities (Fig. 8). Abundant natural light, outdoor connectivity, and green spaces enhance student well-being, fostering a strong link between the built environment and nature. Safety and accessibility are ensured with barrier-free layouts and the use of non-toxic materials. Sustainability is addressed through aluminium slats on the exterior, which regulate daylight and reduce energy consumption [24]. The design's dynamic spatial arrangements and warm, geometric aesthetics, highlighted by the distinctive 'Altino red,' create an inspiring and engaging atmosphere. The student-centred approach encourages play, exploration, and social interaction, supporting both individual and group learning while promoting community engagement. The project exemplifies a forward-thinking model where architecture actively enhances education and personal development [22].

CASE 5. The 'Arca di Noè' Kindergarten in Alzano Lombardo (Bergamo), designed by C+S Architects, is a modern educational facility that combines flexible learning spaces with environmental sustainability principles [25]. Inspired by architect Maria Alessandra Segantini's childhood memories, the design features a ramp entrance decorated with Enzo Mari's animal puzzle figures, adding a playful element to the building's welcoming atmosphere. Clad in white glass mosaic with bronze-framed windows, the building reflects the industrial heritage of the Lombardia region while integrating harmoniously with the landscape through a deactivated red concrete wall (Fig. 9). The flexible layout supports innovative teaching methods and accommodates various uses by both children and the local community, fostering a multifunctional environment. The interior spaces are designed to adapt easily to different educational activities, encouraging creativity among teachers and students. Large windows and ample natural light establish a strong connection with nature, enhancing the learning experience. Sustainability is prioritised through energy-efficient systems, water conservation, and eco-friendly materials, enabling the school to achieve NZEB ('Nearly Zero Energy Building') certification [25]. The project also reimagines the Villa Paglia park as a shared community resource, reinforcing local identity and culture. Safety, comfort, and inclusivity are ensured through the use of non-toxic materials and adaptable, barrier-free spaces. The school serves not only as an educational facility but also as a community hub, illustrating the vital relationship between architecture and education.

A bubble chart diagram was created to analyse the fulfilment of key features across the five case studies, categorising the presence of features as *not present*, *half present*, or *fully present* based on available data (Fig.10).

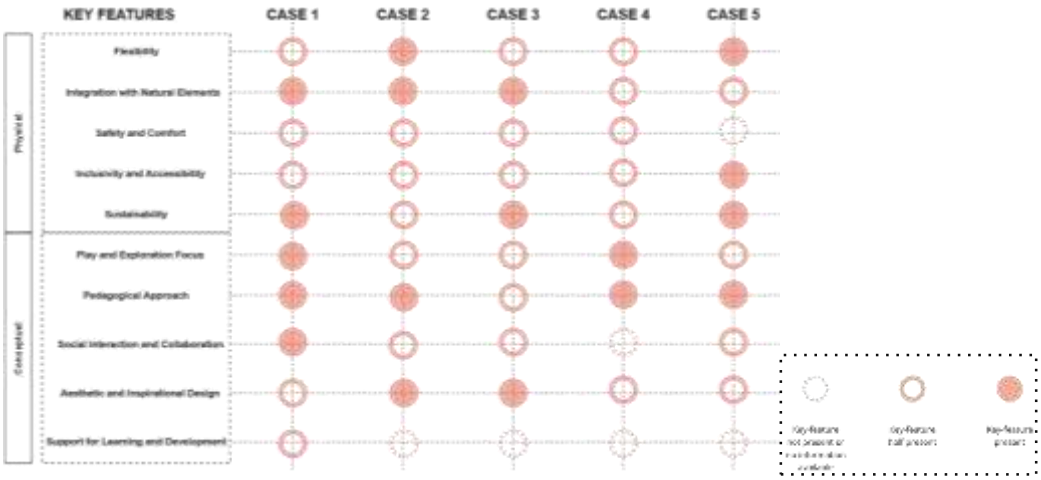


Fig. 10. Bubble Chart Diagram

The criteria to support learning and development, safety and comfort, as well as social interaction and collaboration, are not fully met in these projects. Especially conceptual key features which have social impacts are difficult to easily detect within school architecture. While flexible social spaces, both open and enclosed, have been provided for students and educators to socialise, the projects still lack spatial solutions for social initiatives that include families, local communities, and guests, allowing their participation.

Even though this a preliminary study, the findings can still represent a starting point to provide architects with key features and criteria to design innovative environments to enhance children's wellbeing and learning performance. Such preliminary features extrapolated could be a basis to develop more structured guidelines, such as a 'best-practice book' to inspire architects.

Discussion and Conclusions

These theoretical assumptions offer numerous cues for research that can be aimed as much at the quality of the school structure as its educational and social value. In this context, the role of the built environment, important to enhance or hinder pedagogical effectiveness, was first underlined by Rousseau [1], laying the foundations for the later definition of the space as a 'third teacher', introduced by Loris Malguzzi [27]. Such a concept sees the physical environment as a tool to put the individual's wellbeing at the centre, in the belief that the development of new teaching methodologies moves hand in hand with that of new learning environments [27]. The environment inevitably has an impact on learning since it has the capacity to influence where and how we learn, conditioning not only didactics but also social relations and the opportunity for people's expression and fulfilment [2]. Therefore, there emerges the need to rethink architectural space in such a way that it can foster, or at least not hinder, the well-being and learning of those who will inhabit it.

In this context, evaluating specific design features is essential for understanding how architectural spaces contribute to or limit pedagogical effectiveness. This study explores various school environments through key design criteria, revealing differences in flexibility, integration with natural elements, safety and comfort, inclusivity and accessibility, sustainability, play and exploration, pedagogical approach, social interaction, and overall support for learning. In this study, the 'Flexibility' feature was fully present in Case 2 and Case 5, while it was only partially present in Case 1, Case 3, and Case 4. This difference can be attributed to the fact that the criteria—such as 'Spaces should be easily convertible for different activities,' 'Furniture should be adaptable to meet various needs,' and 'Design elements should be extendable or reconfigurable when necessary'—were met in Case 2 and Case 5. The 'Integration with Natural Elements' feature was partially met in Case 4 and Case 5, while it was fully realised in the other cases. This is because Case 1, Case 2, and Case 3 provided strong solutions in terms of natural light, direct access to gardens and terraces, and the use of natural elements and materials in both indoor and outdoor spaces. The 'Safety and Comfort' feature was not fully achieved in any case. To fully meet this feature, all criteria must be addressed, including the use of non-toxic, environmentally friendly materials, fire prevention systems, safe exit routes, proper acoustic arrangements, thermal insulation for energy efficiency, and systems ensuring clean airflow and air quality improvement. The 'Inclusivity and Accessibility' feature was fully met only in Case 5. The requirement that 'The school building should be inclusive' and 'Spaces should be accessible to all users (e.g., children, teachers, school staff)' was not met in the other cases. While all cases demonstrated sustainable features, the criteria for using sustainable materials, energy-efficient systems (solar panels, smart lighting), water conservation methods, and environmentally friendly food practices were only evident in Case 1, Case 3, and Case 5. The 'Play and Exploration Focus' feature was only present in Case 1 and Case 4. In the remaining cases, criteria such as 'Spaces that ignite curiosity and encourage exploration,' 'Dedicated areas for activities like art, music, and drama,' and 'Safe and enjoyable play areas for different age groups' were not fully realised. The 'Pedagogical Approach' feature was partially met only in Case 3. Meanwhile, the 'Social Interaction and Collaboration' feature was fully met only in Case 1. In Case 1, the design solutions provided satisfy the requirements for common areas where children can socialise and collaborate, spaces where teachers can work with small groups and offer individual support, and areas designed to encourage family and local community involvement in activities. The 'Support for Learning Environment' feature was only partially present in Case 1, with insufficient information or responses in the other cases to meet the criteria. While some features were fully met in all examples, others were only partially addressed or not considered at all. Such issues might depend on the limitations of this study. Specifically, the small number of case studies included in the visual analysis may threaten the external validity of its results, exposing it to selection bias risks. Additionally, the case studies considered are all located in northern and central Italy, with no examples included from the southern part of the country, thus risking to lead to a partial analysis of the key features identified. Indeed, a bigger and comprehensive sample would enhance and strengthen the findings.

However, this is considered to be a preliminary and exploratory study, and we do acknowledge that to comprehensively correlate architectural features with pedagogical principles, a multidimensional approach is imperative. By integrating the visual analysis conducted in this pilot study with ethnographic methodologies [28], such as observations and photo-elicited interviews, a more nuanced evaluation of how physical spaces align with educational objectives is facilitated. Research in this domain has demonstrated that employing a combination of qualitative methods can effectively identify subtle interactions between spatial design and pedagogical outcomes, for instance in a study [3] that employed a combination of qualitative methods to identify 'fragments of frictions' that affect pupil well-being in educational settings. By employing such comprehensive analytical frameworks, it is possible to develop evidence-based design strategies that promote environments conducive to both teaching and learning.

Building upon our initial pilot study, which utilised visual analysis to examine the interplay between architectural features and pedagogical practices in educational settings, we propose an expanded, multidimensional research initiative. This forthcoming study aims to conduct a comparative analysis of European primary schools, focusing on the implementation of architectural principles and their alignment with pedagogical methodologies. Recognising the intricate relationship between physical learning spaces and educational outcomes, as highlighted by [29], our approach will integrate visual assessments

with ethnographic methods to capture the lived experiences of both teachers and students within these environments. Such a comprehensive methodology will enable us to identify how specific design elements facilitate or hinder pedagogical objectives across diverse cultural contexts. By systematically comparing schools across various European countries, we aim to uncover best practices and potential areas for improvement in the design of educational spaces. The insights gained from this research will inform architects, educators, and policymakers, fostering the development of learning environments that are both culturally responsive and pedagogically effective. To conclude, this study provides valuable insights into the relationship between physical learning spaces and key educational features, highlighting both the strengths and gaps in the design of various cases. While most of the cases demonstrate a commitment to sustainability, flexibility, and inclusivity, there are notable variations in the extent to which these spaces meet specific criteria, such as safety, comfort, and pedagogical alignment. Ultimately, the results underscore the importance of carefully aligning spatial design with pedagogical goals. As educational settings continue to evolve, further research is needed to refine these connections, ensuring that physical spaces support not only the academic but also the social, emotional, and physical well-being of all learners.

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IDEOLOGY IN ARCHITECTURE OR ARCHITECTURE OF IDEOLOGY: HOW POLITICAL AND TERRITORIAL CHANGES CONDUCTED MAKS FABIANI'S ARCHITECTURAL LEGACY TO HALF A CENTURY OF ANONIMITY

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Abstract
Maks Fabiani (1865-1962), an architect of Slovenian, Austrian and Italian descendance and European (by his own definition) background, with a complex and hard-to-define cultural identity, has left with his work a significant mark in Central European space. His brilliant academic and professional career originated in his multilingual familiar Karst region and had led him to the imperial capital Vienna at the turn of the 19th century. His cosmopolitan framework, intelligence and gallant personality contributed to establishing him as one of the central figures of the Austro-Hungarian cultural milieu. This was a wide, culturally rich, large and diverse space that he has always identified with; however, the historical events that led to an entirely different Europe, altered not only the geographical and political borders, but the even more complex questions of identity. Although he never had a doubt about it (he has always considered himself first and foremost – a European), the much shrinked space he decided to return to in 1917, at the peak of his career, has changed drastically and no longer acknowledged (any of his) identities. By declining an offer for professorship in Vienna and by choosing to move to (by then Italian) Gorizia he has thus become an (Italian) traitor in the eyes of the Austrian social circles; for the Italians he was considered a Slovenian, or more generically Slavic, whereas for his Slovenian native environment he ended up being considered, obviously, an Italian with questionable fascist affiliations. A designation that for some narrow-minded opinions still persists, undoubtedly also as a part of that legacy brought about thanks to the new political order that altered the situation in Slovenian territory after 1918 (when it came under the dominion of the newly funded Kingdom of Slovenians, Croations and Serbs).
The paper discusses how controversies and misinterpretations of Fabiani's identities and intentions seem to have prevailed over the intentions of the brilliant mind and creative genius that he was. The author offers an insight on how historical events and ideological decisions (following the formation of Tito's communist Jugoslavia that Fabiani's Karst territory now belonged to) effectively pushed his work and his memory into neglect, actual anonymity and even near-to oblivion for decades after his death in 1962. The conclusions point to how the case of Maks Fabiani continues to divide public opinion and the efforts to appropriately address the discussed problematics surrounding the great architect's professional and personal life.

Key Words: *Maks Fabiani; Cultural Identity; Ideology in Architecture; Identity in Architecture; Slovenian Architecture*

1.Introduction - Maks Fabiani: from celebrity to near anonymity

Maks Fabiani's multicultural origins have always been a matter of debate. He was born in 1865 in Kobdilj, near Štanjel, in what was then a part of the Austro-Hungarian Empire. His family has lived there for generations and was mostly of mixed German-Italian origins; his mother Charlotte Hofler came from a wealthy family from Trieste, with an Austrian cultural background that carried important connections all the way to Vienna) [17]. This rich, multicultural Mitteleurope spirit prevailed at home, (where they spoke Italian, Slovenian and German languages on a daily basis) and contributed to the broad education young Maks as well as all his 13 siblings received. There is a certain degree of inconsistency in regards to his name, sometimes spelled Max (from his birth-name Maximilian, which has also been used on all official documents [17], but he also used the Italian version Massimiliano, especially after he moved back to Gorizia from Vienna in 1917; he signed almost all his work with *MFabiani*. After finishing school in his hometown and Ljubljana, he studied architecture in Vienna, which was at the turn of the century one of the most important cultural, philosophical and political centers in the world. For a period he even collaborated with one of the key figures, professor Otto Wagner, thus finding himself at the center of the Viennese architectural avant-garde.

His career was rapidly advancing as he participated in countless competitions, designed numerous buildings in (among others) Vienna, Ljubljana, Gorizia, Trieste, not to mention scores of monuments, interior spaces, exhibition pavilions, etc. The list of some of his most notable creations from his Viennese period include Palace Portois&Fix, Artaria Palace, Urania Palace (Vienna), Lyceum Mladika Palace, Krisper and Bamberg Houses (Ljubljana), National Hall *(Narodni dom)* in Trieste and Chamber of Commerce Building *(Trgovski dom)* in Gorizia (the latter two plans from 1903 and 1905 respectively are among the first examples of multi-purpose buildings in Europe, see below). He is the author of several architecture-related essays as well as studies on architectural education and has also participated in various symposia. Among his most prominent

professional achievements is his dedication to urban planning: he developed the regulatory plan for Ljubljana and Bielsko (today Bielsko-Biala in Poland), which have procured him the first honorary doctorate in the field of urban planning of Austro-Hungary in 1902. He became a professor of History of Ancient Architecture at the Technical University of Vienna and has also been a personal consultant of Franz Ferdinand, the Habsburg crown prince, advising him on architectural and art-history matters – a function that went hand in hand with his position of Chief architect of Austrian exhibitions.

The war has changed everything, reducing his professional and academic assignments and deviating his focus on the question that would be at the center of his activity for the rest of his life: reconstruction and rehabilitation of the WWI (and later WWII) damage of the frontier and surrounding territory. Gorizia is located in proximity of where the infamous Battles of Isonzo took place between 1915 and 1917 and left the entire territory, from the mountainous northern area to the Karst plateau that spreads all the way to Trieste, completely devastated (fig.1) which radically changed lives of the population and their environment. In 1917 he became a chief architect of the *Wiederaufbau* - regional office for regulation of affected municipalities of Gorizia region. At the peak of his career he seemed to have sensed the declining spirit and scepticism on the future possibilities of what was left of the Empire. He decided to return to his origins, to his Karst, in order to contribute in rebuilding his homelands, extensively damaged during the Great War. It is in the light of his strong feelings toward his provenance and the desire to apply his creative ideas for the cause in question that reasons for his decisions can be found. The disintegration of the Habsburg Monarchy that he strongly believed in and consequent formation of new frontiers have contributed to Fabiani's troublesome definition of his national identity. He seemed not to fit into any of the newly established characterizations and establishments; the geo-political changes have ment also transformations regarding nationality questions and the questions of ideology connected with identity and belonging. Fabiani with his post-Habsburg cultural imprint was now not Italian enough for the Italians who eagerly annexed the traditionally multicultural territory of Trieste and Gorizia. Similarly, for the newly formulated Kingdom of Slovenians, Croats and Serbs with its troubled relations with western neighbours, Fabiani's questionable family origins also represented certain problematics. He certainly was not to be considered Austrian after having left the life and status he had in Vienna; however Fabiani himself never had a doubt about the question of his identity: as a true visionary, he considered himself *a European* [15]. This auto-identification clearly sums up his ideological views (or, rather, the lack of interest in them); he was, after all, an artist, a philosopher, an architect, an urban designer, an educator – a man of visionary ideas for the future, with a clear desire, purpose and a lucid vision for what was best for this beloved territory of origin.

2. Rebuilding the Homeland, Redefining the Identities

The decision to leave Vienna in 1917 and his established career, social life and privileged position brought Maks Fabiani back to the territory he once knew well, but was now affected by the destruction of the Great War (which not only affected urban areas but also the natural environment and radically altered lanscape that took decades to recover). Not only, with it came a new set of rulers, rules and their ideologies. Fabiani's cooperation with the Italian authorities started during the military occupation of the Julian border territory and continued after the implementation of the Treaty of Rapallo (in 1920).[2] His work was closely related to the tasks he accepted to perform in the ruined Gorizia area just before the dissolution of Austro-Hungarian Empire, which depended entirely on cooperation with the local authorities, which was not without difficulties.

The position of chief architect of the newly established Regional Office for Regulation of the affected territories allowed him to carry out his vision for countless restoration and spatial plans for the lands between Isonzo (Soča) and Vipava river valleys, Gorizia larger area all the way through the Karst (fig. 1). In 1919 Fabiani refused the offer to return to Vienna Technical University (according to his own words as *a moral obligation*), but that same year the new Italian commissioners relieved him of his duties that were the reason he came to Gorizia. Most likely this was due to the fact that he was considered sympathetic to Austrian and Slovenian culture, among other reasons. For many years to follow he was forced into anonymity and therefore many of his superb, even visionary regulation plans and interventions he performed are not signed: smaller reparations performed on parts of buildings, towers, churches, streets and squares, where the author's mediation can be felt, although the documentation is partial and sometimes deficient [2]. Until 1922 Fabiani and a small number of assistants produced over 90 regulatory plans for municipalities of Isonzo river area, Gorizia area, the Karst and Vipava valley area, on the Slovenian and Italian side of the newly established frontiers [18]. Moreover, about 70 plans for

[2] The Treaty of Rapallo was an agreement between the Kingdom of Italy and the Kingdom of Serbs, Croats and Slovenes in the aftermath of the First World War, intended to settle the question of Italian claims over territories promised to the country in return for its entry into the war against Austria-Hungary. It affected a third of the territory of Slovenia which was handed over to Italy, dramatically changing life in the territory in question.

Fig. 1. (a) The destruction of the Isonzo area (Url1); (b) Map of the area (Url2); (c) Fabiani's urban and restoration interventions (Url3).

public buildings have also been elaborated, making the restoration of the region his most extensive work. In a relatively short time, Fabiani arranged and modernized many places from Bovec to Trieste hinterland settlements, which represents a truly unique achievement in European urban planning practice. Fabiani's restoration is still considered exemplary in the field of spatial planning, in large part thanks to his first-class urbanistic knowledge and extensive experience, as well as deep knowledge of the territory – the spatial plans he designed have elevated the spatial culture of numerous places that reflect the plan's qualities until today. In his regulatory plans, the architect wanted to capture the *genius loci* where renovation was not only intended in an urban but also in an economic and social sense. In order for settlements to be functional from every point of view, they also had to satisfy aesthetic, artistic and spiritual values. One of Fabiani's leitmotifs during the restoration was to include at least one public square that functioned as an identity point, played an important social role and represented the source of local self-confidence and uniqueness. Additionally, green areas, inclusion of water (especially important within the specific Karst environment, characterized by the omnipresent stone and scarce superficial water), avenues and other park elements were part of the urban and aesthetic solutions. They all converged into the realization of Fabiani's idea of an orderly city, which would be of best possible use to inhabitants, both in the collective and individual aspects [19].

As indicated above, Fabiani was firmly determined to apply the acquired knowledge and professional experiences in the region's reconstruction - even if that signified submitting his own professional inclination to exhibiting his national affiliation preferences. Conforming to the current ruling party was evidently the only way to open up possibilities for his professional engagement. What followed was probably his most controversial decision that is being discussed and judged to this day. He joined the National Fascist Party in 1921 – a decision that most likely came as a consequence of a realisation that it would be the only possibility if he wanted to be able to do his work and thus contribute with his knowledge to offer support and help in the most active and efficient way. The involvement with the fascist regime came partly as a proof of the propensive inclination towards the Italian cause, as well as his deepest and most heartfelt desire for possibility to express his creativity in his professional activity. Moreover, the ideas of the movement must have decisively inspired him, if we consider how he later described the role of the State in his philosophical essay Acma, published in 1946 [4]. Opportunistic, according to some, but surely also a conscious and pro-active sober personal and professional resolution, that has in many ways changed his life. Fabiani's decision to join the fascist party is fundamentally the main reason for the intentional neglect of his memory by all the countries involved, especially in the postwar communist Jugoslavia. It often still prevails in public opinion as ideological affiliation formulated without considering broader context of the specific time of transformations of frontiers, nations and identities, and despite the indisputable greatness of his professional achievements.

3. Trieste National Hall and Gorizia Chamber of Commerce: How Changing Ideologies Affected Destinies of Two Important Examples of Architectural Heritage

Maks Fabiani planned the National Hall *(Narodni dom)* in Trieste and the Chamber of Commerce Building *(Trgovski dom)* in Gorizia; the former between 1902 and 1904 and the latter in 1904. They are both fundamental for the Slovenian population who have resided in the two cities for centuries. Not only were they a symbol of their presence and importance; the mentioned buildings also represent exceptional achievements from architectural and engineering point of view. They were both built during Fabiani's peak period of success and fell in decline during the fascist uprising period after WWI, as further explained below.

3.1 National Hall (Narodni dom) in Trieste

Ambitiously planned multifunctional building of *Narodni dom* was conceptualized not only as the economic, cultural, sportive and recreational center of the Slovenians in Trieste, but as a symbolic cultural embassy of all the Slavic nations of the Imperial setting (it is important to keep in mind the role that Trieste had for Austro-Hungarian Monarchy in that peroiod, representing a melting pot of nations, a Mitteleuropean cultural, commercial and economic center, as well as the biggest and most important northern Adriatic sea port). A complex multipurpose facility included a hotel with 69 rooms and additional apartments and spaces for different associations (cultural, sports, musical clubs, printing house), savings bank, as well as a restaurant, a gym, a theater with 350 seats and a café. All of the hotel rooms came with individual bathrooms and central heating and the storeys were connected with elevators [8]. Elaborated organization of all these functions contained within the building is indicated by the fact that there were, next to the main, also four additional staircases. The building was equipped with an electro-generator, a rarity in those times; elevator installations, central heating system and individual sanitary facilities represented advanced housekeeping technology - for this Fabiani even won the first prize at the 1906 Vienna Hygiene exhibition [8]. Similarly, the steel construction of the retractable roof structure above the theater and the movable side-walls represented an extraordinary technological challenge - the use of steel, glass and iron, ubiquitous today, was an ingenious, extremely modern choice more than a century ago, when Fabiani used them to construct the roof of the theater. It is evident Fabiani used the most advanced materials and left no space for random design solutions. The increasing importance of spaces and their hierarchy, rhythm and axial composition have been taken into account. Various spaces were intertwined and interconnected through a network of corridors, stairwells, elevators and passages. The square floor plan building occupies half of the city block and was planned as a rational technical structure, with a monumental external surface. Because of its multipurpose and complex character, it was mandatory for Fabiani to plan the National Hall building extremely rationally and functionally. The core of the building ornament has thus been reduced to the main entrance area – the recessed stain-glass windows above the portal and the decorative metal door-railing were designed by a famous Viennese artist Koloman Moser. The monumental portal, designed as a concave entrance, also served as a protection from the infamous bora wind, typical for the area. The lower part of the building that reaches up to the *piano nobile* level, as well as the corners, was cladded in stone. The façade of the three storeys are executed in fired brick in two colour shades, woven into regular geometric pattern that embraces the entire external volume and resembles a carpet – alluding to the oriental or, according to Fabiani's explanation, mediterranean figurative expression and thus indicating what and who the building represents already from its exterior.

Fig. 2. (a) Floorplan of The Trieste National Hall by Maks Fabiani; (b) The view of the building after the latest renovations in 2020 (Url4).

The monumental building, with clear allusion and semblance of a renaissance palace, was created as a counterweight to the Italian national city institutions (financial stock market, the opera theater house and the town hall as the seat of administrative political power). It was therefore a symbol of political emancipation of the Slovenians in Trieste and expressed its influence beyond the city to reach towards Slovenian national and larger Imperial territory [9]. Despite its technical complexity and polyfunctional character, the National Hall was largely ignored by professional circles. Moreover, the fact that the Italian public used exclusively the denomination *Hotel Balkan* (and thus promoting the negative connotation it traditionally had) instead of the official denomination National Hall indicates the intentions to minimize the institution's value and meaning. The symbol of the Slavic nations cultural, economic and political achievements and its favourable architectural

result were becoming increasingly inconvenient as the nationalistic feelings (originating in irredentist movement which effectively paved way to fascism in this multicultural area) escalated in the ever more complicated post-war period in Trieste and all other acquired provinces. On 13 July 1920 Italian fascist and nationalist groups attacked and set fire to the building in a shocking assault that reverberated throughout Europe. Only the charred shell of the building remained as all details were lost as the National Hall lost its original form forever. In 1928 it was renovated, in the spirit of the times, completely altering the concept and only kept the façade according to Fabiani's idea, while he has not even been informed about the renovation and the future plans for the building [9].

3.2 Chamber of Commerce (Trgovski dom) in Gorizia

In the late 19 century the national halls became omnipresent throughout the various national territories of the Austrian empire. Just as the Trieste National Hall, the *Trgovski dom* (Chamber of Commerce), as the founding trade and craft cooperative decided to call it, has also been built as the cultural and economic center of the Slovenian community in the Gorizia and surrounding region. The building was to be the most outstanding, modern and representative which is highlighted also by the dominant corner location of the park and the main street of Gorizia. The edifice was home to a theater, shops and restaurants, bank and loan office, various associations and offices, as well as apartments that occupied the uppermost floors. Descriptions from the early 20th century mention a central heating system and an outstanding illumination system installed inside the theater [9]. All equipment and interiors, also designed by Fabiani, have been entrusted to Slovenian craftsmen and companies from the Gorizia region [9]. Similarly as in Trieste, the organization of various public, private and commercial functions have been meticulously planned and arranged around different passages, corridors and four separate staircases.The exterior is designed so that the use of different materials (stones and plaster) indicates and separates the public functions, contained in the lower floors, from the more private upper floors. The angular turret with the lantern alludes to local noble mansions typical of Gorizia. During the First World War the building was badly damaged and the situation after Italy took possession over the territory was far from favourable to the Slovenians of Gorizia. In 1926 fascist authorities prohibited all events in languages other than Italian, broke into the building, emptied it and burned all books, musical instruments, furniture and anything else that could be destroyed. Later it was the fascist party that bought the building turning it effectively into *casa del fascio* as can be clearly seen on the photographs from that period. After 1945 the building came under the authority of Slovenian-Italian antifascist units, who turned it into *casa del popolo/ljudski dom* – a seat of different cultural associations. However, in that period the rest of any remaining archives has unfortunately been destroyed.

Fig. 3. (a) Fabiani's *Trgovski dom* on the photograph from 1945 (Url5); (b) The building after the latest renovations (Url6).

Two of Fabiani's most famous architectural accomplishments were both symbols of Slovenian presence in Trieste and Gorizia and indicate the strong connection he felt towards the Slovenian population and his native environment. The event of burning of the *Narodni dom* building assumed a central role in the rise of fascism and consequently the destruction of Slovenian identity – the context that should necessarily be considered when analysing Fabiani's decisions and professional actions and his gradual descent of public memory towards his legacy.

4. Štanjel, Fabiani's iconic union of urbanism and landscape – redeeming the forgotten gem

In the period between the two wars Fabiani's focus was concentrated on his native Karst region, as he embraced yet another important political role, which, again, enabled him to pursue his creative vision. Between 1935 and 1945 he was the mayor *(podestà)* of Štanjel, a settlement next to his native Kobdilj, where he conceptualized some truly innovative approaches in the field of spatial planning. Through well-considered architectural interventions he managed to restore the former central role of the settlement and substantially contributed (often at his own expense) to the redesigning of the space, as we can still see nowadays. He established a municipal centre in the castle (at that point really more of a decaying medieval ruin), including the mayor's office, a school, a kindergarten, a cinema, a health station and some other public spaces, such as a large ballroom painted with frescoes and a municipal warehouse. Fabiani thus focused on fundamental edifices that represented the public and social aspects of the settlement. He paid special attention to secure the best locations for schools, with abundant daylight, open views and protection from the notorious bora wind [18]. His plan of placing different public functions of a local community into a repurposed castle structure with new content can be considered visionary and had no comparison for years to follow. Multifunctionality and interconnecting of various purposes has been tackled here on a different scale and background in comparison with the National Hall in Trieste. Other interventions in Štanjel include the redesigning of the town's medieval entrance towergate, the ascending staircase that functions as the town's access, the main square and, perhaps most notably, a new distinct lemon-shape look of the bell-tower of the church of St.Daniel, that is (together with Ferrari garden, also planned by Fabiani – see below) still the most recognizable landmark in the whole region. Medieval Štanjel has through Fabiani's interventions profited with entirely new content without losing its core identity, in a geniously executed fusion of tradition and modernity, where rationality meets the visually convincing solutions.

During the Second World War both Štanjel and Kobdilj were almost completely destroyed. Fabiani succeeded, to a certain extent, to apply his political influence to defend the people and the native settlements: according to the villagers' testimonials, on 15.02.1944 he convinced a troup of German soldiers to spare the town that thus avoided being burnt down [13]. Only three months later it was the partisans who set fire to Štanjel (together with Fabiani's entire personal archive) and destroyed its most iconic buildings [13]. Afterwards he helped the villagers to obtain reconstruction funds from the Allied military administration [21]. Controversy of his role of *podestà* does not change the local public memory which shows the image of a careful mediator between the inhabitants and the authorities. Once again, ideology that necessarily needs to be put into appropriate context to interpret the complex personality of Maks Fabiani and his actions.

Fig. 4. (a) The staircase and the bell-tower of St.Daniel church (Url7); (b) Ferrari gardens with Štanjel in the background (Url8).

Possibly the best known example of Fabiani's legacy in Štanjel is the Ferrari Garden. In 1920 Enrico Ferrari, Maks Fabiani's nephew, bought a set of abandoned buildings in a row between the two towers of the Štanjel wall. Fabiani reconstructed them into what is known as Ferrari Villa, with his typically respectful approach for the built and natural environment and the town's medieval atmosphere. The houses were gradually renovated with functional adaptations, but without changing the street-side façade character and are thus perfectly blended into the original setting. At the foot of the villa there was a steep and barren terrain that Fabiani gradually transformed into a true landscape masterpiece, the Ferrari garden. When designing the garden, he used traditional techniques and numerous vernacular elements characteristic of the Karst landscape – terraces, stone retaining walls, staircases, pergolas – as well as details and material that reflect the contemporaneity and ideals of the time. He boldly combined the ubiquitous stone with concrete, innovative material that has

only started its course of popularity in that period, uniting them in harmonious compliance. The park was constructed on terraces, in communication with the layered urban structure of the rest of the old town, as can be observed on fig. 4. Landscape features of the garden reflect harmonious unity between landscape components, that combine with the harsh Karst environment, and architectural constituents. The choice of planting Mediterranean evergreen tree species furthermore point to Fabiani's attention and understanding of the local environment. The undisputed highlight is actually the water supply system that Fabiani put in place in Ferrari garden. The traditional method of collecting rainwater has been upgraded with a system of floor collection channels, cisterns, pipelines, drainage and irrigation canals that have been connected into a complex system. This system already supplied the villa with fresh running water, not only for basic needs, but also for entertainment and decoration – a bold statement of ingenious mind over the severity of a strict Karst landscape notoriously poor with water. The lower part of the park is completed with an outlook pavilion, where the oval pond with Venetian bridge and a renaissance-style grotto are placed. The pool with water jets is not only there for decorative purposes, but was mainly used as an accumulation of water utilized to irrigate the garden and fields in the sinkhole below the park. In winter, when the water in the pool froze, the ice on its surface was broken and stored in the ice cave through the opening next to the pool [13]. The destruction of Kobdilj and Štanjel in 1945, together with the absence of the town's management in the decades following WWII period, led to degradation and near disintegration of the park (the magnificent rose garden vanished while cows grazed freely through the terraces and the abandoned pathways). Lack of interest in Fabiani's work and inheritance, no doubt also due to changing post-war ideologies and shift in values, furthermore contributed to the complex scenario that obscured the true value of the gardens project. However, in the last 25 years the entire town, the walking trail surrounding the terraced settlement and the park have been gradually renovated. The garden is since 2015, the 150t^{h} anniversary of Fabiani's birth, finally open to the public for the first time after decades and today represents cultural monument of national importance.

5. Conclusion

The incredible life and achievements of Maks Fabiani are inspirational, to say the least. The list of works, functions, awards and acknowledgments speak of an accomplished professional course that covered different historical, geo-political (and ideological) periods. The flourishing Viennese period, which ended during the course of the First World War conflict, are considered by many not only the peak of his professional and personal success, but also come with the weight of partiality, as changing Europe was confronted with the complex issue of post war identity. This decisively marked the years that Fabiani dedicated to reconstruction of the frontier area (between 1917 and 1922). He was since 1923 also lecturing art history at the college in Gorizia, was between 1925 and 1945 the secretary of the Association of Engineers and Architects of Gorizia and in the same period also member of the Diocessan Commission for Religious Art. A well-known and repeatedly commemorated reality (albeit often from a narrow, one-sided point of view) is that he was also a member of the fascist party since 1921, and (once again) established himself as a regime architect. This fact necessarily needs to be considered from a broader context, as the function came with the aim of realizing his mission as the urban planner, thinker, problem-solving architect that he was. This led to another political function, that of a mayor or *podestà* in Štanjel between 1935 and 1945, a period that saw the completion of works of great importance and intellectual commitment. Between 1938 and 1962 he was a part-time inspector for the conservation of monuments. He was also a member of commissions for the organization of various exhibitions (e.g. Gorizia 1929), at which he sometimes also exhibited himself. He received several honors and recognitions for his work (e.g. the Grand Prix and the gold medal at the World Exhibition in Paris in 1900). A lifetime of achievements that ended in Gorizia in 1962 when he was 97 years old, in dignified misery [18]. This last fact being another proof of how awkward and out of place Fabiani continuously was considered, never truly belonging to any one side and never being properly acknowledged, despite a century of creations and inventions.

Possibly the greatest value of Maks Fabiani's work is how his creations point to his profound knowledge of places, understanding and respect for their cultural and historical components. He dedicated his whole life and worked to ensure a better future for his community by means of arrangements that were progressive but at the same time borrowed from local traditions and area of origin. Moreover, his work speaks of his deep awareness of the necessity of modernization and preparation for the new approaching times, setting foundations not only for the present but also for future generations, as a true visionary of one, common - European culture.

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PRE-EXISTENT ENVIRONMENTS AND THE QUESTIONS OF CIRCUMSTANCE: RETHINKING TRADITION AS A PARADIGM OF SUSTAINABILITY IN THE CONTEMPORARY ARCHITECTURAL DISCOURSE

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Abstract

Sustainable development has become a defining concern in contemporary architectural discourse, particularly within the European context. With the European Union aiming for climate neutrality by 2050, architecture has been defined as a key sector responsible for energy consumption and greenhouse gas emissions. As a response, policies and initiatives were made advocating for energy-efficient, bioclimatic, and technologically innovative design solutions. In spite of the various advancements, the main approach to sustainability is often narrowly focused on the questions of energy efficiency, material life cycle, and context awareness, yet neglecting historical continuity as a paradigm of sustainability. This paper argues that true sustainability extends beyond the questions of bioclimatic design and energy efficiency. Though the use of sustainable materials is an important step, it is insufficient if the vast majority of the buildings are not preserved. The most sustainable structures are those that societies value and maintain, avoiding the high carbon emissions associated with demolition and new constructions. Yet, on the contrary to addressing the root causes of unsustainable developments, contemporary practices that incorporate sustainability, often remain limited to the superficial questions which are mainly applicable for marketing goals. In addition, prior to the emergence of sustainability as a formal concept, leading architects and theorists of the twentieth century had already recognised the importance of historical continuity, which, in our contemporary reading, can be included as a paradigm of sustainability. Ernesto Nathan Rogers, through his notion of "Pre-existent Environments" and Fernando Távora's emphasis on "Circumstance", both advocate for an approach that integrates tradition within the modern architectural practice. Their perspectives highlight the necessity of preserving and adapting architecture to the contextual and temporal context in which it is operating. By rethinking sustainability through the lens of historical continuity, this paper proposes a shift from a technologically driven, short-term approach to one that values architectural heritage as an essential dimension of the sustainable discourse.

Key Words: *Pre-existent Environments, Circumstance, Sustainability, Architecture*

1. Introduction

The architectural discourse around the theme of sustainable development has been among the leading topics in the past years, especially in the European context. To the extent that the European Commission has set the target of "economy-wide climate neutrality" by the year 2050. The relevance of the construction sector in the sustainability discourse is of such relevance that currently 40% of total EU energy consumption is used by the building sector, and 36% of total EU greenhouse gas emissions[3] come from buildings. Therefore, the European Union has emphasised the path to green and sustainable buildings by promoting architecture that takes into consideration "ECO Construction, Bioclimatic and thermal insulation, integrate renewable energies, pursuits innovative solutions smart energy efficiency as well as expanding knowledge on the discussed topics". Interdisciplinary Initiatives such as the New European Bauhaus (NEB) have also gained popularity in academic and professional sectors with the aim to "connect the European Green Deal to living spaces and mobilise a collective effort to imagine and build a sustainable, inclusive, and beautiful/aesthetic future for minds and souls"[4].

[3] See EU figures > https://climate-pact.europa.eu/priority-topics/green-buildings_en

[4] See published information by the EU Commission on the topics of Sustainable buildings and Green buildings. The Mission regarding Sustainable buildings is defined as the following: The Partnership on Sustainable Buildings is conceived as a strategic alliance between European regions to boost new markets and take advantage of regional opportunities for smart specialisation in sustainable buildings.> Sustainable buildings https://ec.europa.eu/regional_policy/policy/communities-and-networks/s3-community-of-practice/partnership_energy_sustainable_buildings_en

In today's world, one can refer to the various technological advancements in the application and development of new materials, calculation of energy management, and striving for buildings that are “engineered without engines”, as in the words of Bijarke Ingels, as he argues that “we have much to ‘«re-learn» from vernacular architecture in the regions where we work, but we must also put our latest technological advances to work in realising these principles” [1].

However, one can even argue that today, even in some cases, what symbolises sustainability is, in fact, not sustainable. Often restricted to bioclimatic design and energy efficiency, the concept of sustainability has been reduced to a stereotypical language that ignores the broader implications of sustainable architecture. During a building's operational phase, in various instances, a considerable number of architects still merely place a high priority on energy efficiency while ignoring other important factors, including resource extraction and material lifespan. Because of this, even while energy efficiency is emphasised, especially in high-rise buildings, these structures still mostly rely on non-renewable energy sources, which depletes natural resources and worsens the environment. In addition, the materials used to build them are frequently obtained by extraction methods that harm the environment and make little attempt at recycling or reuse. These structures are made exclusively for construction, which exacerbates resource depletion and increases waste, rather than being intended for adaptive reuse or responsible deconstruction. Therefore, even while operational energy efficiency is encouraged, it is not always a sign of an architecture that truly adheres to environmental standards [2].

2. On the notion of Continuity

In addition, sustainability is often seen merely in the relationship of architecture to the geographical context and its future outcome, where historical continuity is often neglected. The most sustainable buildings are those that society strives to preserve because the largest subsidy to CO2 emission is when a building is built[5]. Hence, even though building in sustainable materials is a considerable step, it is not enough unless a building is preserved. Based on this argument, one should stress the sense of historical continuity of architecture, in which the artefact is embedded in a historical context, making it worthy of preservation instead of entering the repeated cycle of demolition and construction. This is to argue that the most sustainable architectural practice is the preservation of architecture (Reuse, Rehabilitation, Renovation and Reconstruction) or a new construction that can pass the test of time.

In the same sense, one can argue that Pantheon, though mainly constructed in Roman cement, travertine, porous tufa, and brick, is indeed a sustainable structure, having passed the test of time, remaining still centuries later. It is not the use of materials labelled sustainable that defines Pantheon as a sustainable structure, but rather the wisdom in its design principles. According to the renowned Spanish architect, one can find both “Beauty and Intellectual Enjoyment” in Pantheon. Campo Baeza argues that “The Roman Pantheon is the most beautiful piece of architecture in the world, capable of arousing deep emotion. Yesterday, today and tomorrow. I made a deal with my students many years ago that when they visit the Pantheon, if they shed tears, they have to send me a postcard telling me that they have cried. All those who have written have cried. And I’ve amassed a sizeable collection of postcards of the Pantheon in Rome, all handwritten and a few smudged with tears” [2,3,4]. It is exactly the historical continuity in Pantheon which makes it an oeuvre worthy of preservation, as the past and present generations have done, and those in the future will strive to do, reinforcing the idea that preservation is not just about safeguarding a structure but about sustaining historical identity.

[5] See the published conversation between Michael Diamant’s interview in Cave of Apelles in 2022, where the theme of “New Traditional Architecture”, which has become a rapidly growing movement, especially in the Nordics, has gained popularity. The movement argues in favour of Neo-Classical architecture for today’s world, based on the premise that Classical architecture is more aesthetically pleasing and hence the society strives to preserve it. It should be noted that this article is not in favour of returning to a pastiche Classical architecture, which is detached from the actuality of the contemporary condition, yet reviving guiding principles of Classical and Traditional architecture can certainly be pondered upon.

Fig. 1. Pantheon

In this regard, and prior to the widespread use of the term "Sustainability" and its derivatives in architectural discourse, a number of architects and theoreticians of the twentieth century have emphasised the relevance of historical consciousness in design. Namely, the renowned Italian architect Ernesto Nathan Rogers, in developing his notion of "Pre-existent Environments"[6], either in Casabella-Continuità as the editor or in his seminal book *Esperienza dell'architettura*[7] [6] published in 1958, enhances the importance of incorporating tradition into the Modern Movement. One can observe a similar tendency in the work of the famous Portuguese architect Fernando Távora, as he emphasised the importance of Circumstance[8] as a key theme in his book *Da Organização do Espaço* [9][7], published in 1962.

3. Pre-Existent Environments

The first use of Pre-Existent Environments in the work of Ernesto Nathan Rogers dates back to 1948, in the writing of Rogers in the Faculty of Literature and Philosophy of the National Major University of San Marcos, where he reflected upon the role of architect as an artist [8]. Rogers argued that one's humanity is not due to the accumulation of knowledge, of the learning of facts but rather the constant balance between emotions and intellect translated to action, arguing that it is in the confrontation between artistic sensitivity and practical concerns that we find the morality of aesthetics, where an ideal encounters expression [8]. This understanding of aesthetics is deeply thought-provoking in the architectural discourse regarding the questions of sustainability. It is often assumed that sustainability in architecture must come at the expense of

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[6] Pre-existent Environments is the English translation of the Italian terminology "le preesistenze a*mbientali" of Ernesto Nathan Rogers. This translation was argued to be the more adequate version in Maurizio Sabini´s book, Ernesto Nathan Rogers: The Modern Architect as Public Intellectual*. The author argues that In the past, translations have varied between "preexisting conditions," "environmental pre-existences" (literal translation), or simply keeping the original Italian. Yet in his book, which is the first book about Ernesto Nathan Rogers written in English (published in 2021), Sabini preferred the "pre-existent environments" to preserve the concept of Rogers' "environment". Therefore, this paper also uses the same translation offered by Maurizio Sabini.

[7] *Esperienza dell'architettura* often translated to English as *The Experience of Architecture.*

[8] Fernando Távora referred to the notion of "Circunstância" in Portuguese, which, if translated literally into English, is "Circumstance". Yet notably, Távora, in various cases, conjugates this terminology.

[9] *Da Organização do Espaço* often translated to English as *About the Organisation of Space*

aesthetics. However, drawing lessons from Rogers, one can argue that addressing practical concerns such as climate change and energy efficiency should not exclude the questions of aesthetics in architecture. Instead, these elements should be integrated to create a new, functional, yet ethically grounded aesthetics. Rather than relying solely on technological solutions for sustainability, architecture should also embrace artistic and cultural dimensions.

Rogers expanded his notion by incorporating the idea of historicity, not as a nostalgic recollection of the past but as an operating tool within the realm of architecture [9]. In addition, Rogers, in numerous instances, clarifies that for him, tradition and the sense of history are contrary to a pastiche reading of the past. Arguing that;

"The early Modern Movement designers' impulse to rebel against that situation [of eclecticism's empty formalism] necessarily had to turn into a polemic against the past. This feeling was so strong that the new buildings represented an act of violence against the pre-existing environment. … [Now] we examine the problem of the pre-existing environment in a new light. We are no longer satisfied if a work expresses our epoch; it must also assert contemporary values in full by blending with society and space—both of which are deeply rooted in tradition.

The modern meaning of tradition is close to that of historicity. … For us, tradition is the common origin of opinions, feelings and facts, from which a certain social group derives, and toward which every individual's thoughts and actions move" [10].

Roger's reference to contemporary values can also be read in today's context, where true sustainability is both a responsibility and a value for contemporary society. Therefore, architecture is responsible for incorporating sustainability into its core principles, arguably as an inherent dimension of functionality (Utilitas by borrowing the words of Vitruvius). The echoes of Rogers' pre-existent environments can be seen in the BBPR's arguably most well-known work of architecture at the heart of Milan, the Torre Velasca [11]. A modern oeuvre, which does not lean towards the American-styled skyscrapers, rather, it is a tall Milanese building [10]. A building which, despite some of the polemic that was created around it, is surely one of the most significant marks of Milan. As described by Manfred Tafuri:

> "an homage to Milan completed with the as yet unsilenced tools of historicism. The Velasca is being built in the city, lyrically telling the story of an urban body on its way to extinction. Once again, we await the catharsis from the intentions buried in the folds of a single object (..) the Velasca, wrapped in its ambiguous aura built on analogy and innuendo; it is there to act as a symbol of Italian architecture's aspirations in the 1950s. In the great museum that is this historic city, the tower is almost certain to find a home that might alleviate their solitude, protecting them from the future and reassuring them of their moral duty" [12].

In this regard, the tower can be argued to be a sustainable work, having become part of the city's identity. It is certainly a valid argument that the notion of sustainability, as understood in the current era, is absent in Rogers' discourse. Yet, his notion of pre-existent environments, which he understood in close relationship to continuity and tradition, can allow us to rethink our current challenges. This is to argue that a sustainable structure is that which is conscious, not only in terms of energy efficiency, carbon footprints and the use of local materials, but also is reactive to the morphological and historical context in which it is situated. It is only through such a holistic approach to design that architecture becomes worthy of preservation.

Fig. 2. Torre Velasca

4. Questions of Circumstance

As the historical records reveal, Fernando Távora met Ernesto Nathan Rogers on at least two occasions, first in 1952 in which Távora participated in the first summer school of CIAM in Venice, and second in 1959 in which he participated in CIAM held in Otterlo presenting two projects, Mercado Municipal de Vila da Feira and Casa de Férias in Ofir[10]. Yet, the influence of Rogers on Távora goes beyond these two events. The generation of architects that Távora belonged to was profoundly influenced by Rogers, as it was through him that international architecture was interpreted and perceived in Portugal for many years [13].

Yet, when Távora in 1962 published his seminal work, *About the Organization of Space*, he did not reference Rogers even once; therefore, due to the lack of historical evidence, it is hard to argue that Távora´s understanding of what he called circumstance is directly linked to Rogers´ notion of Pre-existent environments. Nevertheless, one can argue that, like the invention of the telephone, both architects have developed similar ideas in two different places during the same span of time, both advocating for architecture to respect the sense of place.

[10] See the chronology of Tavora100, the centenary of Fernando Tavora, which promoted a series of events and exhibitions regarding his legacy. https://tavora100.pt/pt/timeline

The Spanish philosopher, Ortega y Gasset's notion of circumstance, as described in his words, “I am me and my circumstance, if I do not save it, I will not save myself” [15], is echoed in Távora´s understanding of the circumstance in architectural terms [14]. Subsequently, Távora translated this understanding to the profession, where identity, rooted in the physical built context and historical continuity, becomes the central theme of his works. This can be seen in one of his interviews where he stated, “The circumstances of each work are very different, and I think it’s very interesting that definition of the circumstances, of the conditions of each work. It’s fundamental, it gives the work its character, it gives the work its identity”[16]. Regardless, one can argue that Távora, despite not using terminologies which are often associated with sustainability, indeed advocated for a sustainable methodology of intervention in which the conditions of the place define the adequate decisions to be taken. This approach, according to him, is what constructs a modern work [17].

In addition, the desire to understand and respect the circumstances of the place may even oblige the architect to remain silent in some cases [18]. When Távora decides to intervene, architecture as an artefact, and the questions of form and the subtle line between the natural and man-made are reflected upon as the architect’s language. He calls upon a conscious intervention [19], which, in today’s wording, can be interpreted as a genuinely sustainable architectural principle, arguing:

> “[...] the artificial forms, the result of human creation – in addition to the natural forms that play a role of fundamental importance – find themselves to be conditioning factors for every new form created since the space organised by man is conditioned in its organisation but, once organised, becomes in turn conditioning for future organisations. [...]
>
> The «circumstance» will, therefore, be, in the proper meaning of the term, that set of factors that surround man, that are around him and, since he is the creator of many of them, to these must be added those that derive from his very existence, from his being” [20].

This argument posits that architecture actively transforms the conditions of a place, reshaping its circumstances and contributing to the formation of a new identity. Consequently, the architect's role is fundamentally rooted in the ability to observe and interpret the built environment—an essential skill that informs the design process. Through critical observation, the architect must engage with the specific conditions of a site, ensuring that architectural interventions respond thoughtfully to their spatial, historical, and cultural contexts.

For Távora, architecture has the ultimate goal to instill itself in a historical continuity, where a constructive and critical relation with the past is reflected in the project [21]. In this regard, for him, reading history is not a collection of emerging styles which have consequently been subsequently substituted with one another but rather a critical understanding of principles that can serve our current needs. Hence, for Távora, history becomes an operating tool, making his architecture an example of a “permanent modernity” [22] that is respectful to the context, learns from it, and can sustain itself in time.

Fig. 3. Pavilhão Carlos Ramos

Arguably, an echo of incorporating the pre-existent circumstances of a work can be seen in his most well-known student and collaborator's work, where Álvaro Siza, through careful observation, documented in his numerous sketches, intends to understand the forces of the site and intervene accordingly. Pavilhão Carlos Ramos, which is one of the main buildings of the Faculty of Architecture of the University of Porto, is an example of this principle, where the presence of the pre-existing natural context, especially the presence of the beech tree (known as faia in Portuguese) defines the limits of the artefact's morphological implantation. Being a building dedicated to the students of architecture, it is an exemplary method of intervention in which Siza consciously takes Távora's notion of circumstance into consideration. A lesson of architecture, offering profound insights for young architects. Though the tree has unfortunately fallen a year ago, its impact due to the presence of the artefact remains still.

5. Final Consideration

As discussed in this paper, the reflections of Ernesto Nathan Rogers and Fernando Távora, which in many instances are in accordance, illustrate how tradition and historical continuity can function as dynamic tools for contemporary architectural practice in contrast to a mere reference to the past. Rogers' "pre-existent environments" and Távora's "circumstance" both advocate for an architecture that takes into consideration the historical and contextual conditions. In this regard, this paper argues that both Rogers and Távora's theoretical contributions based on their practice, in fact, highlight one of the dimensions of an architecture that is sustainable in its principle without using the specific terminologies which, in our current days, are often associated with the topic. This interpretation of sustainable principles in our current condition is especially of great relevance due to the fact that, in many instances, sustainability has become a branding tool for competitive purposes rather than core principles that should be embodied in our architectural education and practice.

In addition, by reading history as an operating tool, this paper argues that instead of constantly pursuing the answers to sustainability in technology, one can search for existing principles that can be applied today as well, hence bridging continuity and innovation to ensure that new interventions resonate with the identity of the environments in which they are situated.

Lastly, it is important to recognise that sustainability is a complex and multi-faceted topic. In some instances, the contemporary discourse of sustainability is commercialised as a marketable feature, which comes at the cost of its broader ecological, social, cultural and historical dimensions. While a building's ambitions and achievements can be assessed in relation to the evolving principles of sustainability, it is essential to recognise that no building is entirely sustainable. This is to argue that sustainability is not a fixed state but rather a continuous process of adaptation, critical engagement, and innovation. Hence, it is essential to promote an ongoing dialogue between architectural practice, environmental responsibility, and social needs. Thus, in contrast to perceiving sustainability as a mere certification or a set of predefined standards, it should be understood as an evolving framework that promotes architects to integrate existing concepts and ideas in the history of architecture and reinterpret them based on the characteristics of the era in which they belong to.

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Figures

[1] Fig. 1. Pantheon by Anastasiia kholopova
[2] Fig. 2. Torre Velasca by Mahdi Alizadeh
[3] Figure 3. Pavilhão Carlos Ramos by Anastasiia Kholopova

TIME, MEMORY AND EXPERIENCE IN THE CRAFTING OF SPACE: TWO EXAMPLES, FERNANDO TÁVORA AND ERNESTO NATHAN ROGERS

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Abstract

The overemphasis on rationality and physicality of architecture has come at the cost of neglecting time and memory from the architectural discourse. Therefore, this article explores the role of time and memory in shaping our experience of the built environment. Drawing on the perspectives of the Portuguese architect Fernando Távora and the Italian architect Ernesto Nathan Rogers, both of whom have contributed significantly to the topic and have reflected on similar themes in their architectural legacy, this article examines how architecture engages with temporality, whether through the pursuit of timelessness, the suspension of time or the deep connection between memory and space.

Additionally, the study situates these ideas within a broader intellectual discourse, reflecting upon a critical detachment from the conventional expression of the era in favour of a more enduring architecture through the lens of historical continuity. By doing so, the article emphasises the value of a theory that embraces history as a dynamic tool in bridging between the past, present, and future rather than a chronological and linear understanding of history. Finally, the article advocates for a phenomenological approach to architecture in which architectural spaces are perceived in an existential sense.

Key Words: *Time, Memory, History, Experience*

1. Introduction

It is commonly acknowledged that architecture is the art of constructing adequate spaces for specific purposes, framing the physical dimension of our inhabited spaces. Though the role of architecture in dwelling spaces according to our needs is a reasonable assumption, the limits of architecture are not bound to our physical interaction and perception of the built environment. The three-dimensionality of architectural representation has limited us in the realm of thinking and imagining our spaces. Arguably, time is the neglected dimension of space, often absent in the architectural discourse, yet it is as important as space in constructing our holistic perception; as Juhani Pallasmaa argues, “we dwell in both space and time, and both dimensions are articulated and domesticated for human purposes”[1].

The notion of dwelling in time is especially evident when a space ceases to exist in its physicality; Aldo Rossi’s *Teatro del Mundo* lasted for some months, and even though its spatial significance was of great relevance, what made it a masterpiece was the spatialisation of time, or in other words, an architecture that was ephemeral in space but transcendent in time, that it; an architecture that dwelled in time. *Teatro del Mundo* has been studied, envisaged, and imagined by generations who have never seen the building in its physical form but encountered it in its temporal dimension, triggering imagination by constructing the city’s common memory.

The notion of time has articulated many thoughts and ideas throughout history. Yet, one common factor in different attempts to define time is its association with action, an action that is not bound to the past, present, or future but is a continuum conjugation of our memories. For this reason, we can relate to the architecture of the past; we can relate to the Pantheon without it seeming stranger to us; we relate to it more than we relate to most of the contemporary constructions built in our era. One could argue that the lost dimension of architecture in our era is time; we strive to comprehend the meaning of time in the buildings of the past. This is especially of great relevance since, to a large extent, in the post-industrial era, the rapid pace of construction has diminished our ability to integrate the dimension of time into architecture.

2. Time, Memory, and Experience

The significance of time in juxtaposition to space is of such relevance that Joseph Brodsky argues, "Space to me is, indeed, both lesser and less dear than time"[2]. In other words, we do not build spaces for the mere reason of shelter; we build them to slow down time, or as Karsten Harries says, the principal task of architecture is "not only about domesticating space, it is also a deep defense against the terror of time. The language of beauty is essentially the language of timeless reality"[3]. In this regard, Juhani Pallasmaa argues that "We have a deep existential need to feel rooted in time as much as in space; we need to dwell in time and duration as well as in space and place" [4]. By introducing the relevance of time in the architectural discourse, the Finnish architect and theorist is in the pursuit of enhancing the importance of the experience of our spaces. Pallasmaa further argues that the title of the book he co-authored with McCarter in 2012, entitled *Understanding Architecture*, is not what he desired the most, as it is an "emphasis on rationality and intellectualisation, "understanding" over experience" [4]. This is of great relevance that there seems to still exist a sense of resistance towards the experience of architecture in contrast to understanding it. Interestingly, Ernesto Nathan Rogers' seminal work, entitled *Esperienza dell'architettura* [5], translated into English as *The Experience of Architecture*, expresses a very similar argument in 1958.

The renowned Spanish architect Alberto Campo Baeza categorises how he perceives time in architecture. Time can be understood in its relation with functionality (the time of Utilitas), in the duration it achieves (the time of Firmitas), and its aesthetical qualities surpassing centuries (the time of Venustas), yet the most important aspect of time, according to him, is the relevance of time to memory. What remains essential in a work of architecture is "the time that the building is capable of remaining in men's memory: a built work's resistance to oblivion, or in other words, the thing that secures its trajectory into architectural history, which has little to do with current fashion or passing fame" [6]. He argues an architect should find his/her place in history, and his/her work should at least have the desire and intention to transcend. In this regard, Picasso's statement, "I am tired of being modern. Now I want to be immortal"[7], can be understood not as a resistance against being modern but rather the rejection of conventional codes and styles which define the fashion of the day. This is to argue that in order to be modern and embody time into the work of art or architecture, the architect should, in fact, distance from the age in which he/she belongs to. The Italian philosopher Giorgio Agamben, in a text entitled *What is the Contemporary?* argues;

> "Contemporariness is, then, a singular relationship with one's own time, which adheres to it and, at the same time, keeps a distance from it. More precisely, it is that relationship with time that adheres to it through a disjunction and an anachronism. Those who coincide too well with the epoch, those who are perfectly tied to it in every respect, are not contemporaries precisely because they do not manage to see it; they are not able to firmly hold their gaze on it" [8].

It is what Giorgio Agamben calls "contemporary", and other authors name "permanent modernity," which instils upon the artist or architect the demanding burden of detaching from the common conventional expression of his/her time, which will certainly be accompanied by much criticism from a society that is attached to its short-lived stylistic expressions. Yet, it is the very same burden that will find the oeuvre embedded in memories and history.

In addition, Giorgio Agamben defined the contemporary as a critical observer and thinker who traces what he calls the "obscurity" of his/her age but also takes action [8]. Where precisely the artist, and in this case, the architect's ability to transform this obscurity into opportunity, is the merit of the oeuvre.

> "The contemporary must firmly hold his graze on his own time. But what does he who sees his time actually see? What is this demented grin on the face of his age? I would like, to propose a second definition of contemporariness: The contemporary is he who firmly holds his gaze on his own time so as to perceive not its light but rather its darkness. All eras, for those who experience contemporariness, are obscure. The Contemporary is precisely the person who knows how to see this obscurity, who is able to write by dipping his pen in the obscurity of the present" [8].

This critical perception towards the era and the rejection of common conventional expressions can be traced in the work of a number of influential architects. Ernesto Nathan Rogers and Fernando Távora, who were both among the pioneers of modernity in their countries, paid special attention to the questions of time, memory, and experience in both their architectural practice and their theoretical works.

3. Távora and the Continuous Construction of Memories

The Continuous Construction of Memories is the title of Álvaro Siza´s speech in Fernando Távora´s Laurea Honoris Causa held at the IUAV University of Venice[11] in 2003. In his note, Álvaro Siza referred to the Holidays House in Ofir, the Cedar School in Vila Nova de Gaia, the Pousada of Santa Marinha, the Barredo Recovery Plan in Porto, and the text *O Porblema da Casa Portuguesa*[12], as well as the House of 24, a tower built beside the Porto cathedral [9].

Álvaro Siza makes a clear distinction that memory in the work of Távora is not "nostalgia but rather the awareness of the shared present and the appetite for the future" [9]. Perhaps this quality and capacity to read and interpret history as an architectural design tool characterises his work as "not-so-easy work" according to Siza, yet profoundly "contemporary in a country that was one of doldrums and suffocated anxiety. It reveals itself successively as an act of reflection, continuity and subversion in a counterpoint of projects in a state of happiness and suspended decomposition"[9]. For Távora, architectural lessons can be learnt not only from the past but also from the Modern heritage, as he himself was closely associated with the Modern movement. He was impressed by the experience of architecture, whether a landscape in the East (Zen garden) or a detail, that of the door handle of the Ronchamp in the West, and essentially, his legacy lay in the passing of this experience to his students [9].

This sense of continuity and contemporariness (or the state of permanent modernity) is rooted in tradition but not limited to it. A modern work of architecture, not by the definitions of a style, but of innovation and forward-thinking, is materialised in one of his most well-known projects, the Holidays House in Ofir. A project that was presented by him in 1959, in the CIAM of Otterlo. Álvaro Siza describes the house as "strongly rooted in Portuguese popular tradition, although not as much as meets the eye at first sight. In fact, this house has the typical organisation of a modern house and is very much in line with Breuer" [10].

In a Text published in 1952 entitled *Architecture and Urbanism. The Lesson of Constants,* Fernando Távora describes some of the guiding concepts of his work. Távora presents his definition of architecture and urbanism in a holistic manner, in which the act of architecture is indeed a manifestation of man's existence; as he argues, "Wherever man is, at any time and in any place, there is Architecture and Urbanism. A necessary phenomenon, inherent to man's very nature, an indispensable extension of his life, a manifestation of his existence"[11]. The role of the architect as the "organiser of space" [12], in creating the conditions of life, shaping the experienced memories of the individual is central to his thinking. He argues that "if man, in organising space, carries out conditioned work, insofar as he satisfies the realities that surround him, he also carries out work that conditions his own activity; a city or a house are built according to pre-existing conditions but once built, they create conditions of existence for the men who live in them" [11].

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[11] The Rector of the University Marino Folin, the Dean of the Faculty Carlo Magnani, the editor of Casabella Fancesco Dal Co, the renown Portuguese architects, both of whom were close students of Távora meaning Eduardo Souto de Moura and Álvaro Siza were present in the ceremony.

[12] Translated to English as *The Problem of the Portuguese House*

Figure1. Redrawing of Holidays House in Ofir

This implies that to perceive the pre-existing conditions of architecture, one should refer to history; it is through the in-built memories that we relate ourselves to the surrounding world; hence, as he puts it, “Knowledge of the past is of value to the present. It is true that the mentioned constants, by their very nature, have not lost their relevance. Sometimes, however, they are forgotten, and Architecture and Urbanism take on aspects of crisis” [11].

Contrary to architects in whose works a clear use of recipes of design is seen for Távora, and due to his understanding of the particular conditions of each work, one observes an absence of a set of design techniques that are always applied, yet the principles of design remain the same. For instance, the House of 24, which is one of his last projects, built on the foundation of a medieval building in the proximity of Porto’s Cathedral, according to Siza, is a “great little jewel”, in the heart of the city. As Siza puts it, Távora built “an intimate and yet wide open doorway between the past and what is to come”[9]. In House 24, Távora strives for a balance between modern and traditional, an organic and natural cohabitation, which embodies the memories of the place and a vision for the future [13]. This principle was stated in his writings back in 1952, in which he argued that “contemporary Architecture and Urbanism must show their modernity, reflect total collaboration, and not forget their importance as conditioning elements in human life” [11]. The House 24, responds to the required necessity of the current era, yet preserves the image of the past [13]. Távora, in explaining the project, states that:

> “Given that the building has been a place and representation of municipal power, the project proposes to transform it into a memorial of the long years of life and history of the city of Porto, through the creation of an architectural object that evokes the existing tower, in dialogue with the remaining buildings of the Cathedral and the current Historical Archive [the medieval tower reconstructed by Rogerio de Azevedo], possessing an interior space capable of moving its visitors by reminding them of such a glorious past” [14].

Figure 2. A view of the House 24 from the stairs. Figure 3. The House 24 and the Cathedral in the Skyline of the city

Only eight years after the compilation of the project, Siza stated that House of 24 achieved “the continuous construction of Tomorrow’s Memories, Memory and open eyes and heart, serenity and desire, being instruments” [9], and today, years later, one can affirm Siza’s statement, as House 24, remains an exemplary work built both in space and time, one that preserved the city’s historical identity and shaped its memories.

4. Rogers and the Sense of History

In a speech entitled *Memory and Invention,* delivered in Tokyo in 1960 [15], Ernesto Nathan Rogers stated that “Memory confers to the things of space, the measure of time”[16]. In other words, Rogers recognises that space is not merely defined by its physical dimension but rather also by the experience and memory associated with it, which shape its temporal characteristics. This dynamic understanding of the phenomenon of time and history, in Rogers’ words, can be traced to his teachings as well. He often cited Leonardo Da Vinci when giving his course on the History of Modern Architecture at the Politecnico in Milano. To explain the notion of time to his students, Rogers would do so by borrowing the words of Da Vinci, who argued that "the water that laps against one's hand in a river is the last to have gone and the first to have come - such is the nature of the present" [17]. By doing so, Rogers sought to contradict the linearity of time and history, arguing that the “present comes from the past and the past is still linked to present”, in which “the flowing of the human experience continues, which ultimately translates itself into the experience of art and in our case of architecture” [18].

In addition, Rogers often emphasised the importance of learning how to “read” architecture whether modern or of the past [18], in order to benefit from its content. Indeed, Rogers intended to introduce history as an operating tool in architecture, in which rather than an accumulation of historical knowledge in a chronological sequence, an architect has the ability to pursue the answer to the fundamental questions of his/her era in the past, as the fundamental questions of life remain the same, regardless of time. To explain this, Rogers would reference Marcus Aurelius, who suggested that “Whoever looks upon the present sees all that has been since the beginning of time and all that will be for all eternity because everything is of one nature and of one kind” [19]. Hence, for Rogers, modernity was not a rupture from history [15], but rather, “Being modern simply means feeling contemporary history within the order of the entire history, that is feeling the responsibility for our own acts

… as a collaboration that, with our contribution, augments and enriches the eternal timeliness of the possible formal combinations of universal relationship."[16]

Figure 4. A photo of *Architettura misura dell'uomo* in IX Triennale di Milano © Archivi Triennale

The sense of history and the fluidity of time in space can be seen in the exhibition he co-authored alongside Giorgio Gregotti and Giotto Stoppino at the 1951 IX Milan Triennale, entitled *Architettura, misura dell'uomo*[13], arguably as a continuous attempt to reflect upon the theme of *La Casa dell'uomo*[14] [15]. Rogers, alongside his colleagues, employed a collage-like scenography composition of photographs to construct a critical statement on perceiving human interactions beyond functionalism. This assemblage integrated a diverse selection of imagery, including promenade architecturale, as exemplified in Le Corbusier's Villa Savoye, a fragment of a historical Italian town, sketches of Mies van der Rohe's Barcelona Pavilion, and an element of Baroque ornamentation. Rogers conceptualised the exhibition as a demonstration of how the measure of man extends far beyond mere ergonomics. In addition, they contended that adopting the lens of the measure of man enabled architects to engage with multiple temporalities, facilitating a reconciliation between historical continuity and modernity. The careful choice of photographs and their diversity in historical terms allowed the observer to place modern architecture into a historical context.

For Rogers, the essence of modernity meant the continuity of tradition, as he stated, "It is not truly modern the work that has no authentic foundations in tradition, but the ancient works have the current meaning as long as they can resonate through our voice" [15]. In this regard, one can perceive that both Rogers and Távora, through their criticality, which is arguably the most central asset of modernity, advocated for reading history as an operating tool, shaping our understanding of time and memory as components of space that are as important as the physical elements that construct our existential experience of the built environment.

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[13] *Architettura, misura dell'uomo* translated to English as *Architecture, the measure of Man*

[14] *La Casa dell'uomo* translated to English as *The House of Man*

5. Final Considerations

The architectural legacy of Fernando Távora and Ernesto Nathan Rogers, both of whom were architects, theorists and teachers, lies in their ability to sustain a critical approach that positioned them as truly modern figures. At a time when architectural discourse often resisted engagement with history, both architects approached the past not as a static repository of styles but as an active, evolving framework through which modern architecture could be enriched. Both architects felt the burden of resistance against the common conventional expression of their time, yet they used the obscurity of their era to draw exemplary works of architecture, which today construct our common memory and experience.

The sense of history in the work of Rogers and Távora was deeply rooted in the interplay of space and time, allowing them to bridge tradition and modernity in a manner that remains significant to us, having passed decades. The enduring impact of their work extends beyond the physical realm of their buildings, shaping our collective memory. Despite their geographical differences, Távora and Rogers shared a fundamental intellectual kinship, particularly in their recognition of history as a living and evolving dimension of architecture. Yet, perhaps one of the most significant points of intersection in their legacies is found in the work of their students, some of whom had the rare opportunity to collaborate across different contexts. Today, their voice resonates in the architectural culture they have advocated for, as it is instilled in history.

Lastly, writing about the architectural discourse and practice of architects who have decades of distance from us may be equivalent to taking an out-of-date position. Yet, it should be stressed that the questions of architecture remain the same irrespective of age. This is to argue that the ethos of the questions of architecture from Vitruvius up to current days remained the same, although based on each era's particular characteristics, the format may change. Furthermore, the tools of architecture also remain the same, whether the tools are applied in the practical realm or in the theoretical domain.

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Figures

[1] Figure1. Redrawing of Holidays House in Ofir
[2] Figure 2. A view of the House 24 from the stairs by José Pedro Cerdeira
[3] Figure 3. The House 24 and the Cathedral in the Skyline of the city by José Pedro Cerdeira
[4] Figure 4. A photo of *Architettura misura dell'uomo* in IX Triennale di Milano © Archivi Triennale. https://archivi.triennale.org/archive/archivi-triennale/9

TANGIBLE SKIN OF SPACE: THE ROLE OF MATERIAL SENSORIALITY IN INTERIOR YACHT DESIGN

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Abstract
In recent decades, interior yacht design has undergone a significant evolution, progressively drawing closer to the residential interior sector and shifting from an approach primarily based on functionality and ergonomics to a design concept that emphasises the sensory dimension of space, in which materials play a central role. This transformation is particularly evident in the luxury motor superyacht sector, where Italy holds a global leadership position in both construction and export. Furthermore, the motor yacht sector represents the predominant production segment within the broader nautical industry. In particular, large motor superyachts constitute the most relevant segment, both in terms of production volume and design innovation. In this context, the selection and use of materials emerge as essential distinguishing factors, contributing not only to meeting technical and functional requirements but also to defining a sophisticated sensory experience. This study aims to analyse the role of materiality in contemporary interior yacht design, highlighting how materials have progressively acquired a significance that transcends their structural function, becoming true catalysts of perceptual experiences. Through a comparative analysis between the past and present, the design implications of this evolution will be investigated, with particular reference to emblematic case studies. The objective is to outline the evolution of material usage in yacht interiors and explore their impact on the perception of liveable spaces.

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Key Words: *Interior Yacht Design; Superyachts; Made in Italy; Materials; Sensoriality*

1. Introduction

Interior yacht design has emerged as a design field that, in the 21st century, has demonstrated an increasing convergence with residential interior design. The two share numerous affinities and pursue the common goal of creating environments characterised by high standards of comfort, sophistication, and responsiveness to the aesthetic-functional needs of the user. However, unlike domestic spaces, yacht interiors are subject to specific technical and regulatory constraints resulting from the mobility of the vessel, which significantly influence design choices, particularly regarding the selection and use of materials.

Within the industry's critical discourse, the relationship between yachts and dwellings has generated intricate debates, sometimes marked by strongly opposing positions. On one hand, there are those who favour an approach oriented towards navigation techniques, often drawing on the design heritage of past pioneers; on the other hand, there are positions that embrace the more innovative and experimental visions of contemporary design [1]. With the increase in yacht sizes, the design of interiors progressively assumes characteristics that are comparable to those of domestic environments, to the point that designing a large yacht increasingly resembles designing a home [2]. Numerous interconnections exist between the naval construction sector and the civil engineering sector, and it is the interior spaces that endow the vessel with the character of a mobile residence [3].

Residential interior design relies on a vast repertoire of technical and methodological expertise, ranging from furniture system design to lighting and micro-environment control, from ergonomics to colour and material management, to the use of interior fabrics, environmental sustainability principles, communication aspects, and commercial promotion, as well as scenographic implications [4]. These principles are also significantly applied in interior yacht design.

The interiors of sailing yachts and motor yachts differ profoundly in terms of spatial configuration, hull morphology, target audience, and usage modes, making direct comparison inappropriate. It is, therefore, essential to circumscribe the field of investigation to ensure a homogeneous and methodologically consistent analysis. This study, therefore, focuses on large mono-hull motor yachts, privileging this segment for two main reasons: on one hand, these vessels offer greater availability of interior space, allowing shipyards and designers to experiment over time with innovative solutions; on the other hand, they represent the sector in which Italy holds a leadership position in global construction [5].

Furthermore, the motor superyacht segment is the sector with the highest production [6], constituting the core of contemporary design research. In the 21st century, interior yacht design has undergone a paradigmatic evolution, shifting from a concept centred on a 'boat-tailored' design approach – where furnishings were moulded to fit the shape of the hull and superstructure – to a 'human-tailored' approach [7], placing the user's needs and experiences at the heart of the design process. Materials (the tangible 'skin' of interior yacht design) have gradually acquired a key role in ensuring a sensory and meaningful experience on board.

While in the past, material selection for interiors primarily responded to criteria of resistance to marine agents and durability, attention has progressively shifted towards the capacity of materials to generate an immersive and multisensory spatial experience, further placing the human experience at the core of the project. This study aims to analyse this transition, highlighting the growing role of the materiality of space – understood as the physical and perceptual quality of materials used in interior yacht design – in shaping the aesthetic identity of interiors, with particular reference to yachts Made in Italy.

2. Methodology

The analysis was conducted using a qualitative and comparative approach in order to understand how the use of materials in interior yacht design has evolved over time. The research is based on three main phases:

- historical analysis: a comparison between past and contemporary interior yacht design to highlight the shift from a functionalist to experiential design approach
- case study analysis: selection of Italian superyachts that have marked a change in material and sensory approach
- critical reflection and future perspectives: evaluation of possible future developments in the sector in relation to emerging trends in material usage.

The criteria for selecting case studies include:

- the adoption of innovative materials with distinctive sensory characteristics
- the contribution to redefining the relationship between material and spatial perception
- the impact of material design on the concept of luxury in interior yacht design.

3. Evolution of materiality in interior yacht design: from functionality to a sensory experience

The motorboat sector began to develop in Italy after World War II [8], progressively consolidating until it became one of the driving sectors of the national nautical industry. For several decades, the selection of materials used in interior design was primarily driven by the need for resistance to marine agents, lightness, and durability—essential criteria in a context marked by extreme environmental stresses. During the 1960s and 1970s, the interiors of large motor yachts developed a distinctive stylistic identity, characterised by the widespread use of lacquered woods such as mahogany and cherry, the employment of shiny metal alloys like brass, and the selection of fabrics not for their tactile qualities, but for their iconic pairing of white and blue stripes. This aesthetic was marked by a balance between a strong visual impact and a pragmatic logic oriented towards durability and ease of maintenance of surfaces.

From the 1980s and throughout the following decade, the dominant trend saw the use of opulent materials, not so much for their technical and sensory properties, but rather to convey an image of prestige and status symbol. An emblematic case from this period was the creation of the 86-metre mega-yacht Nabila, built by Cantieri Benetti in 1979 for Saudi entrepreneur Adnan Khashoggi. For the interiors, the owner turned to Italian designer Luigi Sturchio, and it is here that his ambitions reached their peak. The yacht was lavishly decorated with gold and diamonds, enriched with exclusive details such as chinchilla bed covers, an enormous bathtub carved from a single block of marble with gold faucets, and a piano covered in crystals [9].

While the 1980s and 1990s also saw elegant and temperate projects, such as all the work carried out by Zuccon International Project with the Ferretti Group's Custom Line yard (Fig. 1), the material selection in most large yacht projects during this period continued to adhere to principles of representing luxury rather than focusing on the perceptive qualities of the materials.

Fig. 1. Custom Line 94' designed by Zuccon International Project, 1998. Historical archive of Barche Magazine, courtesy of Director Francesco Michienzi.

However, from the beginning of the 21st century, a paradigm shift has been evident, with an increasing tendency to reduce the number of materials and finishes, favouring a greater appreciation of their intrinsic quality. The goal is to pursue an essential architectural purity, devoid of superfluous ornamentation and redundant decoration, thus aligning with trends in contemporary residential interior design. The result is a new aesthetic sensitivity that (in a move closer to the domestic environment) places the user's sensory experience at the centre.

In the product design sector, it emerges that materials are no longer required solely to deliver traditional performance, linked to physical, technical, and mechanical requirements, reliability, and safety. In line with the evolving nature of our time, soft performance characteristics are also required, such as greater sensory expressiveness [10], and this is gradually happening with the tangible 'skin' of interior yacht design.

In the context of the perceptual experience of nautical space, materiality has played a determining role only from the 21st century onwards. As noted by Ivana Porfiri, one of the interior yacht designers who has most contributed to innovation in the sector in terms of sensory expressiveness: "Materials are the main element that gives character to space. Shape and composition also give character to space, but this character can only be completed with materials, because they have the ability to establish a direct relationship between the user and the space, more fully than the visual or geometric factors. In equal form and section, a space treated with different materials changes completely: we perceive our relationship with space in a completely different way" [11].

The role of materiality thus emerges as a central element in the creative process. In some cases, thanks to a renewed focus on the sensory value of materials, a transition has occurred from the traditional approach – focused on minimal ergonomics and space rationalisation – to a new conception of comfort, understood as an immersive and multisensory experience [12].

It is no longer just sight that is stimulated, but also smell and, particularly, touch. Traditionally undervalued within a predominantly visual culture, the sense of touch stands out for its refined perceptual ability, its wide sensory field, and the specific qualities it is capable of detecting. These qualities allow one to recognise the characteristics of surfaces – such as roughness, smoothness, viscosity, humidity, temperature, softness, hardness, elasticity, plasticity, silkiness, abrasiveness, and intangibility – and shapes, including sharpness, thinness, roundness, heaviness, lightness, regularity, and symmetry. Unlike sight, the tactile system explores the world through a gradual and sequential process, based on a series of successive exploratory stages aimed at reconstructing the perceptual whole [13]. In this new design scenario, tactility in interior yacht design assumes strategic importance: soft surfaces, embossed leather coverings, three-dimensional fabrics, and innovative material treatments contribute to creating environments that encourage a physical and perceptual interaction with the inhabited space.

The growing attention to the perceptive dimension has driven more advanced research on surfaces, which no longer simply cover and protect but have become true expressive tools capable of transmitting emotions and tactile suggestions. When an artifact is used and experienced, emotion plays a central role in the everyday relationship with the object, becoming one of the fundamental elements of sensory experience and expressiveness. This occurs due to their common origin: both emotion and sensory perception derive from the senses, from sensory mechanisms, and are processed by the mind-brain system [14].

Progressively, materials traditionally associated with nautical design, such as wood, are reinterpreted through treatments that emphasise their texture and visual warmth. Simultaneously, the introduction of natural materials aims to enhance the

sensory dimension of the space, just as the use of high-tech materials - such as advanced composites, metals subjected to controlled oxidation treatments, and laminated glasses with experimental finishes - no longer solely respond to structural performance requirements but actively contribute to the perceptive quality and expressive value of the interior environment.

4. Chronological excursus of the 21st century: practical applications of sensoriality

4.1. The first decade of the 21st Century: the introduction of sensoriality in interior yacht design

The early years of the 21st century marked a turning point in the design of luxury yacht interiors, characterised by a paradigmatic innovation in which the integration of sensoriality became a key design element. Interior yacht design evolved from a purely functional and ergonomic concept towards a more sophisticated exploration of perceptual experience, where materials not only define the aesthetics of the space but also enhance its immersive quality. Three emblematic projects that have marked this transition include *Sai Ram* (Benetti, 2003), *Nina J* (Baglietto, 2005), and *Stella Maris* (Viareggio Superyachts, 2012). Each of these projects has made a significant contribution to the redefinition of interior yacht design through the innovative use of materials, finishes, and spatial solutions oriented towards multisensoriality.

Sai Ram (Fig. 2), a 52-metre superyacht, was designed by Stefano Natucci for the exteriors and the Roman studio Lazzarini & Pickering for the interiors. The spatial layout is distinguished by a configuration that deviates from the traditional horizontality of yachts, favouring instead a vertical composition [15]. The spaces are emphasised through mirrors, glass surfaces, and transparencies, accentuating the perception of height and creating a sense of architectural fluidity. One distinctive feature is a steel band covered in red leather that passes through various levels of the yacht, acting both as a unifying graphic element and a perceptual device: the material and colour invite tactile interaction, enhancing the sensory connection with the environment. The flooring, made of dark wenge wood, has been described by the designers as "silky" [16], designed to be experienced barefoot and encouraging a direct tactile perception. The attention to materiality is also evident in the owner's bathroom, where the combination of leather and soft stone further intensifies the sensory experience of the space.

Fig. 2. Sai Ram, interior design by Lazzarini & Pickering, 2003. Photos: Matteo Piazza, courtesy of Benetti.

The design of *Nina J* (Fig. 3), a 40-metre superyacht with exterior design by Tommaso Spadolini and interiors by Ivana Porfiri, represents an exemplary case in the field of expressive-sensory research. The entire design concept is based on an experiential approach, where materials, colours, and even scents work together to create an immersive environment. A novel element for the nautical context is the vertical garden designed by internationally renowned botanist Patrick Blanc, located in

the living room, stimulating the senses of touch, smell, and sight simultaneously. The material selection is driven by a desire to highlight the natural qualities of materials, favouring surfaces that undergo transformation over time. For example, the Marmorino plaster partitions initially raised concerns about their resistance to marine humidity, but they proved capable of ageing harmoniously without structural alterations. An additional contribution to the sensory dimension is the use of Hinoki wood for the owner's bathroom bathtub lining, which, when in contact with water, releases a characteristic fragrance that enriches the olfactory experience. Particularly noteworthy is the use of solid zebrawood, preferred over the more common veneer; thanks to its grained and veined surface, it imprints a strong tactile and visual identity on the interiors, enhancing their expressive value [17].

Fig. 3. Nina J, interior design by Ivana Porfiri, 2005. Courtesy of Baglietto.

Innovation in the search for sensory materials continues in the design *of Stella Maris* (Fig. 4), a 72-metre superyacht designed by naval architect Espen Øino in collaboration with Laurent Giles, with interiors curated by Michela Reverberi. One distinctive aspect of this yacht is the introduction of a vertical garden in the aft section, arranged over two levels and connecting the two main salons. This solution is not merely decorative but serves as a true sensory device, as the vegetation filters natural light, creating suggestive shadow games and enhancing olfactory perception of the space. Tactility is further emphasised through the furniture, which includes light fabric sofas by Zanotta, green ones by Baxter, and the sculptural E-Turn bench by Kundalini. The master suite is distinguished by an imposing bed frame designed by Michela Reverberi, with a headboard upholstered in Foglizzo leather featuring a wave pattern, the design of which contributes to reinforcing the sensory character of the project.

Fig. 4. Stella Maris, interior design by Michela Reverberi, 2012. Photo: Beppe Raso.

The projects analysed highlight how, from the 2000s onwards, interior yacht design has progressively integrated a multisensory approach, where material selection is no longer guided exclusively by aesthetic and performance criteria but also by the ability to generate a complex and engaging perceptual experience. This evolution reflects a broader change in the concept of luxury, which is not only seen as an expression of exclusivity and refinement, but also as an experiential dimension in which the quality of sensory interaction with the space becomes central to the definition of the project.

4.2. The sensorial character of materials in recent interior yacht design projects

Material experimentation aimed at stimulating sensory perception has found widespread application in contemporary interior yacht design, becoming an indispensable design element. While in some cases this approach is less overt than the pioneering experiments of the early 21st century, sensory design is today a fundamental component of the onboard experience. The choice and treatment of surfaces, the use of different wood species, the application of sophisticated coatings, and the search for materials with specific tactile and visual properties contribute to creating environments that are not only visually attractive but actively engage all the senses.

Wood undoubtedly represents the most emblematic material of this trend, thanks to its natural and warm texture, capable of evoking feelings of intimacy and connection with the marine environment. Its application varies, depending on the design requirements and desired perceptual stimuli: brushed oak surfaces provide a rough, tactile sensation, while polished surfaces amplify the perception of light, contributing to greater spatial airiness. On the *Diamond Binta* superyacht (Fig. 5) by Tankoa (2024), designed by Francesco Paszkowski Design in collaboration with Margherita Casprini, the use of oak is expressed in a range of finishes that enhance its sensory potential: the deck features a distinctive "tatami" texture, characterised by a surface treatment that offers a rhythmic and sophisticated tactile sensation, accentuated by the dark brown hue that evokes a warm, enveloping materiality. The staircase is enclosed within a shell featuring a metallic finish, further enhanced by leather-clad panels with intricate carvings on the surrounding bulkheads, designed to create a tactile and visual sensory experience (Fig. 5).

Fig. 5. Diamond Binta, interior design by Francesco Paszkowski Design in collaboration with Margherita Casprini, 2024. Credits: Josh Breed Media, courtesy of Tankoa Yachts.

Onboard the *Arcadia A96* superyacht (Fig. 6) by Arcadia Yachts (2023), material research translates into a totalising sensory experience. The deck, made of treated wood to highlight its silky texture, offers an almost intangible sensation under bare feet, evoking the softness of silk and enhancing the comfort of walking directly on the surface. The interior design, by Igor Lobanov, stands out for its refined aesthetics, blending Art Deco influences with a contemporary design language, characterised by elongated curves, fluid profiles, and dark lacquered surfaces that reflect light and create a vibrant sense of depth in the spaces. The shipyard's commitment to integrating natural and, where possible, eco-friendly materials is reflected in a careful selection of woods, coatings, and tactile finishes. The furniture, with its harmonious shapes and enveloping ergonomics, not only contributes to the compositional elegance of the spaces but also amplifies the sensory pleasure, making tactility a fundamental element of the design [18].

Fig. 6. Arcadia A96, interior design by Igor Lobanov, 2023. Photo: Alberto Cocchi, courtesy of Arcadia Yachts Yachts.

Another example of sensory research is represented by the Benetti Oasis 40M *Kahala* (Fig. 7) project, where RWD handled the exterior lines, while the interiors were designed by Bonetti/Kozerski Architecture. Tactile and visual dimensions are emphasised by the use of lacquered surfaces, following the same technique used for pianos: successive layers of lacquer applied by hand and polished until a reflective finish is achieved. The result is a high gloss surface, capable of reflecting and absorbing the chromatic variations of the surrounding environment, amplifying the fusion between interior and exterior spaces. The use of rosewood, applied to define the details, further enriches the tactile experience, offering a contrast between the lacquered finishes and material texture of the wood. The wooden deck, in continuity with the external surfaces, accentuates spatial fluidity, while the gradual transition to warmer tones in the more intimate interior spaces fosters an enveloping perceptual experience.

Fig. 7. Benetti Oasis 40M Kahala, interior design by Bonetti/Kozerski Architecture, 2024. Photo: Giuliano Sargentini, courtesy of Benetti.

On the Sanlorenzo SL86A, designed by the Zuccon International Project design firm, the expressive value of materials is explored through the use of clay finishes provided by Matteo Brioni. This material, known for its ability to impart depth and movement to surfaces, is used both to cover walls and architectural volumes and to create sculptural elements. In the salon, a central totem acts as a visual and tactile focal point: its front surface features intricate artistic workmanship that emphasises the clay's chromatic variations, while the sides are treated with a smooth finish that offers a velvet-like sensation to the touch. The same material is also used in the cabins, where the panels behind the headboards acquire a three-dimensional decorative value, made even more evident by the strategic use of grazing light that amplifies the chiaroscuro effect and the depth of the texture.

In recent years, in addition to wood, leather has assumed an increasingly important role in interior yacht design, thanks to its softness, durability, and versatility. Its application has evolved from mere upholstery of furnishings, to use in three-dimensional decorative interventions. The techniques experimented with by companies such as Marine Leather introduce new sensory dimensions, with elaborate textures that enhance not only the tactile experience but also visual and olfactory perception. The integration of leathers with embossed or carved patterns to create geometric and organic motifs enriches spatial perception, generating surfaces that change appearance according to the light and the observer's position. These details testify to a growing focus on sensory interaction and intentional design in the use of materials, affirming the central role of the experiential dimension in contemporary luxury yacht interior design.

5. Conclusive reflections and future prospects

The concluding reflections of this study on the evolution of interior yacht design for luxury motor superyachts Made in Italy highlight the significant transformation that the nautical industry has undergone in recent decades. The shift from a functional approach, focused on minimal ergonomics, to an immersive sensory experience represents a direct response to the growing demand for onboard experiences. Sensory design has emerged as a central element in interior yacht design, transforming the space into an environment that not only meets the physical needs of users but also their emotional desires. The innovative use of materials as the "tangible skin of space," which stimulates more than just the visual sense, plays a crucial role in shaping this experience. Contemporary design no longer treats the surface of interiors merely as an aesthetic covering, but as a true catalyst for sensations, capable of interacting deeply and personally with both the environment and its users.

The case studies analysed, such as the Nina J and Sai Ram superyachts, illustrate the move toward a design that not only meets functional needs but also integrates the concept of "luxury experience" as a complete sensory journey, where materials play a central role. These yachts are tangible examples of how design innovation can respond to the search for a deeper emotional connection with the surrounding environment, not only through aesthetics but also through physical interaction with the materials themselves.

Looking to the future, the field of interior yacht design is likely to continue moving towards greater personalisation of spaces, with the integration of advanced technologies that enable an even more exclusive and sensory-rich experience of luxury. Future challenges will focus on the ability to balance technological innovation, environmental sustainability, and spatial sensory impact. The adoption of sustainable materials and the search for eco-friendly solutions will be crucial in addressing the growing ecological awareness without compromising on levels of luxury and sensory experience.

The evolution of interior yacht design will likely intertwine increasingly with the world of residential interior design, creating a continuum between living on land and living at sea. This connection could lead to greater mutual influence between the two fields, with more shared research on materials and innovation in general. This could not only revolutionise the experience of living aboard a yacht but also offer new perspectives for designing luxury residential spaces. The integration of new and immersive sensory experiences will likely represent a key evolutionary direction for the design of future superyachts, offering a unique experience that transcends the physical boundaries between sea and land.

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ECO-VILLAGES AS 21ST CENTURY UTOPIAS: A QUEST FOR SUSTAINABILITY

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Abstract
This paper explores the concept of eco-villages as a contemporary embodiment of utopian ideals, focusing on their role in promoting sustainability within traditional and planned communities. By examining both realized (implemented) and unrealized (unimplemented) utopias, the study highlights the philosophical and practical similarities between past utopias and the modern eco-village movement. The analysis includes a discussion of how eco-villages embody the principles of self-sufficiency, environmental consciousness, and social cohesion to ultimately assess whether they represent a genuine utopian attempt to address the multiple challenges of the 21st century, including energy resource depletion, climate change, and social inequality.
The paper contains a critical analysis of historical and contemporary examples, making connections between the theory and practice of community building. In addition, case studies of existing eco-villages provide real-world evidence of their functioning and impact, as well as potential solutions to future challenges in the urban environment. This study assesses traditional and sustainable community types, defines eco-villages, and explores various utopias from the 19th century onwards. Although these analyzed utopias do not explicitly use the term "sustainability," they embody a sustainable approach.These examples are divided into implemented and unimplemented community and settlement utopias, and the study is concluded by comparing utopias and eco-village formations.

Key Words: Utopia, Eco-villages, Community, Sustainability, Sustainable Settlements

1. Introduction

In recent years, the quest for sustainable living has ignited renewed interest in community-based solutions that embody the aspirational ideals of traditional utopias. Eco-villages have emerged as a fascinating model within this context, blending modern interpretations of utopian principles with sustainable development practices. These intentional communities seek to integrate ecological, economic, and social dimensions into a harmonious lifestyle that prioritizes self-sufficiency and environmental accountability.

To fully understand eco-villages, it is essential to explore their historical connections to past utopian communities, which have long aimed to establish ideal societies grounded in shared values and communal living. By investigating this heritage, it can be recognized how contemporary eco-villages adapt these enduring aspirations to tackle pressing global issues such as climate change, resource depletion, and social fragmentation.

This study seeks to investigate the function of eco-villages as a utopian model for the 21st century, highlighting their ability to promote significant societal change through sustainable practices. The analysis explores the theoretical underpinnings of utopian ideology and sustainable development, providing a framework for comprehending the convergence of these two impactful movements.

The eco-village initiatives discussed in this study aspire to realize the vision of a self-sufficient sustainable community. Coomer articulates this vision by stating: "A sustainable society is a society that is self-sufficient within the boundaries of its own environment. This society is not one that avoids growth; rather, it understands its growth limits and seeks innovative ways to expand" [**1].** According to this definition, eco-village initiatives strive to create a self-sufficient community and settlement, fully aware of their growth limitations. This pursuit can also be observed in numerous utopias formed in the 19th century and later.

In this study eco-village initiatives are investigated to illuminate their connections to both historical and modern notions of sustainable communities. It delves into the definitions of traditional, sustainable, and planned communities, emphasizing what sets eco-villages apart as contemporary utopias. This includes examining how these communities draw inspiration from historical utopias while making innovations to confront today's environmental and social challenges.

Ultimately, the findings are summarized to determine if eco-village initiatives signify a continuation of utopian ideals, in the 21st century. Our goal is to highlight how these communities can contribute to building a more sustainable and equitable world, embodying the essence of utopian ideals as they adapt to contemporary challenges.

2. Conceptual Analysis

2.1. Community

The idea of community originated when people began to interact with one another. In the late 19th century, Ferdinand Tönnies presented the concepts of “gesellschaft” and “gemeinschaft,” which laid the groundwork for contemporary understandings of community [2] The term “gesellschaft” refers to an institutional framework that fosters both emotional and natural connections among individuals. In contrast, “gemeinschaft” ("community") refers to individuals united by shared norms and beliefs, often in a physical space.

The family is the essential and smallest building block that creates communities. Traditionally, families often consisted of extended relatives. However, together with industrialization, a significant amount of migration from rural areas to urban centers took place, leading to a shift in family structure, as extended families turned into nuclear families. This change necessitated a redefinition of the concept of "community." In fact, the emergence of the "planned community" approach during the 20th century introduced a new dimension to the meaning of community.

Overall, the notion of community has evolved and taken on various meanings over time. This transformation has led to the emergence of different community models. Brindley (2003) divides these models into three primary categories, based on their characteristics: traditional community, modern community, and post-modern community (Table 1).

Table 1. The characteristics of the community models [3]

	Traditional Community	Modern Community	Post-modern Community
Features	• Constantly being ready • necessary • spiritual • close relationships	• selective • voluntarily • depends on circumstances • loose relationships	• deceptive • spontaneous • lifestyle choice • no relationship
Social Principle	**social status**	**social networks**	**social identities**

2.2. Sustainable Community

During the 21st century, a new community model has emerged that differs from the concepts previously discussed. This model is referred to as "sustainable community." It can be argued that this framework integrates aspects from the three different community types presented in Table 1.

The idea of a sustainable community extends beyond just its physical characteristics. Sustainable settlements must fulfill the social and economic needs of their residents while also prioritizing environmental protection [4]. The goal of a sustainable settlement is to offer quality living opportunities, minimize energy usage, prevent environmental pollution by lowering waste, and rejuvenate the local economy by utilizing local resources. In sustainable communities, a more vibrant social life and enhanced information exchange occur through the collaborative decision-making processes of community members.

Communities formed by individuals who come together to create sustainable societies and settlements are defined as “intentional communities” [5]. Intentional communities are formed when individuals share the same lifestyle, culture, and a common purpose [6]. According to Christian, intentional communities can be seen in many different forms, such as eco-villages, co-housing projects, therapy communes, planned neighborhoods, monastic communities, village settlements, etc. Christian states that each commune she gives as an example shares the same land, the same resources, and makes joint decisions [4]. The settlements where communal life is practiced are formed by voluntary and organized individuals.

As noted by Roseland, grasping the concept of community and sustainable development requires an examination of various dimensions [7]. In his book *Toward Sustainable Communities*, he outlines the factors that influence sustainable communities and settlements, as environmental, physical, economic, human, social and cultural.

Various models are proposed for establishing sustainable communities. In his book, *Ecovillages: New Frontiers for Sustainability*, Dawson categorizes these community models into three groups: eco-villages, co-housing, and eco-settlements [8]. This paper specifically examines the concept of eco-village within the framework of sustainable communities.

2.2.1. Eco-village Model for Sustainable Communities

Eco-villages often serve as experimental grounds for sustainable technologies and practices, allowing for innovation and adaptation to local environmental conditions. This flexibility and adaptability are important for addressing the diverse challenges posed by different geographical and cultural contexts [8]. Moreover, the emphasis on community participation and collaborative decision-making processes ensures that eco-villages are not only environmentally sustainable but also socially and economically inclusive [9].

In essence, the eco-village model emphasizes the importance of living in harmony with nature, prioritizing the well-being of both the planet and its inhabitants. Through their commitment to sustainability and community, eco-villages exemplify a forward-thinking approach to building a better future for all.

Numerous eco-village initiatives nowadays draw inspiration from previously established communal living experiences. Sizemore notes that various types of communities, such as “co-housing” settlements like the Ithaca Eco-village, “hippie communities” from the 1960s (for instance, “The Farm in Rural Tennessee”), Camphill communities, permaculture settlements like Crystal Waters in Australia, and a range of spiritual and socially intentional communities formed between the 1960s and 1980s, form the foundation of the eco-village model [10].

The eco-village concept is defined as a distinct and sustainable evolution of these communities, enhanced with innovative elements. Bates emphasizes that eco-villages incorporate an ecological aspect, making it a central design principle, in contrast to the primarily social and spiritual focus found in other communes and settlements [11]. At the heart of the eco-village philosophy is the vision of creating an environment and community where individuals coexist harmoniously with nature. To realize this vision, eco-villages utilize both traditional architectural methods and modern technological advancements, alongside renewable energy systems to ensure ecological sustainability. Planning eco-villages with a focus on ecological design is crucial for maintaining the sustainability of these settlements.

There is not a single, universal approach for creating an eco-village settlement. Each eco-village has its unique story of formation, diverse methods, geographical features, and varying purposes for establishment. In each setting, eco-villages strive to embody principles of ecological integrity, social equity, and economic viability. They prioritize renewable energy, organic agriculture, and sustainable building practices, often incorporating permaculture principles to create self-sustaining environments. This approach not only reduces the ecological footprint of the community but also fosters a strong sense of connection with nature and among its members.

There is an international organization called The Global Eco-village Network (GEN), founded in 1991, which aims to promote eco-villages globally. Its mission is to empower urban activists, students, and researchers through information sharing and support for sustainable communities. GEN acts as a resource network, facilitating communication and education for those interested in sustainability and eco-village initiatives. According to GEN, globally there are up to 1240 eco-village initiatives in 2025 [12] (Figure 1).

Figure 1. Distribution of eco-villages who are the member of GEN network around the World, 2025 [13]

2.3. Utopian Models for ‘Ideal’ Community and Settlement

To fully understand utopian communities and settlements, it is essential to first define the concept of utopia itself. The term has its origins in Greek, derived from a clever amalgamation of the words "topos" (meaning place), "eu" (meaning good), and "ou" (meaning non-existent). Utopias are envisioned as spaces that reconfigure social conditions, providing alternatives to existing societal structures and systems [14]. According to Mumford, "Utopia is unreal and impossible, a revolution against the real world…. They represent the places that people envision and aspire to inhabit" [15]. A description of an imaginary place that is difficult to reach is made in each utopia definition.

In utopias, it is suggested that the present be replaced with an image of the future or the past that is thought to be better than the present. There are "utopias for the past" that try to revive the past in the present, or "utopias for the future" that try to establish the present with dreams of the future [16] [17] [18]. In utopias created with longing for the past, there is a vision of

creating a settlement and society similar to the past. In several of these utopias that seek to resurrect the old days, life is characterized by primitiveness and simplicity, much like in communal primitive societies.

In utopias designed according to dreams of the future, a technological revolution is described. These types of utopias are also called "techno-utopias" [19]. In this context, utopias can be defined as a revolutionary system of thought that confronts the problems of the time in which they emerge and the existing order through different methods.

Utopian models provide a framework for designing ideal communities that emphasize harmony, sustainability, and collective well-being. They offer insights into creating environments that fulfill physical needs while promoting social cohesion and environmental balance. Utopian models integrate historical and philosophical ideas, merging idealism with practical community living strategies. They focus on cooperative governance, shared resources, and sustainable development to create resilient and adaptable communities.

3. Methodology

The primary research method involves qualitative comparative analyses of four contemporary eco-villages Findhorn, Ithaca, Auroville, and Ökodorf Sieben Linden, selected for their diverse locations, sizes, and historical contexts, enriching the comparative analysis of how local factors influence community development. The study also evaluates four 19th and 20th century models: Ecotopia, Broadcare, Phalange, and Garden City, which emerged in response to the Industrial Revolution, focusing on social, economic, and environmental solutions. Their principles of communal living and self-sufficiency serve as keys to understanding modern practices.

A comprehensive review of the strategies for each model has been conducted, considering their general, social, economic, and environmental characteristics. In addition, tables illustrate the relationships and foundational concepts of eco-villages and utopian settlements.

By analyzing the general, administrative, economic, and environmental characteristics of eco-villages and comparing them with past utopian proposals, this article aims to provide a comprehensive understanding of how these communities serve as modern-day utopias. Through this exploration, it is hoped that this paper inspires further research and innovation focused on achieving sustainable and harmonious living.

4. Case Studies

4.1. Case Studies of Eco-Villages

In this section, selected case studies of eco-villages are examined through research from the GEN (Global Eco-village Network) corporate database and the official websites of different eco-village initiatives. These resources offer valuable insights into the fundamental values, development strategies, and current practices of these communities. This comprehensive data collection allows for an in-depth analysis of the distinct features and operational methods of each eco-village, emphasizing their sustainability initiatives and communal living arrangements.

By integrating information from digital sources such as ecovillage.org, ecovillageithaca.org, ecovillagefindhorn.com, siebenlinden.org/en/, and auroville.org, along with literature reviews [9], the strategies employed by the related case studies are analyzed, focusing on their social, economic, administrative and environmental dimensions, with these evaluations illustrated in tables.

Table 2. Overview of General Characteristics in Eco-village Case Studies

Case Study	Case Study 1 Findhorn Eco-village	Case Study 2 Ithaca Eco-village	Case Study 3 Auroville Settlement	Case Study 4 Oekodorf Sieben Eco-village
Image				
Location	Scotland	New York, USA	South India	East Germany
Population/in 2026	450	167	2160	140
Land	12.1 ha	70.8 ha	191 ha	82.0 ha
Date of Foundation	1962	1991	1968	1997

Table 3. Environmental Characteristics of Eco-village Case Studies

Case Study	Case Study 1 Findhorn Eco-village	Case Study 2 Ithaca Eco-village	Case Study 3 Auroville Settlement	Case Study 4 Oekodorf Sieben Eco-village
Image				
Architectural Style	Vernacular and Innovative	Vernacular and Innovative	Vernacular and Innovative	Vernacular
Settlement-ionic (Specific) Housing Type	Barrel House	Co-housing	Movable House	Straw bale House
Energy Production Devices	Solar and Wind Energy	Solar and Wind Energy	Solar Energy	Solar Energy and firewood

Table 4. Economical Characteristics of Eco-village Case Studies

Case Study	Case Study 1 Findhorn Eco-village	Case Study 2 Ithaca Eco-village	Case Study 3 Auroville Settlement	Case Study 4 Oekodorf Sieben Eco-village
Currency	"Eco" currency - location specific currency	Worldwide Currencies	Currency-free Economy	Worldwide Currencies
Settlement-Specific (Main) Economic Activities	Ecological Education, Workshops, Organic Farming and Eco-tourism	Organic Farming, Other Professions and Eco-tourism	Organic farming and Other Professions, No Eco-tourism only due permit	Organic farming, Ecological Education, Workshops and Eco-tourism
Dependency on External Factors Beyond the Settlement	Independent	Dependent	Independent	Dependent

Table 5. Administrative Characteristics of Eco-village Case Studies

Case Study	Case Study 1 Findhorn Eco-village	Case Study 2 Ithaca Eco-village	Case Study 3 Auroville Settlement	Case Study 4 Oekodorf Sieben Eco-village
Management Group	There is a specific group of administrators.	There isn't a designated group of administrators; every member holds administrator privileges.	The Foundation oversees the management of the settlement.	A council consisting of five members oversees the management of the settlement.
Decision-Making Mechanism	Majority vote (51%)	Consensus	Majority vote (51%)	Consensus

4.2. Case Studies of Utopias

In this section, the research explores four utopian settlement models created in the 19th and 20th centuries. All data and information have been collected through an extensive review of utopian literature, including works by [20] [21] [22] [23] [24] [25]. [26] [27] [28] [16] [17] [18] and [9].

Many efforts have been made to implement utopias resulting in various successful and unsuccessful examples. However, many concepts of utopia have not been implemented and have remained purely theoretical. This study focuses on four notable examples of utopias that are pertinent to the research: Ecotopia, Broadacre, Phalange, and Garden City. It can be noted that each case study offers perspectives on ecology, sustainability, nature-inspired designs, and community development without explicitly mentioning the 'sustainability' concept.

Among the four utopias chosen for evaluation, two have been materialized (implemented) while the other two remain theoretical. This distinction between implemented and theoretical utopias enables a nuanced analysis of their principles and impacts. Implemented utopias, like Phalange (Familistere) and Garden City, provide insights into the challenges and successes of realizing utopian ideals, serving as experiments in community dynamics. In contrast, theoretical models such as Ecotopia and Broadacre inspire innovative thinking about ideal communities, challenging traditional societal norms in governance and social equity. By examining both types, this study aims to uncover adaptable principles for modern eco-village initiatives, bridging visionary ideas with practical application. It highlights lessons from historical attempts to create ideal societies, informing contemporary sustainable community development.

Like the case studies of eco-villages, selected utopias were examined within the framework of general, environmental (physical), economic and administrative (social) characteristics as presented in the tables. All the information and analyses presented in the tables were derived from literature review. The primary sources presented in the tables are listed in the 'source' section of the general features table.

Table 6. Overview of General Characteristics in Utopia Case Studies

	Theoretical Utopias		Implemented Utopias	
Case Study	**Case Study 1 Ecotopia**	**Case Study 2 Broadacre**	**Case Study 3 Phalange**	**Case Study 4 Garden City**
Utopian	Ernest Callenbach	Frank Lloyd Wright	Charles Fourier	Ebenezer Howard
Sources	(Callenbach, 1975) (Bookchin, 1980)	(Wright, 1935) (Pelsen, 2004) (Zaleski, 2009)	(Perrin, 2004) (Crosten and Stories, 2010)	(Howard, 1902) (Wilgin, 1992)
Image				
Proposal of Location	Ecotopia, a small nation that separated from the United States	Decentralization within the urban landscape, where each family possesses their own acre of land	Different geographical locations- no restrictions	Near existing urban centers
Proposal for Population	Not detailed.	Around 1000 and 1 million people	1620 people	Around 30,000 people
Proposal for Land Size	Ecotopia is characterized as encompassing areas of Northern California, Oregon, and Washington.	Approx. 1,200 square miles (about 3,100 square kilometers).	"Phalange" should occupy an area of approximately 1,620 acres (about 655 hectares).	Approximately 6,000 acres (about 2,400 hectares)
Proposal Date	The utopia described in 1975 narrated 25 years after the year 1999	1932	1822-1858	1997

Implemented Version of Utopia	"Familistère de Guise,"	Letchworth Settlement
Image		
Founder/Designer	Founder: Jean-Baptiste André Godin	Designer: Raymond Unwin and Barry Parker
Sources	(Bonnette, 1981) (Gonzalez-Lopez, 2006)	(Hall, 1996) (Garden, 2020)
Location	Guise, a town in the Aisne department of France	A village in the north of London
Population	Around 1,200 residents lived in Familistère. Currently there is no residents and community life.	Approximately 33,000 residents. https://www.visitlet.com/visitors-guide/ (2021)
Land Size	Approximately 40 acres (about 16 hectares).	4000 ha
Date of Establishment	1859	1903
Current situation in 2025	The building is used as a museum. No community life.	The settlement maintains its identity as the first Garden City.

Table 7. Environmental Characteristics of Utopia Case Studies

	Theoretical Utopias		Implemented Utopias	
Case Study	**Case Study 1 Ecotopia**	**Case Study 2 Broadacre**	**Case Study 3 Phalange**	**Case Study 4 Garden City**
Proposal for the Architectural Style	Combination of vernacular practices and innovative (ecological) solutions.	Modern and Futuristic Architecture- Organic elements and harmony with nature.	Shared Spaces- Organic Forms- Integration with Nature	Combination of elements of nature by integrating green spaces, residential zones, and agricultural areas
Proposal for the Settlement Iconic (Specific) Housing Type	"Redwood" The Ecotopians built their structures using stone, adobe, and handmade materials, without paint or aesthetic coverings.	"Single-story ranch house." The city features single-storey houses on large individual lots, with a central office building designed to blend a rural-urban atmosphere with nature.	"Large, compact mixed-use blocks" These blocks have naturally ventilated street galleries that are heated in winter and cooled in summer, regardless of harsh weather conditions.	"Semi-detached house" There is a lack of details regarding the Housing Type in Garden City. However, the urban and rural planning aspects were explained in greater detail.
Image of Iconic (Specific) Housing Type	No image available			No image available
Proposal for the Energy Production	Renewable energy systems: from solar, wind, and biomass	The objective is clearly to reduce energy consumption, despite limited details	The objective is clearly to reduce energy consumption, despite limited details	The objective is clearly to reduce energy consumption, despite limited details
Proposal for the Settlement Pattern	Decentralization	Decentralization	Communal	A model for integrating nature with urban zoning patterns with green belts.

Implemented Version of Utopia	"Familistère de Guise,"	Letchworth Settlement
Architectural Style	Shared Spaces- Organic Forms- Integration with Nature	Combination of elements of nature by integrating green spaces, residential zones, and agricultural areas.
Image of Iconic (Specific) Housing Type		
Energy Production	Conventional Energy Generation- Harnessing Passive Energy Through Design	Conventional Energy Generation but there have been efforts to explore local energy projects, such as biomass energy and wind power, to reduce reliance on non-renewable sources.
Settlement Pattern	Communal	A model for integrating nature with urban zoning patterns.

Table 8. Economical Characteristics of Utopia Case Studies

	Theoretical Utopias		Implemented Utopias	
Case Study	**Case Study 1 Ecotopia**	**Case Study 2 Broadacre**	**Case Study 3 Phalange**	**Case Study 4 Garden City**
Proposal for Currency and Economic Model	Circular Economy, Participatory & Local Economies, Equitable Distribution	Agrarian economy*	Communal Economy- Cooperative Ownership- Shared Labor (Engaging in Volunteer Work), Equitable Distribution	Cooperative Ownership- a balance between urban and rural elements
Proposal for Settlement-Specific (Main) Economic Activities	Local Craftsmanship- Agriculture- Ecotourism- Cooperative Enterprises	Agriculture	Agriculture and Industry-	Local Industry and Employment
Proposal for Dependency on External Factors Beyond the Settlement	Aims to minimize dependency on external factors	Aims to minimize dependency on external factors	Aims to minimize dependency on external factors	Aims to minimize dependency on external factors
Implemented Version			**"Familistère de Guise"**	**Letchworth Settlement**
Currency and Economic Model			Same as the proposal- No ownership Worldwide Currencies	Same as the proposal- no ownership but the residents can rent the building from the Foundation- Worldwide Currencies
Specific (Main) Economic Activities in 2025			Museum/Tourism	Tourism, Agriculture and Local Enterprises
Dependency on External Factors Beyond the Settlement			Dependent	Dependent

Table 9. Administrative Characteristics of Utopia Case Studies

	Theoretical Utopias		Implemented Utopias	
Case Study	**Case Study 1 Ecotopia**	**Case Study 2 Broadacre**	**Case Study 3 Phalange**	**Case Study 4 Garden City**
Proposal for the Management Group	Decentralized form of governance	Decentralized living and community management	Collective Management	Cooperative Governance
Proposal for the Decision-Making Mechanism	Participatory democracy, localized decision-making	Democratic and participatory approach, individual Empowerment	All voices were heard and that management reflected the collective will of the community	Democratic participation, community involvement
Implemented Version			**"Familistère de Guise"**	**Letchworth Settlement**
Management Style			A management for manage the museum.	A foundation/ Cooperative Governance
Decision-Making Mechanism			There is no more communal life, so no need for decision making mechanism.	Democratic participation, community involvement

5. Evaluation: The Relationship of Traditional Utopias and Eco-Villages

In this section of the paper, the analysis of the research has been summarized. The analysis highlights the similarities between utopian literature and specific examples, aiming to encourage discussions on how intentional communities can address global issues and promote sustainable, equitable societies. It is important to note that not all utopian settlements are like eco-villages. Although these initiatives share some features, they also have unique differences.

The similarities between utopian and eco-village designs can be summarized as follows:

- Taking a stand against the prevailing order of their time:

Utopias embody alternative lifestyles and living environments. Utopian studies often advocate for a life that deviates from the current reality [29]. Utopias arise in response to the negative impacts of the current social order on community well-being. They, along with eco-village projects, question the usual way of living by suggesting new lifestyles, different ways of thinking, and creative management methods as options to traditional norms.

- Having a perspective that supports communal and shared living:

Like utopias, eco-village initiatives turn shared living into practical reality, emphasizing collaboration, resource sharing, and collective decision-making for a supportive community. They implement communal systems like shared kitchens and gardens to enhance interaction and reduce social isolation. These communities practice sustainability through aligning communal living with ecological stewardship. Case studies like Garden City, Ecotopia, and Phalanster emphasize the creation of "communities."

- Offering new suggestions to find solutions to existing environmental, administrative, social and economic problems:

Utopias before the 19th century offered solutions to management and social issues. In the 19th century, they addressed challenges from the Industrial Revolution, such as overcrowding and pollution. The 20th century shifted focus to environmental problems, with eco-villages emerging as modern interpretations of utopian ideals, promoting sustainable living and innovative governance. Like utopias, eco-villages aim to enhance resilience and unity, serving as experimental models for sustainable living and providing insights for a more harmonious future. These communities use renewable energy, permaculture, and waste reduction to tackle environmental issues while advocating for social equity.

- Aiming to ensure rural-urban continuity:

In the four analyzed utopian examples, rural-urban continuity is emphasized to tackle urban challenges. These utopias prioritize integration with nature, especially rural communities, believing sustainable living is achievable in rural settings. This concept is evident in 19th and 20th-century utopias and the modern eco-village movement.

- Creating a settlement with defined boundaries and isolated from the environment:

In many utopian visions, proposed communities are often detached from the environment and have clearly defined borders. These settlements are distinct from their surroundings, as utopians tend to believe that it is simpler to establish "new settlements" that are separate from existing urban or rural areas. For example, Ebenezer Howard's Garden City concept envisions a community that is completely isolated from its environment. This trait is also reflected in Fourier and Godin's Phalange and Familistere models. Likewise, the eco-village case studies reviewed are also found in rural locations that are isolated from their surroundings.

- Proposing a Self-Sufficient Society:

In many utopian visions and eco-village projects, the concept revolves around establishing communities that generate as much as they consume, both environmentally and economically. The prevailing aspiration is to significantly reduce external dependencies. Whether through localized food production, renewable energy sources, or shared resources, these communities aim to minimize reliance on external systems.

- Establishing an Agricultural Society or Prioritizing Agriculture in Settlements:

It becomes evident that all the utopia case studies in this study have developed models that either evolve into agricultural societies or where agriculture and industry function together. For instance, the Familistere and Phalange models can be characterized as business-focused, production-driven frameworks. These models were designed to enhance the poor and unhealthy living conditions of factory workers during that era. Similarly, the objectives of eco-villages align with the vision of creating an agricultural society as depicted in the examined utopias. Most eco-village initiatives and the case studies are established in rural settings and aim to sustain themselves through organic farming.

- Proposing “Ideal” Housing Architecture and Settlement Planning:

In utopian concepts, arrangements are crafted to address the social, cultural, physical, and economic challenges of urban life. A new city or settlement is envisioned within the framework of these solutions, with housing being a key element shaped by the philosophical ideals of the utopia. Most utopias define a new and ideal housing type for the proposed city. Like utopias, eco-village formations embrace various housing and settlement types, highlighting its quest for an ideal architectural language.

Despite their similarities, eco-village formations and the examined utopias exhibit notable differences. A key distinction is that the concepts of "ecology" and "sustainability" were not addressed in utopian literature until the publication of Ecotopia in 1975.

When eco-village and utopia designs are compared, it is seen that eco-village designs contain some features found in utopia designs from different periods. It can be said that the structure of thought found in eco-village initiatives is an integrated form of the utopian ideas examined in this section.

Since the 19th century, various examples of utopias have been attempted, but the extent to which these implementations have effectively addressed the challenges of their time remains a topic of debate. The dispersal of these utopian settlements due to encountered difficulties highlights the complexity of altering the established order and reversing negative trends. Notably, among the 'implemented' utopias examined for this study, the Familistère of Godin—declined due to numerous economic and social obstacles. Due to significant challenges such as fierce economic competition, internal social tensions arising from communal living, a leadership gap following Godin's passing, changing societal values that lean towards individualism, and its disconnection from larger societal shifts, the settlement ultimately came to an end and dissolved.

Furthermore, one of the examined utopias, ‘’Garden City movement’’ aimed to create self-sufficient communities like Letchworth, integrating urban and rural life with green spaces. However, urbanization, individualism, economic pressures, transient populations, and bureaucracy have reduced communal living in the settlement. As a result, it can be said that although the Garden City concept still influences urban planning, its original community focus has weakened, leading to more typical suburban developments.

Whether contemporary eco-village initiatives can effectively address the ecological and social challenges of the 21st century, like past utopias, remains a topic of debate. Various eco-village projects around the globe face sustainability problems. Ongoing research aims to identify and tackle these issues. Studies indicate that these challenges often stem not from physical or environmental factors, but from economic, administrative, and social matters [9]. Thus, it can be concluded that eco-

village initiatives, as modern utopian models, should focus on resolving economic, administrative, and social concerns. This approach enables us to derive important insights from historical utopian attempts to create communities that prioritize well-being, equity, and sustainability.

The study's evaluations are summarized in a table comparing key elements of utopian case studies and modern eco-villages, highlighting both shared principles and unique characteristics (Table 10). This analysis shows how eco-villages represent contemporary interpretations of utopian ideals, integrating historical insights with modern sustainability principles. It aims to clarify the potentials and limitations of intentional communities in addressing global challenges, providing insights to guide future efforts for resilient and equitable societies.

Table 10. A Comparative Analysis of the Similarities and Differences Between

Case Studies of Utopias and Eco-villages

ASPECTS	CASE STUDIES OF UTOPIAS	CASE STUDIES OF ECO-VILLAGES
Taking a Stand Against Prevailing Order	Challenge social norms with alternative lifestyles and movements	Propose new lifestyles and management methods as alternatives to traditional norms
Communal and Shared Living	Emphasize collective living and resource sharing	Implement systems like shared kitchens and gardens, focusing on sustainability and ecological stewardship
Solutions to Environmental/Other Issues	Historical focus on social, administrative, and later environmental problems	Promote sustainable living and innovative governance, using renewable energy and permaculture
Rural-Urban Continuity	Emphasize integration with nature, especially in rural communities	Aim for sustainable living through rural settings, aligning with modern eco-village movement
Defined Boundaries and Isolation	Utopian communities often isolated, with clear boundaries	Similar isolation in rural settings, as seen in eco-village case studies
Self-Sufficiency	Focus on communities generating as much as they consume	Aim to reduce external dependencies through local production and renewable resources
Agricultural Society	Develop models integrating agriculture and industry	Eco-villages align with agricultural society visions, focusing on organic farming
Ideal Housing and Settlement Planning	Craft settlements addressing urban life challenges with new housing types	Explore various housing and settlement types, seeking an ideal architectural language
Key Differences	Utopian literature originally looked from an ecology and sustainability, until "Ecotopia" in 1975	Eco-village designs incorporate features from utopias but focus more on sustainability and ecology
Implementation Challenges	Utopias often faced economic, social, and leadership challenges, leading to decline	Eco-villages face sustainability problems, often related to economic, administrative, and social issues
Future Potential	Historical utopias struggled with lasting impact due to various challenges	Ongoing research into eco-villages aims to address 21st-century challenges, learning from past attempts

6. Conclusion

The global rise of eco-villages reflects an increasing demand for communities that offer sustainable alternatives to conventional living. Their success stories inspire others to adopt similar practices, demonstrating that it is indeed possible to

coexist harmoniously with nature while fostering a vibrant and supportive community. As these initiatives advance, it is believed that eco-villages will play a crucial role in shaping future sustainable development efforts worldwide.

Exploring utopian concepts and eco-village projects reveals a blend of idealistic aspirations and practical solutions. Historically, utopias have emerged in response to societal shortcomings, promoting lifestyles that prioritize harmony, sustainability, and resilience. These ideas represent an ongoing quest for improved living conditions through self-sufficient communities and innovative housing solutions.

Despite the numerous challenges faced by previous utopian settlements, the lessons learned from their experiences provide valuable insights for contemporary eco-village movements. Addressing urgent environmental and social issues necessitates the integration of sustainability into community planning. To create enduring solutions, effective eco-village initiatives must consider not only environmental factors but also economic, administrative, and social dimensions.

Ultimately, by examining utopian models and eco-villages, it can be concluded that eco-villages can be considered as the utopias of the 21st century, confronting challenges reminiscent of those faced by earlier utopian efforts. Whether through intentional communities like eco-villages or innovative urban planning projects, the principles derived from utopian ideals serve as a roadmap for crafting a brighter future. By continuously exploring and adapting these models, multiple challenges of the 21st century, including energy resource depletion, climate change, and social inequality can be addressed through principles of self-sufficiency, environmental consciousness, and social cohesion.

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"LIVING MY HOME": HOW INTERIOR DESIGN CAN ENHANCE A SENSE OF HOME FOR PEOPLE WITH DEMENTIA

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Abstract

This paper presents a scoping review exploring the intersection of interior design and homemaking for individuals with dementia, emphasizing the enhancement of belonging, dignity, autonomy, and identity. In dementia care settings, well-designed living environments can alleviate symptoms, promote wellbeing, and create conducive living spaces. While previous studies have addressed the sense of home for dementia patients, few have focused on the process of creating a home and its design possibilities. For individuals with dementia, whose world perception shifts constantly, the relationship between their environment and perception is crucial, especially after relocation to a care environment. The methodology involved a scoping review of five databases (PubMed, Mendeley, CINAHL, Research Rabbit, and Scopus) conducted in November 2024. Search terms included homemaking, dementia, sense of home, identity, dignity, and autonomy. From 984 articles, 18 relevant studies were scrutinized and analyzed. The results highlight the significance of interior design in reflecting personal tastes and life experiences, fostering connections with family memories, and reinforcing identity. Homemaking, linked to personal expression and autonomy, becomes vital when addressing cognitive changes; thoughtful interior modifications can support cognitive challenges, enhance comfort, and provide familiarity. Strategic placement of familiar objects can trigger memory recall, offering emotional solace and continuity. Thus, interior design transcends aesthetics, serving as a powerful tool in reinforcing identity, aiding self-discovery, and establishing a secure environment for individuals with dementia. Future research should explore innovative methodologies, such as design research methods and toolkits, to involve individuals with dementia actively in creating and adapting their living environments, fostering inclusive design practices.

Key Words: Homemaking, Identity, Sense of home, Dementia, Interior Design

1. Introduction

The term 'home' encompasses many dimensions, including material structures, spatial dimensions, temporal connections, social relations, and the processes that make up a home and establish identity in society[1]. The concept of home and domestic practices support individual and collective identities in a fluid and material sense, and recognize the creative value of these practices. The practice of domestic work as a social and personal space-making is closely related to identity[2]. Discovering and creating a language, a physical sensation, and an architectural style that harmonizes with the body is a process of affirming language and physical sensation and creating a safe place for one's "now." In the past few decades, the way care for people with disabilities has changed from a medical model to a social model. The social model treats people as individuals with unique identities, and places emphasis on how to create an environment. This approach emphasizes the importance of individual choice and autonomy. This study focuses on the creation of homes and design approaches in dementia care, and summarizes what approaches are possible in design practice based on previous research.

According to the World Health Organization (WHO), approximately 55 million people worldwide are suffering from dementia, and this number is expected to increase. Long-term institutionalization often causes elderly people with dementia to feel isolated and disconnected from society, leading to depression and a decrease in happiness. Currently, the design of living environments for people with dementia is increasingly being recognized as having the potential to create spaces that alleviate symptoms, promote happiness, and contribute to more fulfilling life experiences. The sense of "home", characterized by small-scale, homelike features and homelike activities that are central to daily life, has been confirmed as an essential element of dementia care[3]. People with dementia face a variety of cognitive changes every day, including confusion about time, space, and self-awareness due to memory loss (World Alzheimer Report 2020). This loss of memory can lead to a loss of self-identity as the familiar cognitive world begins to waver. Apathy, characterized by a lack of emotion, spontaneity, enthusiasm, and intellectual curiosity, can also drain the vitality of daily life. What meaning does self-creation or self-design of the environment have for people with dementia who face such a loss of self? In this study, we will examine how interior design can support the maintenance of self and identity for people with dementia, focusing on research into the concept of "home", and considering how the environment should respond to changes in the body, the design of facilities and housing, the way people with dementia themselves construct their world, and the possibility that the process of constructing "home" can be a creative response to changes in self and world perception. In particular, this paper will examine what kinds of design practices are being proposed, and how interior design can be used to create nurturing environments that help people with dementia maintain and promote their sense of self.

2. Methodology

In November 2024, a rapid review of five databases (PubMed, Mendeley, CINAHL, Research Rabbit, and Scopus) was conducted. Search terms included: home care, dementia, sense of home, identity, dignity, and autonomy. A total of 22 articles were screened for research based on subject and keyword, and a detailed manual classification was performed. Publications focusing on changes in cognitive function in dementia patients in nursing homes and residences, and studies examining how the built environment can be designed to respond to these changes, were selected. This review emphasized models appropriate for specific times and places, and sought to explore the diversity of appropriate responses[4]. The final review included 22 papers, which were summarized based on individual elements such as doors, gardens, reminiscence, memory recall, and the creation of multisensory environments.

3. Results

Regarding the research categories identified in this paper, according to the reviewed articles, current research follows an evidence-based design (EBD) approach, which is defined as a design based on the best available evidence from credible studies[5]. According to this definition, the reviewed studies were categorized into research-oriented and practice-oriented studies. Most research-oriented studies use qualitative research methods, such as observation, interviews, and case studies, to collect and qualitatively analyze data from people with dementia, relatives, and care staff. There were five literature reviews that organized comprehensive analyses of environmental factors and individual elements[6], [3], [1], [7], [8], and three that compiled comprehensive guidelines on interior design and dementia and home design[9], [3], [10], while there were individual practices on home design and identity, including home practice with families[11] and care home practices[8], such as practices in focus groups[12] in Some also referred to localized elements, such as one on gardens[13], one on entrances and exits[14], and one on objects and recall[15]. Also, in relation to house building, those with an action research approach that focused on making, identity, and creativity and connected narrative and chairs[16], those that connected individual house practices with architectural design[17], and those that made reference to cognitive science and interior design[18] were included. For each of the studies, a wide range of practices from a range of places were compiled from actual locations and interviews, including Italy, the Netherlands, China, Belgium, Australia, Ireland, Canada, and Turkey. It also includes a review of queer and home[19]. In each of the studies, the objects and interior design elements chosen often to reflect the country's cultural background, history, and sense of community belonging. Although this review does not discuss much cultural background, future organizing on home building and identity will need to delve deeper into history, cultural background, and its relationship to individual life histories, such as individual sexuality and community. Each of these elements is outlined in table 1.

Table 1. Characteristics of the 22 reviewed publications.

Author	Souse of evidence	Location	Methodology	Key elements
Van Steenwinkel et al., 2014	Residents, Relatives and staff	Belgium	Observation&Interview / Qualitative analysis	Layout, Color, Space, Lighting, Night table, Shelf
Gramegna et al., 2022	Residents, Relatives and staff	Italy	Focus group interview	Photographs of familiar faces, places, and objects, Images related to past hobbies and interests
Chen et al., 2023 a	Residents, Relatives and staff	China	Observation&Interview	Layout, Furnishings, Sensory Elements,Clear pathways and visual cues,Familiar objects
Van steenwInkel et al., 2012	Residents	Belgium	Conceptual framework & Case study	Public and private,Layout,Connection to the Outside,Personal Space,Atmosphere
Hoof et al., 2016	Residents	Netherlands	Photography and in-depth interviews	Personal belongings,personalization, Furniture,Television,internet
Ferdous, 2019	Previous publications		Systematic literature review	Public and private,Layout,easy navigation,visual cues,Connection to nature.Homelike Atmosphere,Dining
Chen et al., 2023 b	Residents, Relatives and staff	China	Case study Observation&Interview	Clear circulation paths, providing easily identifiable landmarks, and ensuring spaces. Public and private,objects, colors, textures, and scents.

Van Hoof et al., 2016	Residents, Relatives and staff	Netherlands	Photography, interviews and focus groups	Personal belongings and familiar furniture,colors, soft lighting, comfortable furniture,homelike,fireplaces,comfortable seating
Falk et al., 2012	Residents	Sweden	Grounded theory	Personal belongings,flexible and adaptable interior design. Public and private
Chau & Newton, 2017	Residents, Relatives and staff	Australia	Case study Observation&Interview	memory boxes, sense of familiarity.
Newton et al., 2021	Previous publications		Narrative review	Freely and safely, independently. Enhancing Well-Being and Identity,Connecting to Nature
Linden et al., 2016	Residents, Designer	Belgium	Case study Creation&Interview	a scene with a chair, lamp and side table with personal objects, a bench in the path,living unit.
Chen et al., 2021	Previous publications		Literature review	Furniture, decorations, and memorabilia, public and private, colors, textures (rugs), and scents (candles)
Cooney, 2012	Residents	Ireland	Grounded theory	keep their activites. personal space, personalization
Weeks et al., 2017	Residents, relatives and friends of residents	Canada	Mixed-methods study	Personal belongings, furniture. Private and public.Homelikeness
Hoof et al., 2015		Netherlands	Focus group interview	Living spaces, personal belongings, furniture, decorations, surroundings, natural light, views of nature, Homelike, color, texture, lighting, and furniture.
Eijkelenboom et al., 2017	Previous publications Space Observation	Netherland	Literature review Case study Observation	Personal belongings, furniture, and cherished items,adjust lighting, temperature. Homelike ,colors, soft textures, and natural light,carpets, tablecloths, and family photographs.Public and private. wide corridors, doorways, and wheelchair-accessible furniture.
Fleming et al., 2015	Residents, Relatives and staff	Australia	Focus group interview	Tactile elements, varied lighting, and aromatherapy. Homelike, Personal belongings and familiar furniture styles. a muted color palette, soft textures, and controlling noise levels.
Siverskog, 2023	Residents	Sweden	Case study Interview	Identity: signaled clues about LGBTQ life histories(identities and art and rainbow flags, subtle clues, such as photos and books, the certificate on her name change). community, shared experience and memories.
Rijnaard et al., 2016	Previous publications		Literature review	Furniture and personalization, Homelik,: a warm and welcoming environment. Connection to nature, access to outdoor spaces, gardens, and natural views.
Author et al., 2023	Residents, Relatives and staff	Italy	Case study Creation&Interview	Framed Panels. familiar elements (like tables and tablecloths) personal belongings.

4. Findings

In this review, we have organized the information by focusing on how the unique sense of “home” is nurtured, how “home” serves as a link between the past, present and future, and how design can further strengthen this link. It has become clear that the following three elements are important for dealing with the ever-changing state of dementia: 1) a safe space, 2) a small world, and 3) connections.

4.1. A safe space

A safe space is the first element needed to create a social model environment that can respond to the changes of people with dementia. When dangerous events occur or family members become anxious, the activities of people with dementia are restricted, and these restrictions are connected to their own autonomy. Here, we will organize the key elements for creating a safe space and the design abilities, and who should intervene when and how.

4.1.1. Physical Safety

Design must prioritize safety and comfort, reducing physical strain and facilitating daily activities. For individuals experiencing cognitive and physical decline, modifications such as barrier-free environments, grab bars, and non-slip mats ensure secure movement and independence. Safety also alleviates family concerns while expanding possibilities for resident autonomy[20].

4.1.2. Mobility and Accessibility

Safe design fosters freedom of movement while minimizing restrictions. Features like concealed doors, secure windows, and designated paths allow residents to navigate environments confidently. These measures reduce wandering-related risks and enhance quality of life by supporting mobility and activity[20].

4.1.3. Color and Visual Cues

Bright colors, labeled objects, and clutter-free spaces improve visibility and reduce feelings of oppression. Directional cues and strategically placed objects encourage safe navigation, enhancing spatial understanding and comfort[11],[20]

4.1.4. Linear Arrangement

Furniture aligned in straight patterns helps residents organize activities and reduces cognitive confusion. Structured arrangements simplify understanding and interaction with the environment, promoting habitual behaviors and routines[11],[20].

4.2. A Small World

“A small world” where they can be themselves refers to their own identity, memories of the past, or a space in their own cognitive world that they feel comfortable in, the rhythm of their daily lives, and their own world. Here, we will discuss the important elements of their own world-building, the possibilities of its design, and how to create relationships.

4.2.1. Organized Spaces

‘Small, organized spaces’ foster cognitive accessibility by placing essential items within easy reach. Familiar layouts in kitchens and living areas trigger procedural memories, allowing residents to perform daily tasks independently and comfortably[20].

4.2.2. Routines and Triggers

Design elements like bedside lamps, tablecloths, and bedspreads establish daily rhythms without enforcing behaviors. Such spatial and temporal cues promote routine while respecting autonomy[11][20].

4.2.3. Personal Belongings

Integrating personal items—photographs, heirlooms, and furniture—preserves identity and fosters attachment. These objects evoke memories, sustain routines, and maintain individuality, enhancing the home’s emotional resonance [11][21][22].

4.2.4. Historical and Sensory Elements

Commonplace items and sensory details such as smells, textures, and music evoke nostalgic memories and foster comfort. Materials like wood, tactile objects, and familiar sensory stimuli bridge past experiences with present realities, reinforcing emotional well-being[16][21].

4.2.5. Connected Identity

Objects are also important in terms of maintaining one's identity. For example, in the homes of queer older people, photographs, rainbow flags and books showed a range of domestic materialities that signaled clues about LGBTQ life histories, a framed certificate of name change, to more subtle clues, such as photos and books, these object makes people with dementia more themselve[19].

4.3. Connections

Connections with others and new encounters can be triggered by even the smallest of details, such as the angle of a chair or the opening and closing of a door[20]. As elements that make up a sense of home, connections with others and encounters with new worlds are also important elements that shape who we are. Here, we will organize the elements that create connections and how to design them.

4.3.1. Social Interaction and Layout

Furniture placement fosters connection and interaction. Strategically angled chairs and open doors create social opportunities. Memory boxes placed outside rooms support wayfinding and spark conversations, promoting communal bonds[8][13].

4.3.2. Recreational Spaces

Items like playing cards, newspapers, and televisions provide social and leisure activities, encouraging engagement with others and the outside world. Accessible setups enhance comfort and create a homelike atmosphere[3].

4.3.3. Nature and Gardens

Access to outdoor spaces promotes relaxation, sensory stimulation, and a sense of agency. Gardens provide restorative effects, encourage physical activity, and reduce negative behaviors, benefiting both residents and caregivers [13].

5. Discussion

The findings of this review highlight the crucial role of interior design in shaping environments that support individuals with dementia by balancing safety, autonomy, and self-expression. Interior design plays a fundamental role in maintaining cognitive accessibility, fostering identity, and encouraging meaningful interactions. By examining the interplay between spatial organization, sensory stimulation, and personal objects, we can develop more inclusive and responsive design approaches that align with the evolving needs of individuals with dementia.

Furthermore, this study highlights three essential processes in addressing cognitive changes in people with dementia through design: creating a secure space, establishing a small, familiar world where they can express themselves, and fostering both order and meaningful connections with others.

5.1. The construction of a secure space.

A safe space is the first step towards building an environment as a social model for changes in people with dementia. When dangerous events occur or family members become anxious, the activities of people with dementia are restricted [23], [8], which can be transferred to institutions, where safe environments such as grab bars, non-slip mats, and barrier-free environments are ensured, or spaces are provided for easy wheelchair access[11], and the surroundings and the people with dementia themselves can move more freely [8].

A key insight from this review is that interior design serves as a mediator between safety and autonomy. Traditionally, dementia care environments have prioritized safety, often at the cost of personal freedom and self-determination. However, this review suggests that well-designed environments can offer both security and autonomy through thoughtful spatial organization, wayfinding elements, and accessible design features. For instance, spatial zoning can allow for structured yet flexible environments where individuals can navigate freely without excessive restrictions. Features such as contrasting color schemes, clear sightlines, and intuitive furniture arrangements provide subtle guidance while preserving the dignity of residents.In particular, the color and arrangement of furniture and rooms also led to the design of a secure space, and by repainting the space from dark to light colors, the space became simpler, more open, and less oppressive, making it easier to perceive the space and manage the house[11]. The organization of furniture and activity areas also helped people with dementia to better perceive and understand space and behavior[11] [8].

Moreover, sensory design emerges as an essential factor in maintaining cognitive stability. The inclusion of natural materials, soft lighting, and familiar textures can help create spaces that feel welcoming and reassuring. Additionally, multisensory cues such as ambient soundscapes, scents, and temperature variations can reinforce cognitive anchors that assist individuals in maintaining routines and spatial awareness.

5.2. A small world in which they can be themselves.

A central theme that emerged from this study is the importance of personalized spaces that reflect the identity, memories, and lived experiences of individuals with dementia. Traditional care environments often lack the personalization necessary for individuals to feel a sense of belonging. However, interior design can counteract this by incorporating familiar objects, flexible furniture arrangements, and personal artifacts that evoke memories and provide emotional grounding. This is where the small world takes place, deeply connected to personal identities. Photographs, children's drawings, and familiar furniture that people with dementia bring into care environments help maintain a connection to personal histories, evoking memories and providing comfort through past identities, routines, and hobbies. These personal objects also encourage reminiscing, reinforcing a sense of home [22] [7], [24], [6], [3], [3], [21]. Additionally, the strategic placement of familiar items—such as those around a sofa, in the kitchen, on the TV stand, or on a night table—helps organize cognitive understanding and physical movements. This arrangement supports daily ‘physical memories,’ enabling people with dementia to navigate their surroundings more freely by creating their own sense of order[8].This overlaps with the identity and homemaking practices

explored in this study, where the person with dementia creates their own order by designing their own little world[11]. This order is more smoothly maintained in collaboration with family members, care staff, and others around them[8], [11], and 'physical memory' through tacit knowledge activates the daily life of the person with dementia[24]. Also, in the sensory realm, sensory elements such as warm lighting, radio, and music create a sense of security and create a state or mood[21]. Elements such as materials, shapes and dimensions are also connected to the sense of home and influence the creation of a comfortable space or place[21].

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This act of creation can also power lively activities for people with dementia, and being able to change the color of the walls or drill a hole in a room is proof that the place is for them. Gathering input on a case-by-case basis, not only on individual rooms but also on the arrangement of the space and artwork, respected the residents and enhanced their sense of well-being[3]. On the other hand, they strongly felt that this was not their place due to restricted access to the space and when they did not know if they could move freely[3]. Additionally, findings suggest that the inclusion of adaptive design elements—such as modular furniture, repositionable fixtures, and customizable lighting—can empower residents to modify their surroundings, reinforcing a sense of ownership and engagement with their environment. The ability to make even small adjustments, such as choosing bedding or rearranging personal items, can significantly enhance an individual's sense of control and stability.

5.3. Connections and new encounters

Beyond safety and identity, interior design plays a vital role in fostering social connections and enhancing emotional well-being. The spatial arrangement of common areas can either facilitate or inhibit interactions between residents, caregivers, and family members. Open-plan layouts, shared seating areas, and semi-private transitional spaces can encourage casual conversations and reduce feelings of isolation[8]. Games and newspapers can also bring out conversation starters[8] and help residents get to know each other. Television is valued as a way of enjoying leisure time, spending time comfortably, keeping abreast of current affairs, and providing a connection to the outside world[10]. 'Mundane objects from the past' can also support people with dementia to recall memories and draw out their history[15]. This may sometimes be a figure unknown to the family. Just as children were not able to choose the favorite things of people with dementia during their transition to the institution[3], we have surprisingly little opportunity to know what people with dementia value and what things they want to cherish on a daily basis, even though we seem to know about them. At the same time, we also know less about ourselves than we might imagine. Encouraging this kind of new self-discovery is one of the doors that interior design can open.

As Vansteenwinke et al. (2012) explain, humans and objects are interrelated, and through relationships, people understand themselves, others, and the things around them. meaning is personal but also embedded in historical, cultural, social, economic, and other contexts. A balance between autonomy and security is important for individuals to comfortably cultivate their days, both of which can be experienced in different contexts and times. Interaction between people and objects: Meaning is constructed through the interaction between people and objects. People experience the 'outside world' through their senses. A person's body and mind work together to interpret and give meaning to these experiences.

Furthermore, the review also identified the garden as a place combining these three elements. It is a safe place for oneself, elicits creative acts, connects to nature, and changes to the outside world[13], [13]. The role of natural environments is particularly noteworthy. Access to gardens, terraces, and green spaces has been linked to improved mental well-being, reduced anxiety, and enhanced cognitive function. Designing dementia-friendly landscapes with accessible pathways, seating nooks, and interactive gardening opportunities can provide both therapeutic and social benefits. Furthermore, the presence of visual

and auditory connections to nature, such as views of trees, water features, or bird sounds, can contribute to a sense of calm and belonging.

In conclusion, the three processes outlined in this review—the creation of a safe space, a small world where one can express their true self and maintain order, and the formation of new connections and encounters—illustrate a progression from safety to autonomy. "Creation" serves as the bridge between autonomy and self-discovery, allowing individuals to navigate between autonomy and safety.

Furthermore, this review highlights the limited number of design practices involving people with dementia in the actual process of homebuilding. At the same time, the transition from home to institutional care is often abrupt, leaving families and caregivers to make decisions about what possessions to bring, often without knowing what holds the most significance for the person with dementia [23], [21] Weeks et al., 2017). To address this, dedicating time for family discussions to identify and honor the "small world" created by the individual with dementia—recognizing its importance and designing their new living environment accordingly[17]—can contribute to preserving their dignity and ensuring a sense of belonging after relocation. Additionally, to address the lack of information about possible options during this transition, care facilities could establish clear guidelines and tools that outline both limitations and possibilities, improving communication and decision-making for families.While this review sought to explore each of these elements in depth, it relied heavily on a limited number of studies concerning homebuilding, underscoring the broader lack of research and practice in this area. This suggests a pressing need to not only design better environments for people with dementia but also to rethink the entire process of emergent homemaking itself. Expanding the diversity of research is also essential—design should consider how to support physical and cognitive changes while integrating historical, cultural, and personal identities, including sexuality. This shift requires rethinking the transition from home to community as a cultural change rather than merely a logistical one. Future research should further investigate innovative methodologies[18][25] within interior design, such as design research methods, toolkits for understanding dementia symptoms, and decision-making frameworks that prioritize the needs of people with dementia. Additionally, advancing homemaking initiatives could lead to the development of new methodologies that better address the complexities of dementia care and living environments.

6. Conclusion

This review underscores the importance of interior design as a tool for enhancing the quality of life for individuals with dementia. While safety remains a foundational consideration, interior design has the potential to extend beyond basic security measures to actively support cognitive function, emotional well-being, and personal identity.

The three core processes identified in this study—constructing a secure space, fostering a personal small world, and facilitating connections—highlight the different ways in which design influences daily life for individuals with dementia. Future research should focus on developing comprehensive design methodologies that integrate cognitive, emotional, and social considerations into interior environments.

There is also a growing need to explore innovative and interdisciplinary design strategies that merge insights from neuroscience, psychology, and cultural studies to create more responsive living environments. This includes the development of design toolkits, adaptable furniture systems, and digital interfaces that enhance communication, wayfinding, and personalization.

Finally, there is an urgent need for more participatory design research, where individuals with dementia and their families are actively involved in shaping their environments. By shifting from a purely prescriptive design approach to a more co-creative and human-centered process, interior design can serve as an empowering force that honors the dignity, history, and evolving needs of individuals living with dementia.

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FLEXIBLE INTERIOR DESIGN IN SYMMETRICAL HOUSING BLOCK TYPOLOGIES: CO-LIVING APPROACH

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Abstract
Rapid urbanization and increasing population density have heightened the demand for housing in metropolitan cities like Istanbul. Traditional housing typologies fail to meet contemporary social, economic, and environmental requirements. This situation necessitates the development of innovative solutions that address sustainability, spatial flexibility, and user needs. This study aims to develop solutions that sustainably transform the existing building stock to meet the growing demand for housing. In this context, considering the housing development in Istanbul, the transformation of symmetrical apartment typologies into co-living spaces is examined, and a sustainable transformation model is proposed. While existing studies focus on general housing typologies, this study uniquely emphasizes the transformation of symmetrical apartment blocks. The methodology of the study consists of four stages. In the first stage, a literature review was conducted on the housing production process in Turkey, the concept of co-living, and spatial design principles from global examples. In the second stage, selected symmetrical apartment blocks were analyzed regarding spatial layout, user needs, and the potential for shared spaces. In the third stage, spatial arrangements were developed to balance private and shared spaces. In these arrangements, no interventions were made to structural elements, and minimal modifications were applied to non-structural partition walls. In the final stage, the proposed model was evaluated regarding sustainability, flexibility, privacy, and user interaction. The findings indicate that the model provides a socially interactive, economically viable solution that meets individual needs. This transformation model offers an innovative alternative to the housing crisis. In conclusion, this study reveals the potential of a sustainable, flexible, and user-centered universal design approach and contributes to developing a new typology in this field.

Key Words: *Co-living, Housing, Interior Architecture, Symmetrical Plan Housing Block, Sustainability.*

1. Introduction

The acceleration of urbanization on a global scale is increasing pressure on housing and living spaces in rapidly growing cities. Rising population growth and migration rates in urban areas lead to significant social, economic, and environmental changes. In metropolitan cities like Istanbul, population density has necessitated the reevaluation of housing areas and the development of solutions incorporating spatial flexibility. Recent studies on sustainable design have brought to the forefront the integration of urban planning and small housing units in architecture. Existing housing typologies are losing their capacity to accommodate this increasing density and number with the current rate of space and resource usage. In this context, Co-living spaces provide efficiency in the use of space in densely populated cities while encouraging individuals to engage in social interaction. The concept of Co-living allows users to share private and/or public spaces, reducing construction costs, creating a social environment, and enabling more efficient use of housing stock. The concept of Co-living is often mentioned in the literature alongside the terms “cohousing” and “shared living.” The primary difference between Co-living and shared living lies in their purpose and the way they emerge. Shared living generally refers to a lifestyle that develops spontaneously in spaces not originally designed for communal living, shaped by the choices of individuals. In contrast, Co-living encompasses living spaces specifically designed to foster a sense of community and support collective living. As part of the social dimension of sustainable development, co-living is presented as a connected lifestyle that promotes sustainable living practices through the shared and efficient use of resources and space [1]. Research in the United States shows that converting office buildings into co-living models can reduce construction costs by 25–35%, making it a cost-effective option [2]. This model provides low-cost housing options by combining centralized communal spaces (e.g., kitchens, bathrooms, and laundry areas) with lockable micro-units. The U.S. is reported to have a housing shortage of 4 to 7 million units, alongside a 20% vacancy rate in office spaces. The co-living model offers a practical solution by repurposing vacant buildings in city centers to create affordable housing, delivering both social and economic benefits [2]. In today's housing sector, the importance of innovative design approaches is increasing due to rising demands and the impact of ongoing crises. As emphasized in United Nations reports, social crises, and climate change have heightened the need for new approaches in the housing sector [3]. Traditional construction methods are insufficient to address these challenges. Therefore, analyzing demographic structures and societal attitudes to develop new typologies has become a necessity. The concept of co-living emerges as an innovative solution to create spaces that optimize user experience while strengthening social connections. Co-living models provide environments that enhance interaction among individuals and communities, offering access to shared facilities and social spaces.

This study focuses on the reorganization of symmetrical apartment typologies within the framework of the co-living approach. It examines how selected apartment typologies can be transformed into co-living spaces through specific planning and spatial modifications. The findings of this study are aligned with the Sustainable Development Goals, particularly "Reducing Inequalities" (Aim 10) and "Sustainable Cities and Communities" (Aim 11). The study contributes to the objective of making cities and human settlements inclusive, safe, resilient, and sustainable. In line with the goal of ensuring access to adequate, safe, and affordable housing and basic services for all by 2030, co-living spaces are evaluated as an effective solution [3]. Symmetry, a prominent design element in architecture, is considered an important criterion for formal simplicity when many apartment buildings feature symmetrical plans in the x-y plane [25].While the literature typically focuses on general housing typologies, this study's emphasis on symmetrical apartment blocks, addressing the concept within the context of sustainability and spatial flexibility, and developing flexible floor plans without intervening in structural elements constitutes its originality.

1.1 Purpose of the Study:

This study aims to explore the potential of transforming common apartment typologies in Istanbul into co-living spaces through various spatial arrangements. The goal is to develop a planning model that meets user needs and promotes social interaction by creating a balanced design of private and common areas. The research questions are as follows:

- What design parameters should be considered when converting typical apartment typologies in Istanbul into co-living spaces?
- How can the balance between private, semi-private, and common areas be achieved in co-living spaces?
- How does the transformation into co-living spaces support sustainability?
- What innovative technologies can be used to provide flexibility in interior without altering the structure?

1.2. The method of the study:

This study follows a four-stage mixed research design. The first stage involved a literature review on the housing production process in Turkey, the concept of co-living, and spatial design principles in global examples. The review focused on relevant keywords (e.g., "coliving", "cohousing", "shared living", "sustainable housing", "apartment typologies"). In the second stage, symmetrical apartment blocks were selected for case analysis, and the typology's existing layout and user needs were examined. The analysis identified the strengths and weaknesses of the current design, considering apartment layout, room distribution, and common area potential. The third stage focused on spatial arrangement and analysis. Various adjustments were made to convert the selected typology into a co-living space, balancing private and common areas. Structural elements (e.g., columns, and shear walls) were untouched, while shafts and plumbing axes were preserved, and minimal changes were made to non-load-bearing partition walls. Spatial arrangements were evaluated based on parameters such as flexibility, privacy, accessibility, and user interaction. The final stage presents the findings and discussion.

2. Historical Development of Housing Typology in Turkiye

In literature, housing production in Turkey is examined in three periods: "integrated housing production" (1923-1960), "housing cooperatives and dormitory production" (1960-1994), and "closed housing production" (1995-present) [4]. Koca (2015), however, analyzes the historical development of housing in five separate periods (Figure 1). Between 1923 and 1950, following the establishment of the Republic and slow urbanization, housing production was largely carried out by the state, with individual production and cooperatives also playing an active role [5]. During this period, low-density, gardened single houses and apartments were common, and architects created original designs suited to the needs of users. State-supported projects, such as public housing, also gained prominence. Between 1950 and 1980, rural-urban migration due to mechanization in agriculture caused a significant increase in housing demand. Squatter settlements became the housing solution for low-income migrant groups, while cooperatives and "build-sell" apartments emerged as new housing types. The introduction of the Apartment Ownership Law in 1965 encouraged apartment production. With the increasing view of housing as an investment, unplanned urbanization and population concentration began during this period. To meet the housing needs of incoming migrants, squatter settlements began to change in the 1970s and, with the issuance of zoning amnesty laws in the 1980s, these settlements became a means to benefit from urban value increases [6]. Between 1980 and 2000, the state took a backseat in housing production, opening space for the private sector. Large capital groups and cooperatives turned to mass housing projects. Gated communities, apartment blocks, and high-density housing developments became widespread. Housing evolved from a basic need for shelter to an investment tool for profit, and unplanned urbanization accelerated significantly. Between 2000 and 2010, following the 1999 Gölcük Earthquake, urban transformation projects gained momentum through the renewal of risky buildings. Public institutions like TOKİ and the private sector developed social housing, residences, and mixed-use projects. During this period, architecture shifted from user-centred design to designs shaped by the demands of investors.

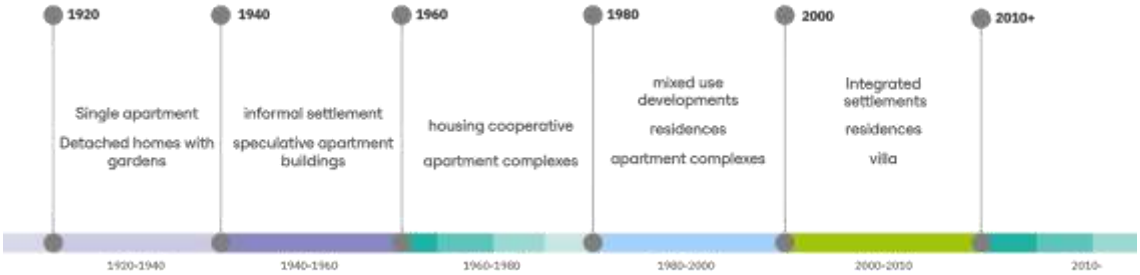

Figure 1. The historical development of housing production in Turkiye (adapted from Koca, 2015)

Looking at the historical process, it is clear that housing production is a spatial reflection of the modernization process, influenced by economic, political, and social factors. It is also evident that in the modernization process, secure housing has increased social segregation and shaped modern lifestyles. In parallel with the growing demand for housing, there has been a consistent increase in housing sales over the years. For example, while housing sales were 1,000,000 in 2013, they reached 1,050,000 in 2014, 1,200,000 in 2015, 1,250,000 in 2016, and 1,400,000 in 2017. The primary reasons for this increase include rapid population growth and migration. These dynamics have led to an annual increase in housing production. However, due to economic shortcomings and the scarcity of qualified construction companies in the country, a situation arises where the housing needs of all individuals cannot be met [7]. High and continuously increasing inflation, in particular, negatively affects the economic situation of middle and low-income families, making it more difficult for these groups to become homeowners in the face of rising production costs. Therefore, housing production emerges as a social and economic issue.

3. The Concept of Co-living and Design Approaches on an International Scale

Co-living is defined as shared living spaces as an alternative to traditional housing [8]. Co-living is also distinct from shared housing; while shared housing combines independent homes with shared spaces and facilities to support a collaborative lifestyle and balance privacy with social interaction, co-living is focused more on communal living arrangements [9]. The term "common/community" refers to a group of people living in close, independent homes who interact socially and share norms and values related to communal living. Conceptually, the prefix "co" refers to sharing common spaces, making collective decisions based on non-hierarchical processes, living and interacting socially, and doing things together [10]. The physical arrangement of shared housing consists of several independent living units, with shared spaces and facilities that balance privacy and social interaction.

The co-living concept is based on utopian, feminist, and community-driven movements from the 19th and 20th centuries. In Denmark and the Netherlands, co-living was developed to enhance social relationships and foster a sense of community (communitarianism), while in Sweden, the focus was on reducing the domestic labor burden for women and improving the lives of working parents and their children through a feminist motivation [11]. The first examples of co-living can be seen in Denmark, where, since the early 1970s, various forms and types of co-living *(bofællesskab)* have emerged [10]. Born from the collective movement of the late 1960s, co-living appeared in Denmark in the early 1970s as low-rise, densely clustered housing [12]. In the 1980s, two American architects, McCamant and Durrett, traveled to Denmark to study co-living with Danish researchers and later introduced the co-living model to the United States, where it developed and spread [13]. In other European countries such as Sweden, Germany, and the Netherlands, co-living projects also have historical developments, but the typology, form, and organization differ somewhat from the Danish co-living movement [14]. In Italy, the demand for affordable housing has directed people's interest toward shared housing, leading to increased investment in co-living spaces [15]. Similarly, in France, co-living spaces have reached a turning point, with self-organized living units emerging, and more recently, partnerships with local governments and housing associations have been developed [16]. A review of the literature clearly shows that the interest in co-living spaces is not a new concept, but rather a recent global resurgence. The reemergence and spread of co-living are a phenomenon observed in many countries, with demographic changes, resources, and lifestyles playing a significant role in this process [17]. Beck (2019) states that the design of co-living spaces consists of four layers: visions and values, organizational, relational, and physical dimensions [10] (Figure 2).

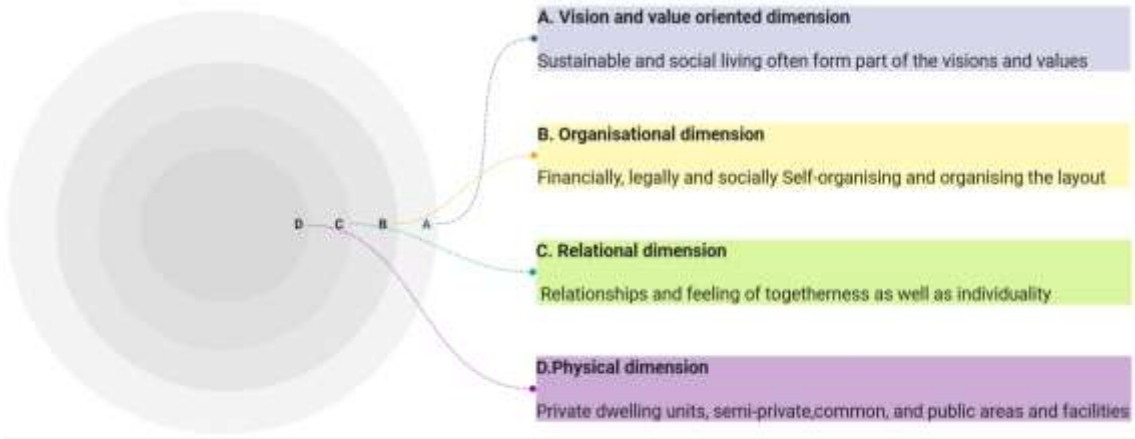

Figure 2. Design Criteria for Co-living Spaces (Adapted from Beck, 2019)

Under the criterion of visions and values, it is necessary to create an alternative to other housing options, establish a balance between privacy and community, and share visions and values related to co-living, focusing on social aspects, sustainable living, spiritual life, and, in some cases, political values. The organizational dimension encompasses how co-living is financially organized and legally planned. The self-management of the group and the design of the spatial layout are part of the organizational dimension of co-living. The relational dimension includes the relationships between residents, group dynamics, identity, interaction, and collaborative practices (such as communal meals, working groups, celebrations, etc.). Fulfilling this criterion is crucial for creating a sense of belonging and unity. Finally, the physical dimension refers to the proper design and handling of the physical environment, which consists of a combination of several private living units, semi-private and shared (and sometimes public) spaces, shared land, and facilities. Co-living designs bring many efficient returns in terms of economics and sustainability, as they require less new building construction by utilizing existing building stock. Most studies highlight the positive impacts of co-living spaces in critical areas such as affordability, sustainability, the creation of shared spaces, a sense of community and belonging, social innovation, and architectural design [15]. In a study by Malmqvist and Brismark (2023), sustainability and CO2 emissions were compared in two different co-living examples in Sweden: a co-kitchen-based design for student housing (Co-Kitchen Project) and an economic co-living design for elderly women (Max4Lax Project) [18]. The results showed a 10-20% carbon savings per apartment unit, a reduction in material usage by designing fewer wet units (kitchen and bathroom), and a 21-36% lower per capita emission rate in co-living units compared to traditional housing [18].

In a design study developed by the Dutch architecture firm MVRDV in collaboration with HUB and Bridges Fund Management, different solutions for the future of housing through co-living practices are proposed [19]. The focus is particularly on the adaptation of existing structures and the transformation of office buildings into residential units. The transformation of buildings contributes to environmental sustainability by reducing carbon emissions. Among the 7 developed typologies, examples such as "Stacked Village," which features different characteristic features on each floor, "Vibrant Heart," which provides easy access to shared spaces, "Vertical Neighbourhood and Collective Ribbon," which facilitate unexpected encounters and socializing, and "Biodiversity Tower and Vertical Farm City," which enable the creation of a green rooftop garden by storing rainwater, stand out. These designs aim to reinterpret traditional housing arrangements and ensure that the transformation into co-living spaces is carried out in a sustainable manner (Figure 3).

Figure.3 Co-living Design Guide (Adapted from MRDV, 2024)

The interiors have been redesigned to meet both individual and community needs. For example, corridors, which were previously used solely as transition spaces, have been repurposed with a street concept to encourage social interaction. In this context, it is suggested that corridors be functionalized for various activities such as sports, storage, art exhibitions, indoor gardens/green spaces, etc. Functions like gyms, libraries, and shops have been integrated into areas with relatively little natural light and low ceilings, making these spaces part of the living environment. The interiors are designed to allow residents to

come together and interact. To achieve this, movable partition walls, spaces that can be divided in different forms, and fixed furniture that can be used on both sides are proposed. The flexible design of the spaces aims to adapt to the changing needs of the users. The different character of each floor plan offers residents various living options. The project emphasizes the importance of natural light and ventilation, with the aim of creating brighter and healthier indoor environments. To reduce environmental impact, sustainable materials and methods have been preferred in the transformation projects (Figure 4).

Figure.4 Co-living Interior Design Guide (Adapted from MRDV, 2024)

These improvements aim not only to increase individual comfort but also to provide spaces that strengthen social bonds and make the interiors more functional. In another co-living project by Gensler, an office building is converted into housing, which differentiates this project from others. The choice to convert an office building, rather than a residential one, is due to the high office-to-residential ratio in the U.S., with 20% of office spaces remaining unused and underutilized. The project explores how empty office spaces can be converted into residential units. In this case, problems such as the lack of comprehensive infrastructure systems in office buildings and the generally lower levels of natural light in interior spaces were encountered (Figure 5). According to the research report published by Gensler, a typical building of this type can accommodate 40 single units and 4 double units, totalling 48 beds on each floor [20]. Currently, many co-living companies in the U.S. are collaborating with property owners to convert buildings into subleasing models for co-living arrangements [21].

Figure 5. The Conversion of the Office Building in Minnesota, Minneapolis into a Co-Living Space [22]

In addition to the structural and interior transformation, the financial impact of the co-living concept on the real estate sector is highlighted in relation to the Dash-Living project. Dash Living is a co-living platform that was established during the pandemic and operates primarily in the Asia and Pacific regions. Dash Living not only offers physical opportunities but also encourages users to participate in events, thus fostering a sense of community. Smart home systems have been integrated into the interiors to make users' lives more practical, enhancing both the sustainability and efficiency of the model. Individual living units are provided to users while also facilitating the sharing of spaces such as kitchens, laundry rooms, and communal living rooms, offering an economical accommodation solution. This project allows flexible rental options, enabling users to sign short-term contracts of up to one month. Particularly in cities known for high housing costs, such as Hong Kong and Singapore, it presents an attractive option for those seeking budget-friendly housing. A key indicator of the sustainability of the co-living model is Dash Living's typical lease contracts with an average duration of ten months. Considering that rentals longer than six months are regarded as long-term in the accommodation sector, this demonstrates that co-living is not just a temporary trend [23]. Another example is the Dozendoors project, designed by Gon Architects in Spain. It involved the conversion of a five-story building to accommodate twelve university students for a year [24]. International students from around the world live together in this building in Barcelona. The general layout of the building not only provides vertical connections between the floors but also organizes and distributes common and private areas around a central staircase. In Dozendoors, various shared spaces are provided both inside the building and on open terraces for collective living. On the ground floor, there is a kitchen, dining room, and living room; in the basement, a game room and laundry room; while on the south-facing terraces of the fourth and fifth floors, sunbathing areas are available. The private rooms are designed as different variations of the same type, ranging from 10-12 m², and contain all the essential elements such as bathroom, resting, sleeping, and working areas. Surface colors are used to separate areas like the workspace and bathroom from the rest of the room, creating a spatial hierarchy.

4. Findings

In this study, different plan typologies were examined, and spatial quality analyses were conducted (Figure 6). Areas such as the entrance, kitchen, dining, living area, bathroom, and WC were classified as semi-private, while bedrooms and children's rooms were considered private spaces, and spatial flow diagrams were created. In this context, although it was determined that the plan typologies sampled showed similarities in terms of spatial function, structural differences were observed. Particularly, the partition walls used in social housing projects were found to be obstacles in applying the concept of spatial flexibility in the study. Therefore, the carrier system was chosen as the apartment typology with a symmetrical floor plan (number 5 in Figure 6), where spatial flexibility could be most easily applied, and spatial analyses were focused specifically on this apartment.

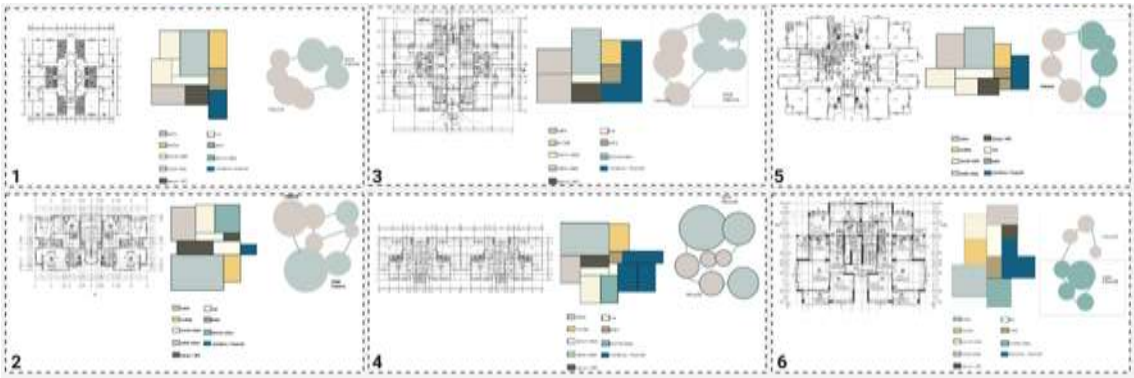

Figure 6. Different Plan Typologies and Spatial Quality Analysis (Created by Authors)

In the study, a 10-story apartment building, including 2 basement levels, has been designed. Under the current conditions, the basement levels are also being used as residential areas. Each floor, including the ground floor, contains 4 apartments. The areas of the second and first basement levels are 377 m², the ground floor is 427 m², and the other floors are 460 m², resulting in a total living area of 4405 m² (Figure 7).

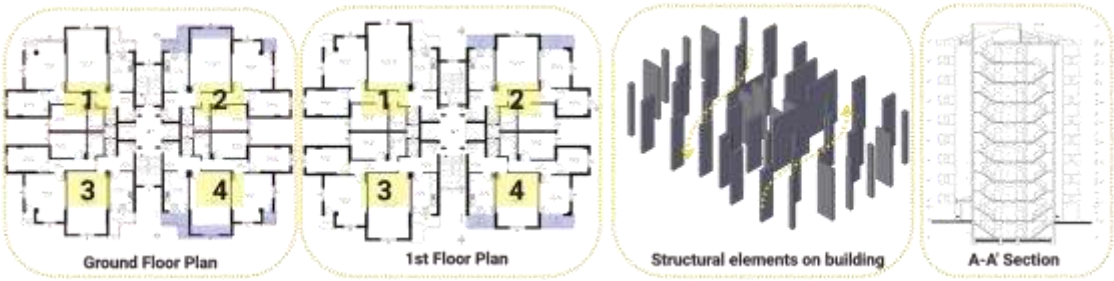

Figure 7. Analysis of Different Plan Typologies and Spatial Qualities (Created by Authors)

The structural composition of the building, including shaft spaces, balconies, and circulation areas, was analyzed. Based on the examined examples, the spatial requirements were identified and focused on. The requirements and outcomes were reviewed under four main headings: Vision and Values, Organization, Relationships, and Physical Aspects. To make the best use of every square meter of the space without interfering with the load-bearing walls, partition walls were redesigned. Both sides of the partition walls are intended to serve a function (storage-rest areas). A balance between privacy and shared spaces was established to promote a sense of belonging and togetherness. For this purpose, spaces were classified into three different usage categories: private, semi-private, and public. The space users were categorized based on different scenarios, including babies, children aged 3-14, early adolescence (14-18), young adulthood (18-30), middle adulthood (30-50), late adulthood (60+), singles (students, adults, or elderly), two-person households, parents with one child, and parents with two children. Eleven different living units were planned for the ground floor. The shared spaces include 2 kitchens, 4 bathrooms, and 2 toilets. Four social interaction and gathering corners were created, and 4 common living areas and balconies are included. The basement levels were designed for service areas. The second basement floor was designated as a shelter and storage area, and detailed designs were not provided for this area. The first basement floor, which is illuminated via daylight, was designated as a gym and laundry room, supported by a HVAC system. The number of individual kitchens, bathrooms, WCs, sitting, and living spaces has been reduced and converted into shared (co) spaces, resulting in a 2.6-fold increase in shared living (coliving) units (Figure 8).

FLOOR	m2	Co-Kitchen	Co-Bathroom	Co-Wc	Co- Living Units	User Scenario	Servis Area	Additional Spaces
2nd Basement Floor	377	-	-	-	-	Staff + General Users	Cleaning Room, Laundry Room, Pantry	
1st Basement Floor	377	2	2	2	4	General Users	Gym, Cinema Room	Indoor Child Play Ground
Ground Floor	427	2	2	2	11	General Users	-	Shared balcony and seating area
1st Floor	460	2	2	2	11	General Users	-	Shared balcony and seating area
2nd Floor	460	2	2	2	11	General Users	-	Shared balcony and seating area
3rd Floor	460	2	2	2	11	General Users	-	Shared balcony and seating area
4th Floor	460	2	2	2	11	General Users	-	Shared balcony and seating area
5th Floor	460	2	2	2	11	General Users	-	Shared balcony and seating area
6th Floor	460	2	2	2	11	General Users	-	Shared balcony and seating area
7th Floor	460	2	2	2	11	General Users	-	Shared balcony and seating area
Provided Usage in model	4405	18	18	18	101	-	-	-
Current Usage	4405	38	38	38	38	-	-	-
%		%52,6	%52,6	%52,6	= %165,7	-	-	-

Figure 8. Space Usage Analysis Based on Floor Plans (Created by Authors)

The wet areas such as the kitchen, dining, bathroom, and WC have been centrally located in the plan around the core, where the shaft spaces are situated. The corridors created around the core are designed as socializing areas, with seating spaces incorporated into various niches. In each floor plan, variations of living units are produced for single occupants, couples, and families. Each living unit contains its own private sleeping, sitting, kitchenette, working, and dressing areas. Since storage space is relatively limited, additional storage is provided in the corridors (Figure 9).

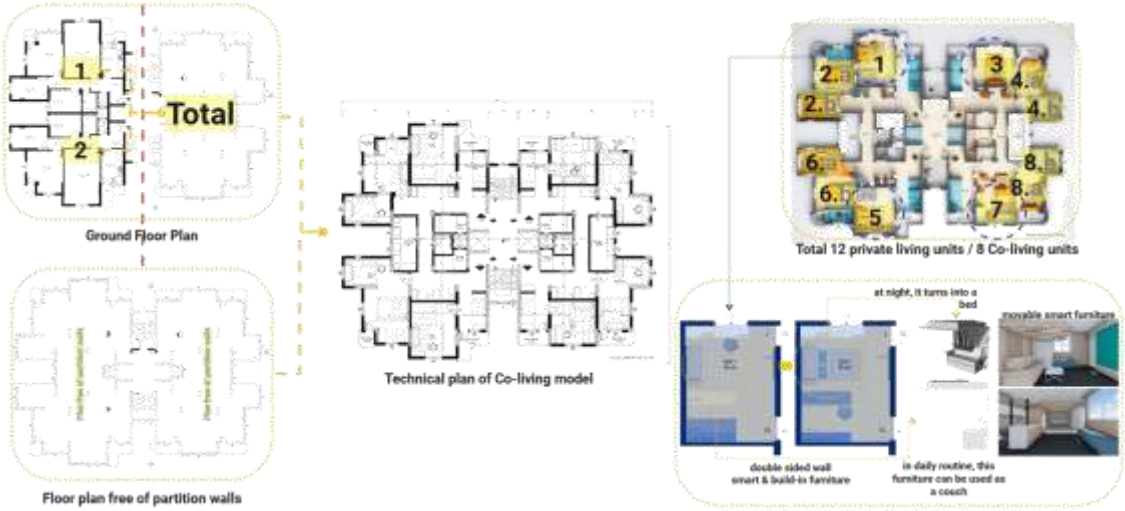

Figure 9. Co-living proposal and changes in floor plans and the furniture used (Created by Authors)

When questioning which design parameters should be considered in the transformation of typical apartment typologies in Istanbul into co-living spaces, four main categories—visions and values, organization, relationships, and physical aspects—were identified to establish both physical and conceptual requirements. Physically, key criteria include preserving load-bearing elements, designing double-sided partition walls, incorporating niches and protrusions between spaces, creating structural furniture, implementing smart, movable systems like Ori Living, treating corridors as public spaces akin to streets, and ensuring privacy is not overlooked. When analyzing how the balance between private, semi-private, and shared spaces can be achieved in co-living arrangements, accurately defining activity-user relationships and programming activities appropriately in social areas were found to be essential.

In terms of supporting sustainability through the transformation into co-living spaces, it was noted that shared spaces (kitchen, WC, bathroom) are reduced in quantity, while the number of living units increases approximately 2.6 times. This approach preserves existing building stock by avoiding damage to structural elements and ensures compliance with earthquake and fire regulations, contributing to sustainability. Regarding innovative technologies for achieving spatial flexibility, it is suggested that robotic furniture systems designed to improve the experiences of individuals living in small spaces can be utilized.

5. Conclusions

The study examines the design parameters that need to be considered in the transformation of typical apartment typologies in Istanbul into co-living spaces and the spatial, social, and sustainability benefits of this transformation. This approach not only improves spatial efficiency but also fosters a sense of belonging and shared responsibility among residents. The findings reveal that co-living spaces not only involve the physical reorganization of space but also offer an approach aimed at improving users' quality of life, strengthening social bonds, and optimizing resource utilization. In particular, innovative design strategies such as preserving load-bearing elements, designing multifunctional partition walls, and integrating smart furniture systems provide spatial flexibility and efficiency. In this context, the balanced design of private, semi-private, and communal (shared) spaces enables the protection of individual privacy while also fostering a sense of belonging. This approach provides flexibility that accommodates various age groups and living scenarios. The transformation into co-living spaces also offers significant advantages in terms of sustainability. Increasing the number of living units and efficiently utilizing shared spaces ensures the effective use of space, while preserving the existing building stock reduces environmental impact. Furthermore, transformations carried out in compliance with earthquake and fire regulations play an active role in ensuring structural safety and sustainability. The designed common areas increase interaction between individuals, strengthen social bonds, and contribute to the formation of shared values. This reduces feelings of loneliness and fosters a sense of community by promoting a culture of co-living. Spaces designed with a balance of privacy and shared use make it easier for users to form an emotional connection with the space, encouraging them to take ownership of their living areas and develop a sense of belonging. In further studies, how the asymmetry criterion can provide more suitable solutions in different designs should be evaluated, even though symmetrical housing blocks have been examined within the scope of this study. Evaluating different design typologies will enhance the flexibility and inclusiveness of the model. Similarly, how users adapt to such spaces and contribute to the potential for community building can be examined in depth. It is believed that conducting qualitative research on the social impacts of the model and its potential for community building will be of great importance in clarifying the physical design criteria of the model. The role of smart systems in improving user experience and contributing to sustainability can also be explored. The potential of Co-living models to offer solutions in urban transformation projects or areas experiencing economic crises can be evaluated. By documenting the environmental benefits of the model with more concrete and comparative data, comprehensive guidelines can be prepared to increase its applicability in different regions. It is also thought that the long-term sustainability and environmental impacts of Co-living spaces can be assessed.

In conclusion, the design and transformation of co-living spaces facilitate the re-evaluation of traditional apartment typologies in line with current urban dynamics. In this context, this study highlights the potential and applicability of the co-living concept in metropolises like Istanbul, providing a framework that can guide future design practices. It is believed that the results of the study will contribute to the restructuring of symmetrical housing blocks based on the co-living concept and raise awareness for the sustainability of future housing and living spaces.

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INVESTIGATING THE ANALOGIC ASPECTS IN VERNACULAR ARCHITECTURAL HERITAGE: CASES OF TURKIYE (THE EASTERN BLACK SEA REGION) AND MALAYSIA

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Abstract
Architectural products reflect their creators' culture, worldviews, lifestyles, and environmental adaptations. Though non-professionals' vernacular heritage constitutes a small portion of documented architecture, its significance lies in fulfilling basic human needs like shelter. Using locally available materials and traditional construction techniques, vernacular architecture harmonizes with its surroundings. Rural communities have developed solutions to handle climatic conditions and topography challenges. This study investigates the vernacular architectural solutions of two geographically distant but climatically similar regions: Türkiye's Eastern Black Sea Region and Malaysia. The goal is to understand whether these communities adopt comparable solutions to the shared environmental pressures through their built environment practices. A literature review, field observations, and case studies (from both regions) are all part of the methodology used in this paper. The study identifies key patterns and variations by analyzing the material usage, structural considerations, and spatial organization of vernacular housing. The Eastern Black Sea Region, characterized by its mountainous landscape, forests, and high humidity level, has developed a vernacular architectural style incorporating wooden structures, stilt foundations, and steeply pitched roofs. Similarly, Malaysian vernacular dwellings used bamboo, thatch, and timber as materials and raised structures on stilts to improve ventilation and reduce the flooding risk in response to the tropical monsoon climate. Despite the differences in cultural contexts, the study reveals similarities in the adaptation strategies employed by these two regions, emphasizing the universal nature of climate-responsive architectural solutions. The results show that integrating natural materials, passive cooling techniques, and raised foundations are fundamental principles that transcend geographical boundaries. This research contributes to the broader discourse on sustainable and resilient architectural practices by demonstrating the continued relevance of vernacular solutions in contemporary design. As climate change pushes the need for environmentally conscious architecture, the principles observed in vernacular heritage provide valuable inputs for future developments. The findings urge built environment professionals (architects, engineers, construction and project managers, contractors, and more) to integrate vernacular knowledge into today's practices and support a resurgence of interest in traditional building knowledge. This study highlights the importance of preserving and learning from vernacular heritage by bridging the gap between architectural traditions and contemporary sustainability efforts.

Key Words: *Vernacular Architecture; Rural Architectural Heritage; Local Material Use; Black Sea Region Architecture; Malay Architecture*

1. Introduction

Throughout history, the architectural efforts created by societies represent an organized pattern of communication, interaction, space, time, and understanding. These products are intrinsically linked to the images and worldviews of a culture. They reflect the characteristics, lifestyles, behavioral norms, and beliefs of the communities to which they belong. The arrangement of the physical environment constructed by humans parallels the images that exist in their minds, shaped by cultural and social experiences. The rich typology found across societies worldwide illustrates these communities' diverse, evolving worldviews and lifestyles over time.

Although the local architectural heritage (as Rudolfsky defined in ‘Architecture without Architects’) generated by ‘common individuals of the community’ constitutes only a small portion of the 'architectural literature’[15] throughout history, the quantity of the products produced and their significance in the context of basic needs hold much greater importance.

Vernacular architecture is based mainly on housing production. Because the need for shelter and the human desire to resist the adverse conditions of nature have constituted the foundation of architecture, this situation has led humans to seek temporary shelters initially and subsequently to construct permanent structures. From prehistoric times to the present, humans have consistently sought spaces that protect them from the adverse conditions of nature and fulfill various needs. In this pursuit, individuals have put forth architectural works that reflect the materials and technologies of each era and the structure and cultural practices of the societies in which they lived. Humans have organized and transformed their environments according to their needs. At the core of ‘housing’ lies this endeavor of human beings. Examples demonstrate that rural

[15] Architects haven’t created all the landscaped areas and buildings around people. The share of architects in the total number does not exceed 8%. The rest are the results of the building art born in that environment and continue its life [1].

communities, regardless of their location, have learned to live in harmony with nature over extended periods and have developed practical solutions, thereby achieving a distinct architectural culture.

This study compares vernacular architectural culture for the Eastern Black Sea Region's housing and Rumah Malay[16]. It aims to investigate whether the architectural heritage of two rural communities living in similar climatic conditions exhibits similarities despite being located at a considerable distance from each other. Additionally, it examines whether these communities have developed comparable solutions to the challenges posed by climatic conditions using similar building materials.

The paper consists of five sections. The introduction begins with a brief background on the topic, vernacular architecture, the importance of 'housing,' the relationships between architectural cultures in distant geographies, and the goals and objectives of the study. The second section is the methodology. The third section focuses on vernacularity**,** architectural heritage, and what the vernacular architectural experience can teach us. In the fourth section, the architectural characteristics of the two regions that are the subject of this study are examined under the headings: material usage (the materials used on buildings and landscape), structural considerations (the details of connections, how vertical and horizontal surfaces are formed, the similarities and differences in the dimensions of structural elements), and space use (the dimensions, proportions, and functions of spaces regarding the building section). A comparison is performed between these two regions within this context. As a result of the comparison, an attempt is made to present the similarities and differences between the two areas regarding local architectural features. The fifth section concludes the issues under investigation.

2. Methodology

This study employs a qualitative comparative research methodology to examine the vernacular architecture of Türkiye's Eastern Black Sea Region and Malaysia. The research is structured around three key dimensions: material usage, structural considerations, and spatial organization. The methodology integrates multiple approaches, including literature review, field observations, and case study analysis, to comprehensively evaluate architectural similarities and differences.

Literature Review: The study begins with a review of previous research on vernacular architecture. This provides a theoretical foundation for understanding the environmental, cultural, and socio-economic factors influencing architectural developments.

Field Observations: The authors had a chance to make site visits to Malaysia in April 2024 under the Erasmus+ KA171 mobility. They have also visited the Eastern Black Sea region before. Site visits and visual documentation of selected vernacular structures in both areas offer insights into material applications, construction techniques, and spatial arrangements. These observations are complemented by photographic evidence and schematic diagrams to illustrate key architectural features.

Comparative Case Study Analysis and Synthesis: Representative case studies of traditional Black Sea and Malay houses are analyzed regarding material use, structural considerations, and spatial use and composition. The findings from literature reviews and field observations are synthesized into a comparative framework, highlighting key similarities and differences.

By utilizing this methodology, the research provides an in-depth understanding of how two distant communities have independently developed climate-responsive architectural solutions. The study's conclusions contribute to the ongoing dialogue on sustainable and culturally informed architectural practices, reinforcing the relevance of vernacular principles in contemporary design challenges.

3. What is Vernacularity, and What Could Vernacular Architectural Experience Teach Us?

Humans have been endeavoring to produce shelters against the harsh conditions of nature throughout their existence. The need for shelter has been one of the most fundamental issues for humankind. In the earliest periods, this need was initially supplied by temporary solutions provided by nature's ready-made products, such as caves, hollows, and dens. The transition to agriculture during the Neolithic period radically altered human lifestyles. With this 'life change,' the first housing manufacturing activities were initiated, resulting in structures that were simple dwellings and storage facilities. Humanity has organized and modified its environment according to its needs. According to Vitruvius [3], the origins of homes lie in humankind's imitation of nature and animals. Marc-Antoine Laugier's An Essay on Architecture (1755) describes the theory of architecture's origins in shelter, particularly in chapter one, The General Principles of Architecture. Laugier presents the theory of the primitive hut in this chapter and claims that the main principles of architecture originate from the essential need for a house [4]. Consequently, it can be stated that the origin of architecture lies in 'housing'[17]. This architecture, where

[16] Rumah means 'house' in the Malay language [2]. 'Rumah Malay' is Malay houses, which are cornerstones for Malay vernacular architectural heritage.

[17] There are proverbs about the importance of 'house' in social life in the cultures of the two regions examined within the scope of this study. Can you guess which culture these proverbs belong to? 'Issız eve it buyruk' and 'Rumah tak berpenghuni, jadi tumpangan hantu'. Respectively, the meaning of the first one which belongs to Turkish culture is 'Deserted house is ruled

functional concerns and rational solutions are more important than aesthetics and luxury, covers structures devoid of monumentality, such as houses, barns, haystacks, fountains, wells, mills, and places of worship. These buildings are in harmony with the climate, geography, and nature where they are located [5]. They are characterized as structures embodying their surroundings' sociocultural and physical traits, created by local masters, and reflect thousands of years of tradition and knowledge [1].

The aesthetic quality of buildings has not been determined separately for each structure. Aesthetics derives from traditions and is transmitted from generation to generation along with the building's technology. As a result of this process, the emerging structures are generally like one another. This resemblance and proximity in scale create coherence and harmony among buildings. All of these persist through generations as that society's social and cultural records. As a result, regional architectural values emerge [1].

The criteria for any architectural work included in this architectural category are not its name, type, size, or physical location. The requirements are the philosophical thought that governs the process of producing that work and the worldview of its creators. Due to the use of natural materials that are readily available in the immediate environment (wood in forest areas, stone in volcanic regions, mud in steppes) instead of artificial, industry-based materials, the resulting products are also in harmony with the nature and climate in which they are situated [5].

Vernacular architecture demonstrates remarkably high performance levels, even when compared to the backdrop of modern technology. It provides precise and detailed information regarding the performance characteristics of local building materials and regional climate data.

It is only now being realized that many 'primitive' solutions existed even before modern technology. Prefabrication, standardization of building components, flexible and movable parts, and mainly features like elevating devices, underfloor heating, ventilation, and light control, and many such innovations considered recent have long been present in vernacular architecture [6].

The users of vernacular buildings have evaluated the opportunities offered by the regions they inhabit remarkably well through the experience accumulated over many years and the resulting traditions. Vernacular craftsmen and builders have become experts in the use of local materials. The anonymous builders who constructed vernacular structures demonstrated incredible skills in situating their buildings within the natural environment.

Rather than considering nature as an obstacle to be 'subdued' as modern technology does today, these builders adapted their lifestyles to all climatic conditions and topographic challenges nature presents. They utilized the natural resources and materials provided by the geography efficiently, creating their physical environments with locally available materials found in their natural surroundings. In doing so, they evaluated the region's climatic data remarkably well. These builders became experts in protecting against the harmful effects of nature, attempting to prevent heat loss by using local materials and sheltering within nature.

There are numerous examples related to this in various regions of the world. A way to enhance the thermal retention of housing is to utilize the ground, which possesses nearly infinite thermal mass. Housing can be constructed underground, as exemplified by the ancient underground city in Cappadocia in Türkiye, Matmata in the Sahara, Shanxi known as “Yao Dong" in the northern Chinese province, Petra historical city with subsurface structure in Jordan, and Edinburgh Vaults of Scotland. Since each space is located beneath the soil, which theoretically possesses infinite thermal mass, these homes can be significantly cooler than anything that can be constructed on the surface [7].

Other climate-related factors include humidity and wind. High and low humidity levels are related to temperature, as temperature and humidity affect comfort conditions. In high humidity, ventilation facilitates heat loss from the building mass. Conversely, in low humidity conditions, efforts are made to increase moisture levels through water features and vegetation. Wind is also directly related to temperature. Wind speed, humidity, and temperature directly influence comfort conditions. Undesirable winds can be problematic in extremely cold and dry weather, whereas in humid and warm conditions, they are often necessary. The anonymous masters of vernacular architecture have also produced eligible solutions in this regard.

Eskimo igloos, used by the Inuit in extreme cold in northern Canada, are a famous example of vernacular architecture. Igloos are typically constructed in areas experiencing icy winds, particularly during winter. Their hemispherical shape proves highly effective in resisting harsh environmental conditions. Eskimos generally build their dwellings in the most sheltered terrain, often oriented toward their primary food source, the sea. The entrances to igloos are designed to block wind infiltration; living space is created one step higher up in the main chamber. A ventilation hole is drilled in the top of the dome wall to enhance the indoor air quality; it is only opened when stale air needs to be expelled. A single entrance unit often serves multiple dwelling units, interconnected through internal corridors leading to the main entrance. This configuration provides a more efficient solution to combat strong winds and heat loss [8, 9].

The significance of vernacular architecture, which emphasizes meeting human needs in the simplest way using local

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by the dogs’, and the meaning of the second one which belongs to Malay culture is ‘The empty house is a host of ghosts.’ These proverbs, which have almost the same meaning, show the core position of the house in social life in both cultures.

materials and nature's resources, has grown even more in contemporary times. The structural solutions vernacular buildings offer to withstand harsh natural conditions and their performance -achieved in their time but only reached today with advanced technology- are remarkable. This architectural heritage guides today's architectural practices and products due to its harmony with nature and its users, its adaptability rather than struggle against natural conditions, and its construction process using local materials from the surrounding geography. Within the context of the examples analyzed and topics discussed in this study, the accumulated knowledge of vernacular architecture can be evaluated under the following headings:

Material Use: This heading encompasses the diversity of materials used in the main structures, auxiliary buildings, and landscapes, as well as considerations regarding where these materials are utilized within the structures.

Structural Considerations: This heading addresses topics such as connection details, the construction of vertical and horizontal surfaces, similarities and differences in the dimensions of structural elements, the presence of any standardization in these dimensions, and, if present, how such standardization influences the growth and reproduction of the structures.

Spatial Use and Composition: This heading covers aspects related to the overall form and shaping of the structure, mass dimensions and proportions, how volumes are utilized, and the horizontal and vertical dimensions and proportions of spaces.

In the following section of this study, two regions located distantly on the world map but possessing a strong vernacular architectural memory and tradition will be compared within the framework of the headings outlined in this section.

4. A Comparison of Vernacular Heritage of the Eastern Black Sea Region and Malay Architecture

The vernacular architecture of the Eastern Black Sea region in Türkiye has been shaped by the region’s mountainous terrain, dense forests, and high levels of rainfall. In Malaysia, vernacular architecture adapts to the hot, humid tropical climate and frequent monsoon rains.

4.1. Material Use

Architecture of Eastern Black Sea Region in Türkiye: The Eastern Black Sea region's vernacular architecture relies heavily on wood due to the abundance of forests. Timber is used for structural and non-structural components, including walls, floors, and roof frames. Local wood varieties' durability and adaptability to the humid climate make them an ideal choice.

Malay Architecture: Timber is the main building material in Malaysia. Other materials like thatch and bamboo are utilized for walls and roofing. These materials offer superior insulation against tropical heat and are lightweight and easily accessible. Using locally grown plant-based products also aids in efficiently controlling excessive humidity levels.

Comparison: Although secondary materials vary, both regions strongly emphasize using timber because it is locally available. Malay architecture uses bamboo and thatch to provide ventilation and cooling, whereas the Black Sea region emphasizes long-lasting, water-resistant wood types. Durability and comfort are ensured by selecting materials and methods that satisfy environmental and functional requirements (Fig.1).

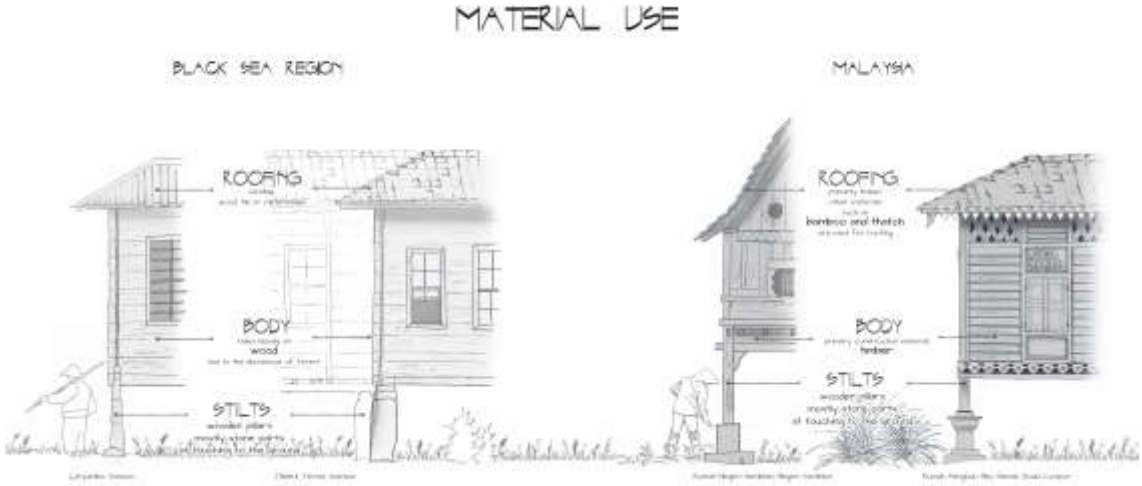

Fig. 1. A comparative diagram showcasing materials (Authors own construct, 2025)

4.2. Structural Considerations

Architecture of Eastern Black Sea Region in Türkiye: In order to prevent flooding and moisture from the damp terrain, houses (particularly in the Çarşamba plain) and storage areas known as Serender were raised on stilts; this improved air circulation is essential in the humid environment of the area. The buildings' sharply pitched roofs are intended to swiftly shed heavy rains. Deep eaves provide ventilation. This additionally helps with rain protection for the walls. Bracing systems and connection details are designed to provide stability on rough, mountainous terrain.

Malay Architecture: Similarly, Malay homes are raised on stilts to encourage ventilation and avoid floods. Deep eaves and ridge ventilation are built into roofs to allow airflow and protect from monsoon rains.

Comparison: Stilt foundations and weather-resistant roof designs are used in both architectural traditions. Stilts are pillars, posts, or poles that raise a building or structure significantly above the ground. Malay buildings maximize ventilation through roof vents and overhangs, while the Black Sea region concentrates on steep roof slopes to accommodate regular rains. Figures 2, 3, and 4 show that both exhibit advanced structural solutions to their distinct climates.

Fig. 2. A comparative diagram showcasing structural consideration: foundations (Authors own construct, 2025)

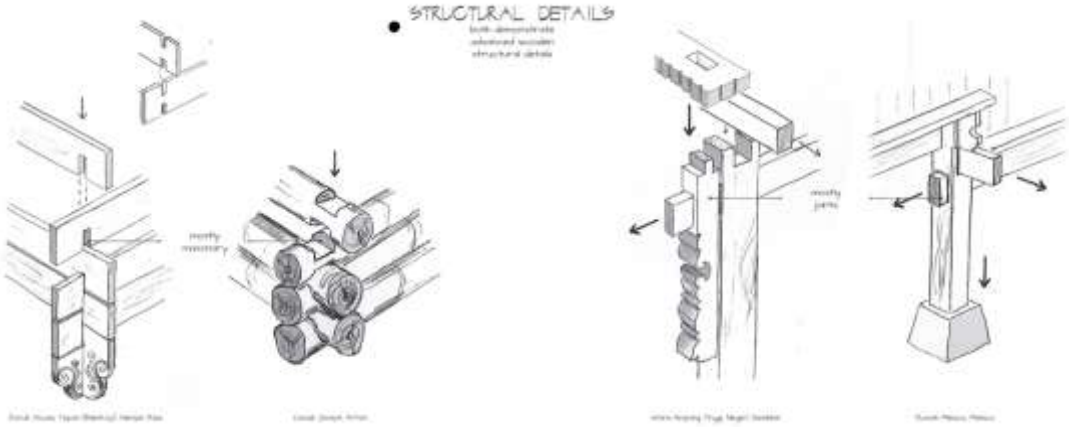

Fig. 3. A comparative diagram showcasing structural consideration: details (Authors own construct, 2025)

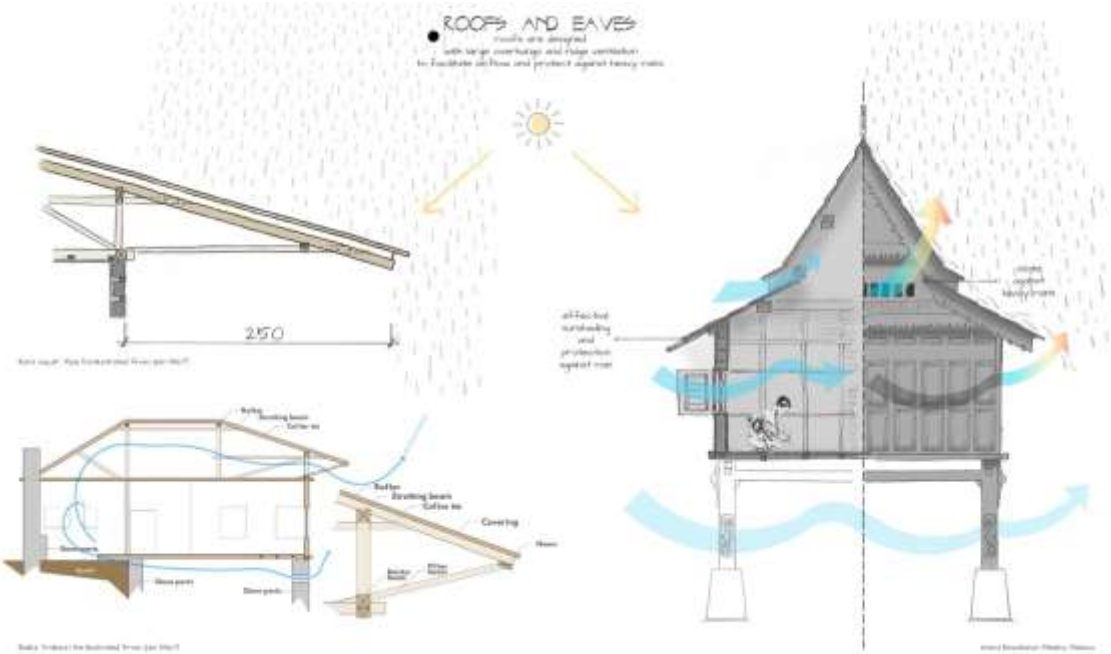

Fig. 4. A comparative diagram showcasing structural consideration: roofs and eaves (on the left: re-illustrated [10]; on the right: Authors own construct, 2025)

4.3. Spatial Use and Composition

Architecture of Eastern Black Sea Region in Türkiye: homes designed with multifunctional spaces that accommodate residential and agricultural purposes. The plan incorporates storage, livestock, and food processing areas. Serender, constructed separately from the primary housing structure, serves as a grain storage facility. Living spaces are designed to be compact and efficient because of the limited availability of flat land.

Malay Architecture: Malay houses prioritize open, semi-outdoor areas to facilitate social interactions and enhance ventilation efficiency. Verandas and communal areas are integral to cultural practices. Private rooms are generally compact and enclosed, embodying cultural values and environmental factors, with strategically placed openings to facilitate airflow and comfort.

Comparison: The spatial organization within these homes reflects the need for a self-sustaining rural lifestyle. Both regions address environmental needs via spatial planning; however, their cultural priorities vary. The Black Sea region incorporates agricultural functions within the home, while Malay houses emphasize open, communal living spaces (Fig. 5).

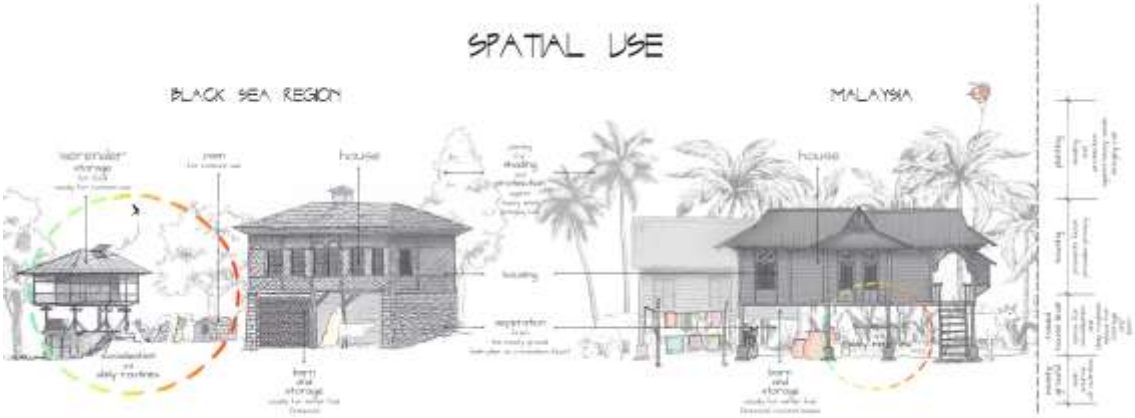

Fig. 5. A comparative diagram showcasing spatial use (Authors own construct, 2025)

5. Conclusion

The comparative analysis of vernacular architecture in Türkiye's Eastern Black Sea region and Malaysia demonstrates the significant relationship between environmental adaptation and cultural expression in rural architecture. Both communities have developed solutions to environmental challenges over centuries, leading to architectural features that enhance resilience, functionality, and sustainability. Both regions utilize locally sourced timber as the main construction material and raise their houses on stilts to reduce moisture and flooding risks. Roof designs in both regions are optimized for heavy rainfall management and thermal comfort conditions, although the specific techniques vary according to climatic differences. Black

Sea residences prioritize steeply pitched roofs to effectively manage rain runoff, whereas Malay residences highlight ventilation through expansive overhangs and gable openings. The aesthetic expressions, while rooted in functional needs, embody each region's cultural identity and artistic traditions. Important insights from these vernacular traditions encompass the effective utilization of local materials, structural modifications in response to climatic conditions, and spatial organization that harmonizes functionality with cultural requirements. These insights are relevant to contemporary architecture, emphasizing sustainable and climate-responsive design. The relationship between constructed environments and their natural surroundings highlights the significance of deriving insights from vernacular heritage. Examining traditional practices inspires contemporary architects and designers to develop resilient and adaptable architectural solutions that honor local contexts and resources.

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MEMORIALS OF PANDEMICS: PLACES OF GRATITUDE AND REMEMBRANCE FOR HEALTHCARE WORKERS OF COVID-19

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Abstract

Throughout history, memorials have been constructed to sustain collective memory, interpret the impacts of past traumatic events, and convey lessons to future generations. Global health crises, such as pandemics, have profoundly influenced not only social life but also cultural expressions of memory through commemorative spaces. The COVID-19 pandemic has inspired numerous initiatives worldwide, including in Türkiye, aimed at honoring the sacrifices of healthcare workers. Within this context, the growing recognition of commemorative spaces as essential tools for fostering social solidarity and preserving the pandemic's legacy through collective memory has been notable. This study focuses on the "Competition for Gratitude and Memorial Space for Healthcare Workers" organized by the Ankara Metropolitan Municipality, examining its process comprehensively. The primary aim is to evaluate the contributions of the competition, which was initiated to commemorate and honor the sacrifices of healthcare workers who lost their lives during the COVID-19 pandemic, to the sustainability of social memory. The study analyzes the general design principles of the competition's first-selected project based on competition documents and jury evaluations. The spatial design, symbolic meanings, and challenges encountered during the implementation process of the project are discussed in detail. Furthermore, the study provides a perspective on the significance of such competitions within the field of architecture. A qualitative research approach was employed, with the case study method serving as the methodological framework. The research involved a literature review, analysis of jury reports, and evaluation of the architectural components of the first-selected project. Competition documents, both printed and digital, were reviewed, and the analysis was enriched by personal observations and experiences. Additionally, the reasons for the project's failure to be realized, are examined. The findings of the study highlight the difficulties associated with the design and implementation of commemorative spaces in Türkiye, offering valuable insights into the influence of such competitions on architectural practice and collective memory. The study emphasizes the critical role of architecture in memorializing global crises like the COVID-19 pandemic, providing a framework for understanding its societal implications. Ultimately, this research aims to guide the development and realization of similar projects in the future.
Key Words: *COVID-19, Pandemics, Memorials, Collective Memory, Architectural Competitions.*

1. Introduction

Global pandemics have been significant biological phenomena throughout human history, shaping critical physical and social turning points. Humanity has faced numerous pandemics, such as the plague, cholera, and Spanish flu, resulting in the loss of millions of lives [1-2]. The COVID-19 pandemic, marking the 21st century as one of the most severe global health crises, has similarly left an indelible imprint on human history [3]. This pandemic was not merely a health crisis but a transformative period during which social norms were redefined, individual and collective lifestyles underwent significant changes, and human existence was profoundly impacted [4]. COVID-19, which claimed millions of lives globally, has reshaped human life while simultaneously exposing both the vulnerabilities and resilience of humanity. Amid the pandemic, healthcare systems, economic structures, and social frameworks were rigorously tested, while healthcare workers stood on the frontlines, risking their lives to safeguard public health. With unparalleled courage, these workers exemplified extraordinary sacrifice, becoming central figures in humanity's fight against the pandemic [5-6]. Their efforts sparked a global wave of gratitude and recognition.

As with other transformative events in history, pandemics occupy a central place in social memory [4-7]. Architecture has historically served as a potent medium for ensuring that collective memory is preserved and transmitted to future generations. Sites of memory, representing the losses, pain, victories, and acts of heroism from the past, foster social solidarity while conveying hope for the future. These spaces allow individuals and societies to confront the past, facilitating the transformation of trauma into collective memory. Memorials, beyond being mere physical constructs, establish cultural and emotional connections through symbolic meanings and spatial narratives. They serve as places for mourning and healing, simultaneously promoting solidarity and unity. Across the globe, memorials have been constructed to commemorate pandemics that have left profound social impacts. In the context of COVID-19, memorial spaces dedicated to healthcare workers, the pandemic's heroes, as well as those who lost their lives, have emerged as universal symbols of sacrifice and resilience. These memorials aim to honor the critical role and sacrifices of healthcare workers, ensuring their contributions remain ingrained in social memory through permanent and tangible forms. Such spaces not only commemorate the past but also embody social unity, acting as guides for future crises.

In the architectural literature, extensive studies on memorials and monuments exist at both national and international levels [8-9-10-11-12]. While many of these works address memorial spaces for pandemics [13-14], research on COVID-19-related memorials remains relatively scarce due to their recent conceptualization and realization. This gap in the literature forms the primary motivation for this study.

This research examines memorials designed to honor healthcare workers in the aftermath of the COVID-19 pandemic, with a particular focus on an example from Türkiye. The study analyzes the "Architectural Project Competition for Gratitude and Memorial Space for Healthcare Workers," organized by the Ankara Metropolitan Municipality in 2021, and evaluates the first-prize-winning project, which ultimately remained unrealized. This project serves as a compelling contemporary example, not only due to its aesthetic architectural design but also for its strong narrative of gratitude towards healthcare workers and its emphasis on social solidarity. By discussing the architectural and symbolic values of memorial spaces, as well as their socio-cultural functions within the framework of the competition, this study aims to contribute a new perspective to the limited national architectural discourse on COVID-19 pandemic memorials.

2. Pandemics and the Places of Remembrance in History

The concepts of pandemic and epidemic are crucial for understanding global health crises. Epidemics refer to outbreaks of infectious diseases occurring within a specific region over a short period, affecting a higher-than-normal number of people. In contrast, pandemics are outbreaks that transcend geographical boundaries, spreading globally and impacting significantly larger populations [15]. These phenomena have profoundly influenced societies throughout history, shaping health systems, social structures, and cultural memory. Beyond their immediate health implications, pandemics have left enduring marks on collective memory, prompting the creation of physical and symbolic spaces that commemorate losses, foster solidarity, and serve as educational sites for future generations.

Throughout history, pandemics have occupied a significant place in societal memory, with monuments and structures constructed to preserve this legacy. The 14th-century Black Plague, which devastated Europe, serves as a pivotal example [16]. During this period, murals in churches, mass graves, and stone reliefs were utilized to reflect the epidemic's catastrophic effects. Additionally, small chapels constructed across Europe to honor plague victims functioned as sacred spaces of worship and remembrance [17].

Commemorative practices during the Black Plague also included religious ceremonies and rituals, which symbolized communities' struggles against the epidemic. These practices not only allowed societies to mourn their losses but also reinforced collective solidarity. One of the most striking monuments from this period is the Plague Column (Pestsäule) in Vienna, commissioned by the Habsburg dynasty. This monument represents both a gesture of religious gratitude and a symbol of social resilience. The Plague Memorial in Prague, an exemplary piece of baroque architecture, immortalizes the plague's legacy through art and design [14] (Fig. 1.). The eerie atmosphere created by the Black Plague also inspired numerous artistic works of the time, further embedding the epidemic in cultural memory.

Fig 1. Completed in 1694, the Vienna Plague Column (Pestsäule) is considered the first work of the High Baroque period [18-19]

The 19th-century cholera epidemics marked a turning point in public health and urban planning, prompting significant reforms [20]. Monuments and water systems constructed during this period not only commemorated the losses but also symbolized resilience and progress in combating health crises. The John Snow Fountain in London represents a milestone in epidemiology, as it commemorates the discovery of cholera's transmission through contaminated water John Snow's groundbreaking work laid the foundation for modern public health practices, and the fountain stands as a tribute to his contributions [21-22]. At the dawn of the 20th century, the Spanish Flu pandemic claimed millions of lives, leading to the establishment of local memorials that honored victims and symbolized the resilience of healthcare workers and communities [23-24] (Fig. 2.). These memorials captured the emotional and cultural dimensions of the pandemic, offering spaces for reflection and solidarity.

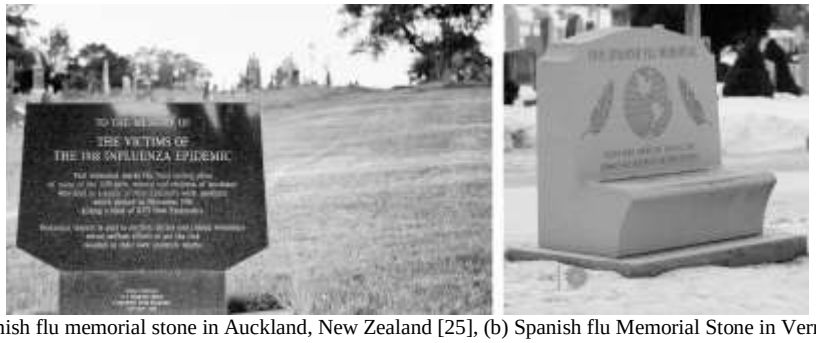

Fig. 2. Spanish flu memorial stone in Auckland, New Zealand [25], (b) Spanish flu Memorial Stone in Vermont, USA [26]

Throughout history, pandemics have tested societal resilience while inspiring architectural and symbolic expressions that preserve collective memory. Monuments and memorials constructed in response to these crises serve not only as reminders of loss but also as symbols of social solidarity and hope. The legacies of past pandemics provide valuable insights into the modern world's capacity to address global health crises and commemorate their impacts. The COVID-19 pandemic, as the most recent and transformative example, has necessitated a reinterpretation of memory spaces to reflect its global significance.

3. Methodology

This study examines the design approach of the project that won the *"Architectural Project Competition for Gratitude and Memorial Space for Healthcare Workers"* organized by the Ankara Metropolitan Municipality. Furthermore, it critically analyzes the inability to realize the project, despite it being awarded a significant budget by the municipality with the intention of construction. The research was conducted using a qualitative research approach. The primary aim of this study is to comprehensively evaluate the general context of the competition, the design principles of the winning project, and the significance of such memorial spaces in ensuring the sustainability of collective memory.

The research was structured within the framework of the case study method, which provided a suitable approach for an in-depth examination of the competition process and outcomes, as well as a detailed assessment of the winning project's design. The study employed various data collection techniques, including a literature review, analysis of competition documents and jury reports, project analysis, and insights derived from individual observations and experiences. During the research process, data related to the winning project and the challenges preventing its implementation were interpreted within the theoretical framework of the sustainability of collective memory. By adopting this holistic approach, the study not only explores the architectural and societal implications of the competition but also sheds light on the broader challenges in materializing memorial spaces of this nature.

4. COVID-19 Pandemic: Places of Gratitude and Remembrance for Healthcare Workers

Healthcare workers played a pivotal role during the COVID-19 pandemic, enduring physical and emotional strain while safeguarding public health. Thousands lost their lives, highlighting the risks they faced. Global efforts, including public applause campaigns and the construction of monuments, sought to recognize their contributions.

One of Türkiye's major initiatives was the "*Architectural Project Competition for Gratitude and Memorial Space for Healthcare Workers"* organized by the Ankara Metropolitan Municipality in 2021. The competition aimed to honor healthcare workers while integrating the memorial into Ankara's urban fabric. The selected site, *Sıhhiye*, has historically been a center for healthcare institutions, reinforcing the memorial's significance within the city's identity. The competition sought innovative and symbolic design solutions, emphasizing public engagement, fine arts, and interdisciplinary collaboration [27]. Despite strong conceptual designs, administrative challenges and conflicting municipal policies prevented the winning project from being realized.

4.1. History of the competition site

Sıhhiye, historically significant for its health-related institutions, was chosen as the site for the *Healthcare Workers' Gratitude and Memorial Space Competition*. The district's healthcare development began in 1926 with the Ministry of Health and Social Welfare, designed by Austrian architect Theodor Jost [28]. Over time, hospitals such as Yüksek İhtisas, Hacettepe, and Ibni Sina further shaped Sıhhiye's identity as a medical hub. Despite the decline in healthcare prominence, Sıhhiye remains a key urban center with extensive public transport links. The competition site, surrounded by landmarks like the Hıfzıssıhha buildings and Abdi Ipekçi and Kurtuluş Parks, aimed to blend open spaces and green areas into a commemorative space, honoring healthcare workers' sacrifices during COVID-19 (Fig. 3.).

Fig. 3. Competition design and impact areas [29]

4.2. Aim and scope of the competition

Healthcare workers played a crucial role in combating COVID-19, facing high infection risks while tirelessly safeguarding public health. Many lost their lives, highlighting the need to honor their sacrifices. To express gratitude and commemorate these efforts, the *Healthcare Workers' Gratitude and Memorial Space Competition* was launched by the Ankara Metropolitan Municipality in 2021. The competition aimed to generate innovative, contemporary design solutions that integrate fine arts and urban planning while reinforcing professional ethics. Open to multiple disciplines, it adhered to Türkiye's architectural competition regulations as a free, national, single-stage contest. Initially announced on February 17, 2021, the project submission deadline was extended to June 7 due to pandemic conditions, and results were publicly shared on June 23, 2021 [28].

4.3. Architectural Project Competition for Gratitude and Memorial Space for Healthcare Workers

The organization of the competition under pandemic conditions necessitated a revision of the project submission deadline, which was postponed to June 7, 2021. The jury evaluation process commenced on June 19, 2021, and the results were publicly announced on June 23, 2021 [28].

This study examines the design concept of the project that was awarded first place in the competition, along with the stages of its development. The jury's evaluations and comments are analyzed in detail to provide insight into the project's selection. Furthermore, the study emphasizes the reasons behind the project's eventual failure to be realized, despite the competition's original intent to construct the winning design.

• *Idea and design stages of the project*

The project area serves as the green core of Sıhhiye, characterized by the lush landscapes of Abdi Ipekçi Park and Kurtuluş Park, as well as the Incesu Stream, which, although partially covered in the 1970s, remains a significant ecological feature. However, the presence of the Sıhhiye Bazaar, situated within the green corridor along the stream, disrupts the spatial continuity of this natural landscape. The proposed project aims to introduce an urban rehabilitation initiative in Ankara—recognized as the birthplace of modern urban planning in Türkiye—through the creation of a memorial space dedicated to healthcare workers.

The Incesu Stream, a defining natural element of Sıhhiye, has been rediscovered and reintegrated into the design as a central unifying feature (Fig. 4.). The proposal seeks to reorganize the market area and the memorial space in alignment with the stream's trajectory. The memorial space, structured around the memorial wall and the stream bed, not only restores green spaces to support urban regeneration but also introduces a multi-layered design that allows the existing marketplace function to be adapted and diversified (Fig. 5.).

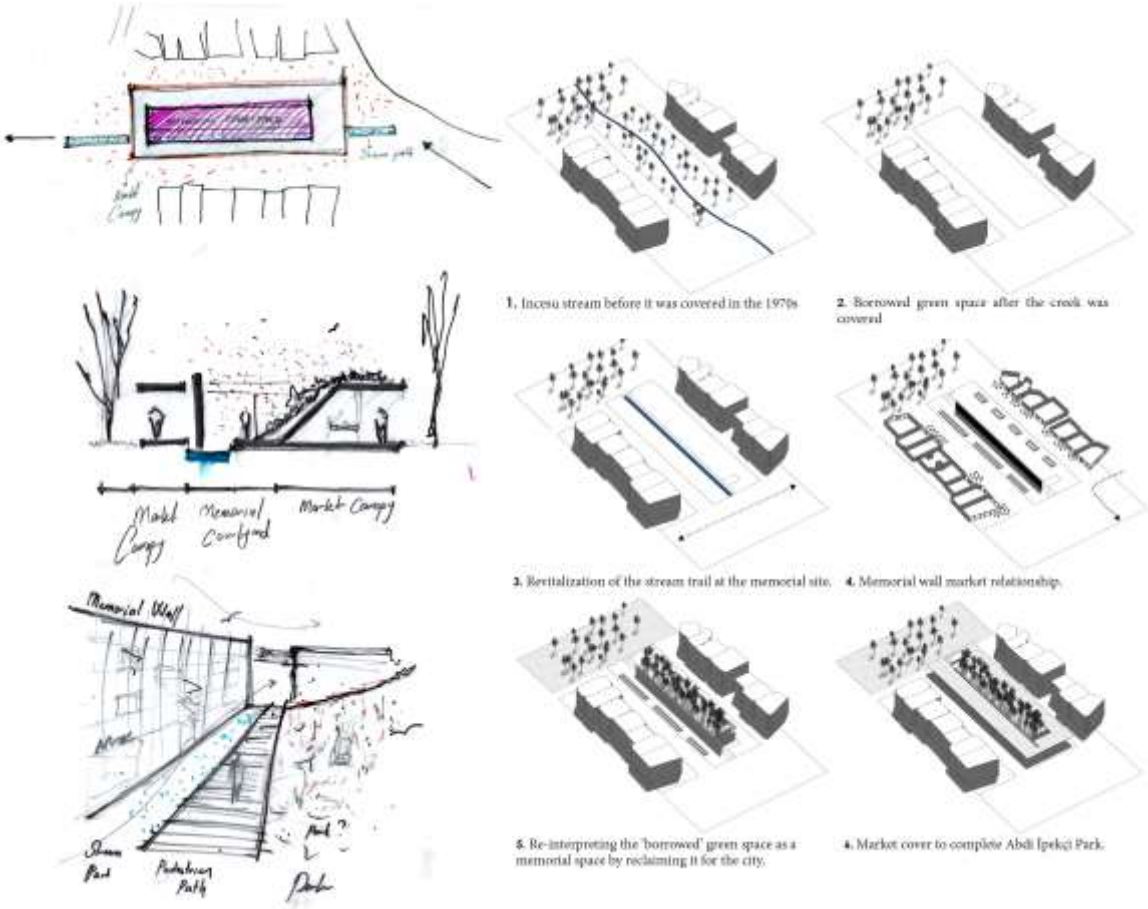

Fig. 4. Development stages of the design ideas – sketches and axonometric perspectives (Archive of Nous Architecture Office)

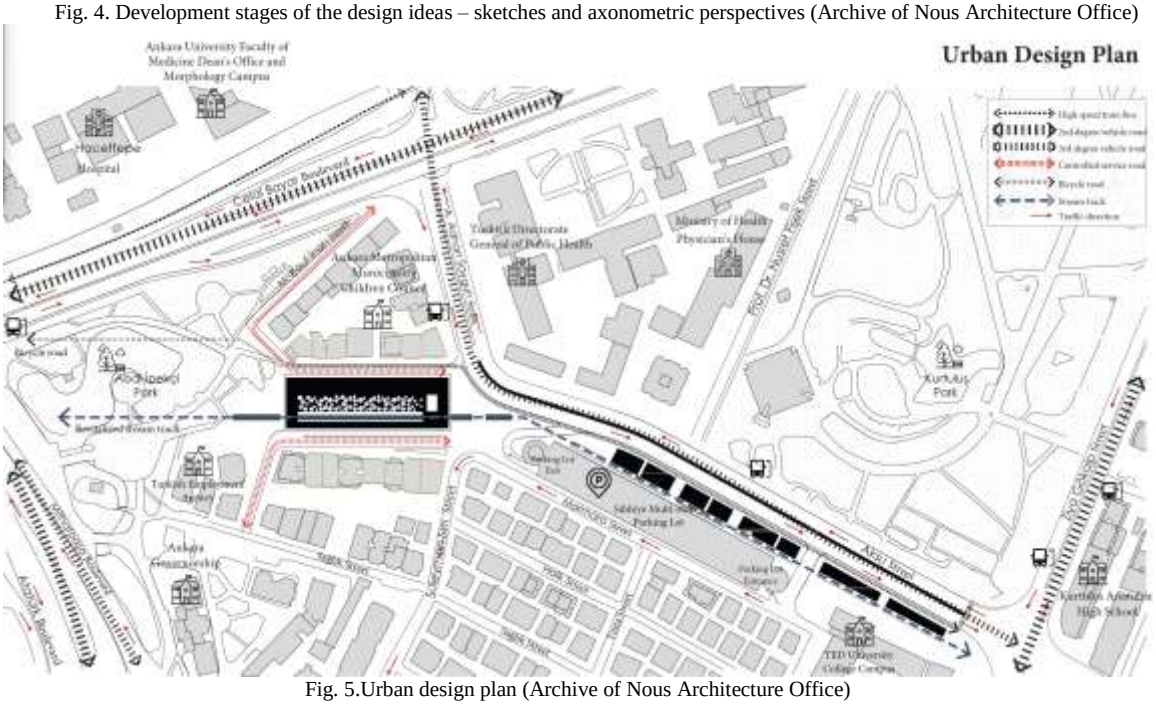

Fig. 5.Urban design plan (Archive of Nous Architecture Office)

Healthcare workers have historically been at the forefront of crises that deeply impact societies, including pandemics and wars. This project envisions the creation of a commemorative wall to express gratitude for fallen healthcare workers and to serve as a space for collective remembrance. The design of the memorial wall follows a chronological sequence, incorporating three distinct thematic sections. The first section of the wall honors healthcare workers who have lost their lives throughout history, ensuring that their sacrifices remain in public memory. The central section functions as a "*Wall of Remembrance and*

Gratitude", emphasizing the social consciousness that emerged during the COVID-19 pandemic and providing a space to inscribe the names of deceased healthcare professionals. The final section gradually transitions into a transparent structure that merges with the green landscape of Abdi Ipekçi Park. This transformation symbolizes both the ongoing struggles of healthcare workers in safeguarding humanity and the profound void left by their loss. The gradual integration of the memorial wall with the natural environment reinforces its conceptual depth, creating a reflective and contemplative space within the urban fabric.

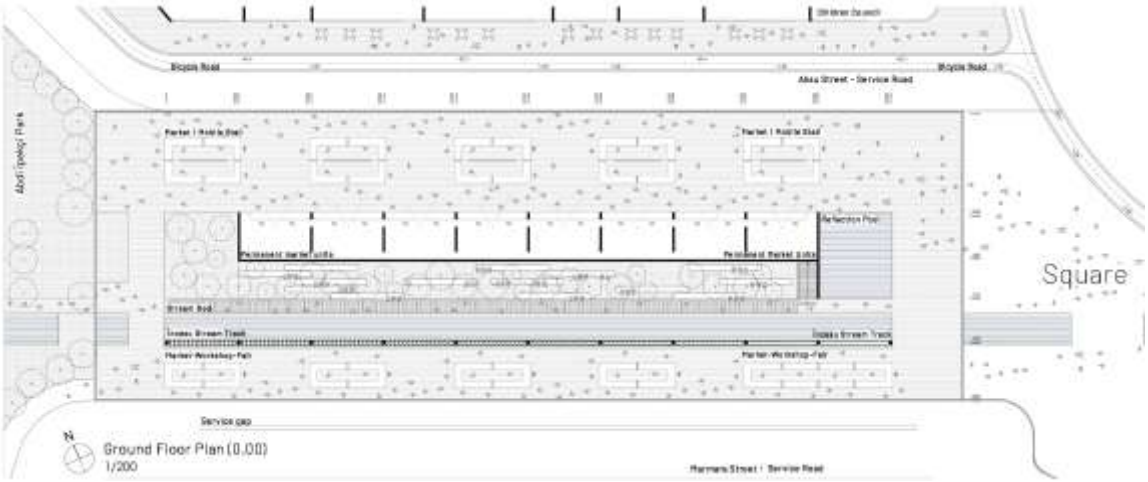

Fig. 6. Ground floor plan (Archive of Nous Architecture Office)

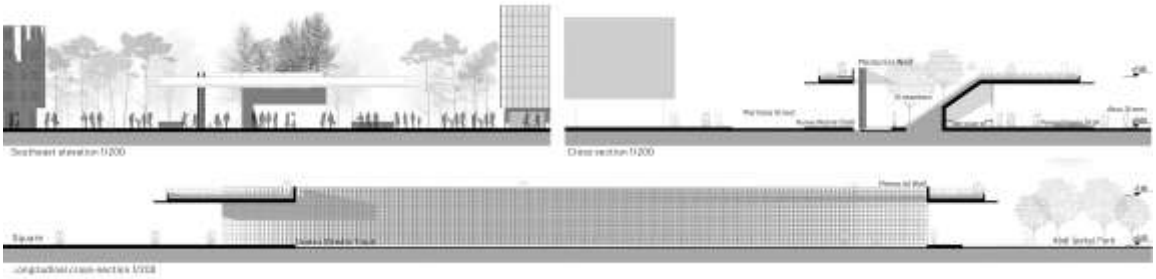

Fig. 7. Sections and southeast elevation (Archive of Nous Architecture Office)

Fig. 8. 3D visuals of urban design (Archive of Nous Architecture Office)

• *Jury's evaluation of the project*

The jury panel for the competition comprised experts from diverse fields, bringing a wide range of perspectives to the evaluation process. The main jury members included architects from academia and the private sector, art historians, artists, landscape architects, urban planners, and urban designers. The advisory jury featured politicians such as the Mayor of the Ankara Metropolitan Municipality and the Head of the Department of Cultural and Natural Heritage of the municipality, alongside a physician, sociologist, art historian, sculptor, and architect [28]

The jury conducted its evaluations in three rounds, reviewing a total of 75 project submissions. Six projects were ultimately selected, comprising three prize winners and three honorable mentions. The third-prize project was praised for its conceptual discussion, particularly its integration of the commemoration space with the marketplace. However, it was criticized for its fragmented structure, lack of a holistic approach to landscape decisions, and failure to establish the anticipated continuity between Abdi Ipekçi Park and Kurtuluş Park. These shortcomings were seen as detrimental to the spatial coherence and sustainability of the proposal [29].

The second-prize project was commended for its interpretation of the theme through the relationship between humans and nature, creating a serene and effective memorial space with a simple architectural language. Key strengths included the separation of the marketplace's chaos from the tranquility of the memorial space, the monumentalization of the landscape, and the thoughtful selection of plants consistent with the competition's theme. However, the jury noted weaknesses, such as the inadequate exploration of the green surface as a structural element, the lack of emphasis on the remembrance function of the proposed “White Garden,” and the insufficient pedestrian connection to Kurtuluş Park [29].

Fig. 9. (a) The second prize-winning project [30], (b) The third prize-winning project [31]

The first-prize project was highly appreciated for its innovative use of Incesu Stream as a defining element in the spatial organization and its conceptualization of a "Wall of Remembrance." The project transcended the idea of a singular monumental object by creating a three-dimensional commemorative environment. The centrality of the remembrance theme, expressed through strong spatial metaphors, and the permeability of the "Wall of Remembrance" were particularly lauded. The wall facilitated continuous interaction between the memorial space and urban life while symbolizing unity through multiplicity. Additionally, the coexistence of memorial and market functions under a shared "roof" without disrupting each other was considered a significant achievement. The selection of plants consistent with the competition's theme further enhanced the project's environmental sustainability. However, the jury noted certain weaknesses in the first-prize project, including the lack of continuity between Abdi Ipekçi Park and Kurtuluş Park, the heavy appearance of the horizontal surface on the upper level, and the problematic relationship between the marketplace along Marmara Street and the Memorial Wall. While the green roof proposal was positively received, its active use remained a point of contention [29]. Despite these issues, the project stood out as the most successful among the submissions and was awarded the first prize by a majority vote.

- *Process of "not" construction*

After the competition concluded and the implementation project was completed, the Ankara Metropolitan Municipality engaged with the winning design team. However, Çankaya Municipality proposed removing the market area to create an exclusive memorial park, prompting design revisions. Despite adjustments and the preparation of implementation documents, attempts to relocate market vendors failed, leading to project suspension. The original brief required integrating the market and memorial, but Çankaya Municipality's later demand for market removal met resistance. Due to conflicting municipal decisions and public opposition, the project was indefinitely postponed and remains unrealized.

5. Discussion and Conclusion

This study examines the impact of pandemics on collective memory and the role of memorial spaces dedicated to healthcare workers within this context, offering an assessment of the design, meaning, and feasibility processes of monuments and memory spaces in the post-COVID-19 period. The focus of the study is the *"Place of Gratitude and Remembrance for Healthcare Workers"* architectural competition organized by the Ankara Metropolitan Municipality and the subsequent inability to implement the winning project. The analysis reveals that this process is not merely a matter of an architectural competition but is also directly related to urban governance, public space policies, and the construction of collective memory.

Throughout history, memorial spaces have been regarded not only as physical structures that commemorate losses but also as symbolic sites that foster social solidarity, uphold spatial justice, and contribute to the democratization of public space. Within the context of COVID-19, such monumental structures dedicated to healthcare workers have emerged as significant instruments that highlight societal solidarity in times of crisis, express gratitude towards healthcare professionals, and ensure the sustainability of collective memory. Memorial spaces that reinforce COVID-19's place in collective memory do not merely serve to commemorate individual losses but also function as urban memory sites that strengthen social cohesion and solidarity. However, the realization of such projects involves a complex set of multilayered dynamics encompassing managerial, political, and economic dimensions.

At this point, the failure to implement the winning project in the Ankara competition underscores the need to evaluate architectural design processes not only through aesthetic and symbolic values but also within the framework of administrative, political, and socio-economic dynamics. In particular, the decision change regarding the removal of the marketplace from the competition site highlights a lack of coordination between local government entities and the absence of an effective communication mechanism with stakeholders. This situation demonstrates that memorial spaces are not merely physical structures but are also shaped by social negotiations, urban transformation processes, and governance policies. The competition process examined in this study reveals the extent to which administrative and bureaucratic obstacles can be decisive in the realization of public projects. In particular, political and administrative disputes among different local government entities directly affect the feasibility of translating competition outcomes into a tangible structure.

In the specific case of the project analyzed in this study, it becomes evident how policy differences among various local governments can lead to the failure of a project. Although the project was initially conceived as a design integrating both the memorial space and the marketplace, the request by the Çankaya Municipality for the removal of the marketplace highlights the lack of consensus among local governments and the consequences of excluding the public from the decision-making process. This study demonstrates that memorial spaces dedicated to healthcare workers are not merely structures that commemorate the past but also serve as crucial elements that foster social cohesion and enhance the functionality of public spaces. However, for such projects to be successfully implemented, the following recommendations should be considered:

- *A Transparent and Inclusive Governance Process:* Local governments should ensure the involvement of diverse stakeholders. The feasibility of architectural projects is not solely an administrative decision but a process shaped by social participation and consensus.
- *Strengthening Coordination Among Local Governments:* Collaboration among different municipal units in the areas where memorial spaces are located should be enhanced, and the feasibility of architectural competition outcomes should be ensured from the outset.
- *Ensuring Public Participation:* Competition processes should involve not only academics and designers but also local communities, civil society organizations, and relevant professional bodies.
- *Integrating Urban Memory Spaces into Daily Life:* Memorial spaces should not be limited to structures visited only on specific occasions but should be designed as spaces integrated with public life, encouraging daily use.

In conclusion, this study highlights that memorial spaces are not merely physical structures but also essential spatial elements that sustain collective memory. However, achieving success in such projects requires more than good design; managerial transparency, participatory processes, and collaboration among local government units are integral to the process. Memorial spaces dedicated to healthcare workers should be understood not only as places of remembrance but also as structures that strengthen social solidarity, promote the democratization of memory spaces, and shape urban identity.

Acknowledgements

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AN ARCHITECTURAL LANDMARK IN CENTRAL ASIA THROUGH THE LENS OF SOFT POWER AS A NEW TREND: ‘‘BIBI KHANUM MOSQUE’’

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Abstract
This study analyzes the Bibi Khanum (Khanym, Hanım) Mosque, a significant architectural landmark in Central Asia, by focusing on its architectural characteristics and interior design elements within the framework of a new trend: soft power. Being one of the most outstanding examples of 15th century Islamic architecture, the mosque continues to exist as a cultural heritage that combines traces of the past and the present, shaped not only by its structural features but also by local myths. In this context, this research evaluates the architectural features of the Bibi Khanum Mosque, how it was built and the changes it has undergone over time, while analyzing the cultural codes, material selection and philosophy and the meanings attributed to it in the context of soft power. The study also provides a detailed discussion of the restoration processes of the mosque and its place in architectural history.

Keywords: Islamic Architecture, Architectural Legends, Timurid Architecture, Cultural Heritage

1. Introduction

Bibi Khanum Mosque, a historical monument of significant architectural value, was built in Samarkand under the rule of Timur, the founder and first ruler of the Timurid dynasty. This structure is considered one of the largest mosques of its time. The mosque stands out not only for its architectural style but also for its cultural codes, material selection and philosophical aspects, all of which contribute to its remarkable character and existence. In this context, this study examines the architectural and cultural significance of the historical transformation of Bibi Khanum Mosque, its traditional material selection approach and its philosophical expansion over time in the context of soft power.

The construction of the Bibi Khanum Mosque was started with the spoils obtained from Timur's India campaign between 1399-1404 (Blair & Bloom, 2006; Fodde, 2010; Shishin & Ismail, 2016). The main purpose of designing the structure as a Mashhad mosque and madrasah complex was to immortalize the memory of Timur's victories in the India campaign of 1398-1399. Analysis of historical sources shows that Timur determined the location and started construction in Ramadan 801 (May 1399). However, Saray Melik Khanum managed the construction process due to the Western Campaign (1400-1404) and the ongoing wars with the Ottomans and Mamluks. After Timur returned from his campaign in 1404, he had revisions made to the construction project, which was carried out under the supervision of his wife. As a result, he ordered changes including the demolition and reconstruction of certain sections, especially the grand entrance portal. The reconstructed entrance portal exceeded the dimensions of the original in terms of width and length (Michell, G., 1978).

The madrasah section was constructed under the supervision of Saray Melik Hanım, and differs from Timur's original plan, which envisioned the building as a combined mashhad and madrasah complex. Within this particular section, the tomb of the queen herself was constructed as an annex to the main building. The tomb, known as the Bibi Khanum Tomb, is located opposite the mosque (Golombek, L. & Wilber, D., 1988). Despite the construction of the building begun in 1399 and largely completed in 1404, it remained in this state after Timur's death in 1405 (Hillenbrand, R., 1999).

In addition to Timur and his wife, the design of this building complex was also influenced by the contributions of some of the most talented architects and artists of the period. The following architects and artists are examples of those who were involved in this project: Mevlana Ubeydullah Sadr, who participated in the construction of the tomb; and Hoca Hussein Shirazi, Abdulaziz bin Sharafuddin Tabrizi, Shams, and Abdulvahab Shirazi, who were employed from Iran for the construction of the complex (Akar, 2022). The name of the mosque comes from the popular title of Saray Malik Khanum, the beloved wife of Timur, who was given the küreken (gürkan) title, meaning "son-in-law of the khan." She was the daughter of Chagatai Khan Kazan (Qazaa) Khalil Khan (Jamaluddin, 1984; Toshturdiyevna, 2020).

From an architectural perspective, the Bibi Khanum Mosque is considered a masterpiece representing the pinnacle of Islamic art during the Timurid period. The monumental portal, the magnificent blue-tiled dome and the massive structure have secured their place in history as one of the most important architectural achievements of the Timurid Empire, Central Asia and the Islamic world (Blair & Bloom, 1994). However, the destruction and damage suffered by the mosque over time is a reminder of how vulnerable man-made monuments are to nature and time. Despite restoration efforts to preserve the

grandeur of the structure for future generations, the structure can also be seen as an example of both enduring grandeur and the transience of time.

Although the mosque is considered to be one of the most magnificent examples of Islamic architecture in Central Asia, it has unfortunately suffered considerable damage over time due to various natural disasters and neglect (Sobti, 1995). Despite falling into complete ruin over time, the mosque has managed to preserve its architectural splendor and maintain its magnificence, grandeur and immense scale. The restoration works undertaken during both the Soviet period, as well as in the subsequent period following Uzbekistan's attainment of independence, were conducted with the objective of restoring the mosque to its original state of glory.

The concept of soft power, introduced by Joseph S. Nye and later integrated into the theoretical framework of international relations from the early 1990s, refers to the capacity of a state to shape the preferences and behaviors of other actors through attraction and appeal rather than coercion or incentive; that is, identity is created through cultural assets, normative values, and political ideals (Nye, 2004). In the post-Soviet era, Uzbekistan, which was established as an independent republic in 1991, adopted soft power as a contemporary paradigm strategy by linking its national architectural identity to the heritage of Timurid architecture, thus transforming the built heritage into a tool of symbolic communication. Soft power forms the normative basis on which public diplomacy operates. (Nye, 2004; McClellan, 2008; Parry, 2007).

Unlike traditional diplomacy, which primarily operates through state-to-state interactions, public diplomacy engages directly with foreign publics using cultural symbols and narratives to shape international perceptions in a manner consistent with national foreign policy objectives (Cull, 2009). Within this framework, Uzbekistan, a young state with a deep and ancient cultural heritage, has strategically undertaken the restoration and international promotion of architecturally significant monuments from its historical past. Central to this initiative is the adoption of Timurid architecture as a fundamental element of the nation’s cultural identity. The Bibi Khanum Mosque in Samarkand, originally built during the Timurid era, has been symbolically recontextualized in contemporary discourse not only as a religious or historical structure but also for the expression and projection of national identity and cultural diplomacy on a global stage. This approach is in line with broader examples of global soft power where cultural artefacts and aesthetic forms are mobilized for strategic recognition; For example, Japan's global branding through manga culture, the United States' dissemination of values through Hollywood cinema, and India's use of the Taj Mahal as a transnational symbol of civilizational depth are examples of the relationship between soft power and design (Nye, 2004; Snow, 2009). These examples underline how design and architectural heritage can serve as mediums for the development of cultural codes that resonate at an individual level across national borders and their impact in shaping international perceptions.

2. Architectural Design in terms of Cultural Codes and Soft Power

In the context of Uzbekistan, in defining its cultural codes, it has adopted the architecture of the Timurid period as its identity in terms of architecture and interior design and has created its identity through this style in the content of soft power. Although the Bibi Khanum Mosque is considered one of the most magnificent examples of Islamic architecture in Central Asia, unfortunately it has suffered significant damage over time due to various natural disasters and neglect (Sobti, 1995). Despite falling into complete ruin over time, the mosque has managed to preserve its architectural grandeur and maintain its magnificence, splendor and enormous scale. Restoration works carried out both during the Soviet period and after Uzbekistan gained independence were carried out with the aim of restoring the mosque to its original splendor. The restoration of the mosque was given importance because it represents the cultural identity of Uzbekistan.

In the context of Uzbekistan, while defining its cultural codes, it adopted the architecture of the Timurid period as its identity in terms of architectural and interior design and defined its identity in terms of soft power content with this style. Although the Bibi Khanum Mosque is considered to be one of the most magnificent examples of Islamic architecture in Central Asia, unfortunately it has suffered significant damage over time due to various natural disasters and neglect (Sobti, 1995). Despite falling into complete ruin over time, the mosque has managed to preserve its architectural magnificence and maintain its magnificence, splendor and enormous scale. The restoration works carried out both during the Soviet period and after Uzbekistan gained independence were carried out with the aim of restoring the mosque to its original splendor. The restoration of this mosque was given great significance because it representation ability of the cultural identity of Uzbekistan.

Bibi Khanum Mosque is regarded as one of the most important structures of Timurid architecture. It is played a significant role in the development of Islamic architecture in Central Asia. The construction techniques and decorative elements used in the mosque reflect the artistic understanding of the period (Michell, 1995). The building's tendency towards symmetry has an important place among the cultural codes of Timurid period architecture. It is reflected in the distribution of rooms, courtyards and passages, the treatment of the main and secondary facades, the entrance gate (pishtaq), the arcade (open or blind), the minarets or the corner towers with repeated units (Rogers, 1989). This mosque, which has a style called Timurid style, has an architectural concept that combines elements of Persian, Turkish and local Central Asian architecture (Telaumbanua, 2024).

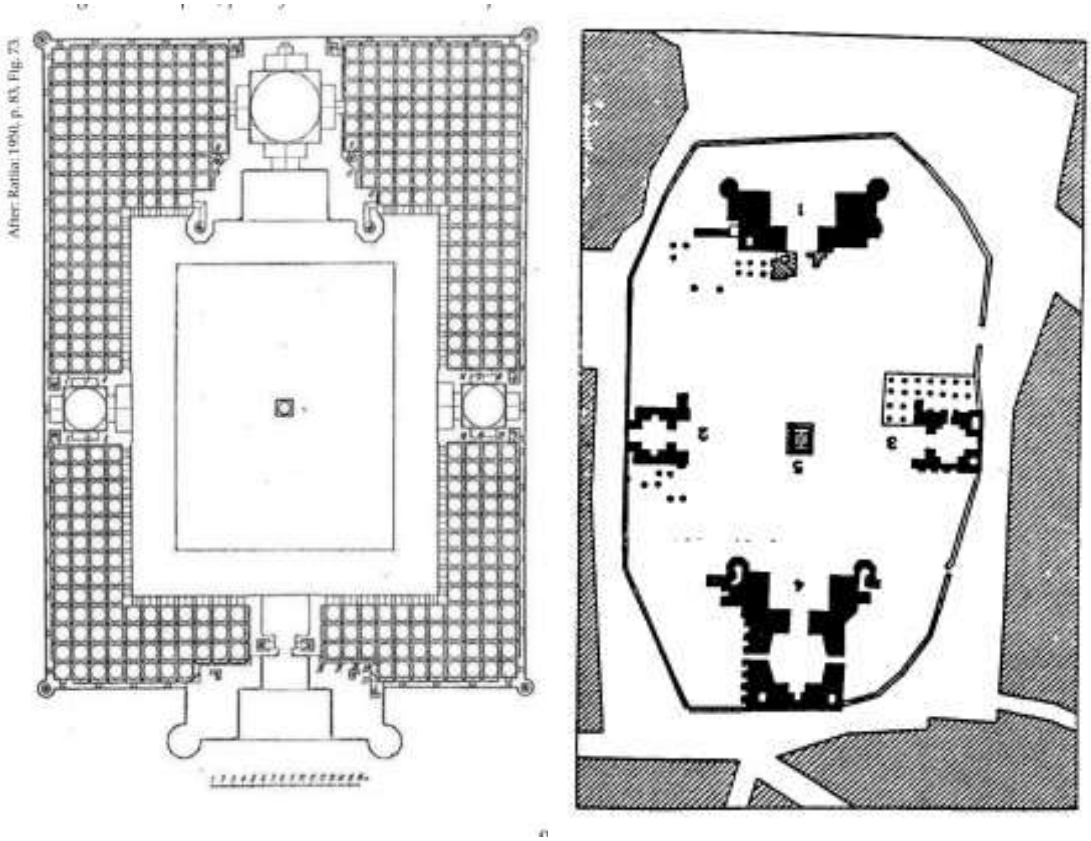

Fig 1.(left) Plan Drawing of the Bibi Khanum Mosque, Paskaleva, E. (2012) Fig.2 (right)Illustration of the Bibi Khanum Mosque, Samarqand (1398); shows the extant components of the building structure and its position within the urban landscape (Sobti,2015)

Legends, myths and stories increase the recognizability and stylistic impact of architectural and interior design in defining cultural codes and creating soft power (Melissen, 2005). These narratives are often intertwined with historical events and blend reality with fantasy. In this case, they are legends that show that the mosque is not just a physical structure, but also a reflection of people's emotions, stories and imagination. When evaluated in terms of legends, Bibi Khanum’s love and elegance stories add a romantic dimension to the cultural codes of the architectural work, while narratives emphasizing Timur's power and authority provide historical depth. For example, there are various square Kufic inscriptions with compositions ranging from simple squares to detailed geometric patterns on the interior and exterior surfaces of the Bibi Khanum Mosque. In addition, the fineness of the old architect's inscriptions symbolizes Bibi Khanum's elegance (Sakkal, 2018). The fact that the mosque is named after Timur’s wife or a mythical female figure, Bibi Khanum, and that Bibi Khanum played a role in the construction process despite the changes made by Timur, is a good example of women being depicted as political and cultural symbols in architecture. In this context, as Uzbekistan strives to establish a cultural identity based on gender equality, it is no coincidence that a structure designed and built by a king and his wife together was chosen for restoration and cultural codes.

Considering that Uzbekistan has recently deepened its soft power strategy by highlighting its cultural heritage, representational forms carried out through the interiors of historical buildings such as the Bibi Khanum Mosque are considered as new generation public diplomacy tools. The atmospheric experience offered by interior architecture creates a strong perception not only on tourists but also on diplomatic representatives, academics and cultural actors, and effectively presents the country's historical and aesthetic heritage. Therefore, space functions as a ground for producing a discourse; spatial design becomes the carrier of this discourse (Aronczyk, 2013).

The mosque is distinguished by its immense scale, elaborate decorations and monumental entrance gate. The architectural structure features a large courtyard, towering minarets, intricate tile decoration, a large central dome and surrounding arcades. The architectural plan of the building is based on a central courtyard (see fig.2, fig.3). The layout of the structure is consistent with the overall characteristics of Timurid architecture in Central Asia, following the four-iwan plan. The four-iwan plan marks the four cardinal points with magnificent gates surrounding a rectangular open courtyard and it is associated with the Parthian palaces of the 1st century AD and the Sassanid period (224–651 AD). This plan scheme, which was formerly employed for palaces, evolved into a cultural code that began to be preferred for structures such as mosques, madrasahs and

caravanserais with open courtyards in Central Asia during the Islamic period (Paskaleva, 2012). While the size and plan of the mosque create a hierarchy with other structures in the city that reflects the cosmopolitan structure of Samarkand, its architectural layout can be perceived as the worldly reflection of the divine order with its central plan approach. Furthermore, the iwans of the prayer hall, which opens onto the courtyard, are accompanied by minarets on both sides, further elevating the grandeur of the mosque. The primary prayer hall, located in the courtyard, is crowned by a central dome that is positioned on the same corner dome as the entrance.

The Bibi Khanum Mosque in Samarkand is distinguished by its square Kufic patterns on its surface decoration. The monumentality of the structures and the complete covering with Timurid-style tiles make it a characteristic example (Sakkal, 2018; Paskaleva, 2023; Kutty, 2024). In particular, the intensive use of blue, turquoise and gold colors are associated with concepts such as sky, heaven and divine light in Islamic art, while the walls decorated with verses from the Quran strengthened the religious identity and sanctity of the structure in terms of Islamic architecture (see Figure 1, Figure 4). As accepted by art historians and researchers, the Bibi Khanum Mosque has been considered a unique monument in the collective memory of the people both in terms of its philosophy and architectural magnificence. This mosque, which is a combination of power, grandeur and spiritual devotion, has become a symbol of Timur and his conquests. The magnificent architecture of the mosque with its width, height and ornaments also carried political messages to the public and foreign ambassadors during its time. The tower-like minarets added to the corners increase the magnificent appearance of the mosque. The building is also reflected the cultural code of the "largest, most magnificent mosque" ideal in Islamic architecture. Samarkand, which has a strategic importance in terms of Uzbekistan’s historical, geographical and cultural heritage, has become one of the important centers of international public diplomacy in recent years.

Fig 3: Exterior View of Bibi Khanum Mosque (Url-1)

Bibi Khanum Mosque, which is at the center of this transformation, is not only a place of worship; it has become a structure that redefines Uzbekistan’s cultural identity and represents this identity on a global scale with the aesthetic and symbolic power of its architecture and interior design. In particular, the restoration and re-functioning of the architectural heritage has made this mosque one of the leading actors of cultural diplomacy strategies. Thus, Bibi Khanum Mosque has been evaluated as a multi-layered tool that builds Uzbekistan’s soft power with both its historical context and visual-spatial representation. By defining the architectural identity and cultural codes of the mosque, it is shared with all visitors through soft power that Uzbekistan has adopted a period of Islamic architecture in terms of self-expression, that it is located in a multicultural geography and that it protects the ancient cultural heritage of this geography, and that it values gender equality.

3. Use of Traditional Materials in Relations to Architectural Style

The utilization of local and traditional architectural materials is fundamental to the cultural legitimacy and symbolic power of heritage structures. Such material choices contribute to the perceived authenticity of architectural monuments, reinforcing their connection to place, history, and collective memory (Lowenthal, 1998). In the context of soft power, buildings that incorporate indigenous materials and techniques become more effective cultural ambassadors, as they communicate unique national narratives in a tangible, aesthetically compelling manner (Smith, 2006). As a result, these structures not only preserve the architectural heritage of a society but also enhance their capacity to influence global public perception through culturally embedded design (Nye, 2004). Architectural design serves as a material expression of national identity, embodying ideological, historical, and cultural values that contribute to the construction and projection of a nation's image both domestically and internationally (Vale, 2008).

In the Timurid architectural style, the main building material is brick. The construction of the mosque involves a combination of brick and tile decoration techniques. The materials used in the construction of the mosque were obtained from different regions, representing a fusion of Central Asian, Turkish and Iranian architectural influences. Marble was used in the mihrab, minbar and some columns, representing durability and grandeur, while its color emphasizes the theme of purity in Islamic architecture (Namiri, 2017). Cut stones were used in the load-bearing parts and foundations of the mosque structure, and limestone was used in some decorative details and floor applications. The interior is abundantly decorated with tiles in turquoise, cobalt blue, navy blue and white tones. These tiles were used to enhance the aesthetics of the interior, to achieve a bright appearance and to protect the structure from humidity and temperature changes. Gold leaf was used in the mihrab and some panels, reinforcing the sense of royalty. Blue, which is often associated with the heavens and the divine in Islamic architectural symbolism, serves as a metaphysical reference to the sky. The extensive application of interior tile work and the chromatic emphasis on the blue domes can be interpreted as a visual manifestation of spiritual transcendence and celestial harmony in the architectural space.

The entrance gate is designed with a deep and wide recess aligned with the mihrab. The main entrance facade protrudes outward, containing intricate tile-mosaic decorations and medieval bricks and glazed bricks reflecting the architectural style of the period (Hillenbrand, 2021). Durable woods such as walnut and pine were used for finer structural elements. Plaster work decorated with geometric patterns and plant motifs added richness to the design of the interior.

Fig 4: Exterior View of Bibi Khanum Mosque: entrance gate (Url-2)

The extensive use of blue and turquoise tiles is one of the most striking aesthetic elements that contribute to the splendour of the building (see fig.3). The tile masters of this period used not only turquoise, cobalt blue, black and white glazed tiles, but also yellow, green and red underglaze colors. The dome is covered with turquoise tiles (Gill, 2015). The dominance of

brick ornamentation combined with tile mosaics, as seen in other Timurid structures, enhances the brilliance of the building and contributes to its magnificence. The inscriptions integrated with tile ornamentation significantly enrich the structure's aesthetic appeal, while the tile cladding materials used in the mosque are recognized as some of the finest examples in Samarkand.

Since each pattern is in relation to another pattern, it is a symbol of the fact that everything is dependent on the 'Creator'. The high dome encourages visitors to look up, that is, to look at the sky and to be modest. The cosmic order, one of the most important foundations of Islamic architecture, has been tried to be represented with the spherical dome, arches extending in four directions and the courtyard. In addition to its architectural value, the Bibi Khanum Mosque is also important in terms of the cultural heritage contributed by its philosophy. In addition to being one of the most impressive examples of Timurid architecture, this mosque continues its existence as a monumental complex that keeps the philosophy of the period alive. Future conservation efforts will contribute to a better understanding of both the physical and cultural dimensions of this unique structure (UNESCO, 2022).

4. Philosophical Approach in Architectural Design

Samarkand has been inhabited by many different civilizations throughout history. It was the capital of the Sogdian province during the Achaemenid Empire of Iranian origin, which was conquered by Alexander the Great in the first half of the 4th century BC, but it experienced its glorious years during the Timurids (Arslan, 2022). Since its independence in 1991, Uzbekistan's political and cultural elites have adopted the medieval ruler Emir Timur (1336-1405) as the representative of Uzbek national identity as a form of post-Soviet ideologies and ethno-nationalism and have codified the colored (mostly blue) tiles and bricks that were the dominant features of this period as their architectural identity. During the restoration period, bricks and ceramic tiles were used in the same way, although they were produced with different modern techniques (Paskaleva, 2018). In these structures, prismatic volumes with square or rectangular bases are brought together to form the main structural mass and the desired order (Golombek & Wilber, 1988).

Bibi Khanum Mosque is one of the most prominent examples of this architectural style. It is known that the general principles of the Timurid architectural style are determined by geometric foundations. The mosque, with its proportionate dimensions, high structure and dazzling decoration, conforms to the philosophy of Timurid architecture both during the period it was built and in later periods. The main entrance of the mosque, the facade decorations and the striking patterns on the dome reflect the artistic understanding of the period (see Figure 5). Timurid architecture is characterized by large-scale structures and aesthetic ornaments (Golombek & Wilber, 1988).

Traditionally, public diplomacy has been defined through the use of cultural, educational and media tools by states to communicate with their external publics. However, in recent years, this conceptual framework has expanded; disciplines such as interior architecture and spatial design have also begun to take their place among the effective tools of public diplomacy. In line with this new trend, interior architecture is not only an aesthetic arrangement or a functional analysis area, but also a diplomatic language in which cultural identity, historical memory and international image are represented visually and emotionally. In this context, the Bibi Khanum Mosque in Samarkand, Uzbekistan, one of the most important architectural heritages of the Timurid period, offers a unique example of public diplomacy being redefined through architecture and interior architecture.

Fig 5-6 (left): Exterior Surface Decoration: (a) geometric ceramic tiles, (b) ceramic tiles with floral motifs (Url-3)

The architects and craftsmen of this period achieved an extraordinary level of geometric harmony in the ornamentation of their structures (Başkan, 2013). The geometric features of the Timurid period are reflected in this mosque with a square plan with four pointed arches on each side. The ornaments used in the mosque symbolize Timur's power as well as its visual artistry and monumental grandeur (see Figures 5-6). In this context, the mosque is an indicator of Timur's power-oriented political philosophy and the value he gave to women. The Bibi Khanum Mosque continues its existence as a historical monument where philosophies and architecture are intertwined. In this fascinating place where the history of Uzbekistan, the Timurid philosophy of art and design, and the philosophy of Islam come together, every visitor can feel the echoes of the past. This huge mosque, built under Timur's rule in the last years of his reign, has an important place among the structures in Samarkand.

In recent years, the government of Uzbekistan has embraced a public diplomacy approach that strategically centers architectural heritage as a key component in the construction and projection of national cultural identity. This approach reflects a broader understanding of architecture not merely as a technical or aesthetic discipline, but as a potent medium of cultural

representation and international communication. Within this paradigm, monumental architectural works from the Timurid period—characterized by their scale, craftsmanship, and symbolic richness—have been re-evaluated as tangible narratives of Uzbekistan's historical legacy and civilizational continuity. (UNESCO, 2022).

Among these structures, the Bibi Khanum Mosque occupies a central position as both a historical monument and a culturally symbolic site. Its restoration signifies more than the conservation of a heritage building; it represents a deliberate engagement with architectural space as a communicative act. The mosque's formal and spatial configuration—marked by a monumental iwan entrance, high domes, minarets, and intricate geometric ornamentation—embodies the grandeur and cosmopolitanism of the Timurid architectural idiom. This design language not only reflects a specific historical period but also asserts a distinct visual identity for contemporary Uzbekistan in the global arena.

Significantly, the restoration process extended beyond the preservation of the mosque's structural and external elements. There was a strong emphasis on reviving and sustaining the interior architectural and atmospheric qualities that define the visitor's experience of the space. Elements such as muqarnas vaults, glazed tile work (kashi), vegetal and epigraphic motifs, acoustic harmony within the sanctuary, and the controlled penetration of natural light through carefully positioned openings contribute to a multisensory interaction with the building. These features serve not only decorative or functional purposes; they encode theological, cosmological, and philosophical meanings deeply embedded in the Islamic architectural tradition.

Importantly, the use of light and shadow, the manipulation of spatial scale, and the rhythmic articulation of surfaces within the interior reflect a sophisticated understanding of space as a lived, experienced phenomenon that evokes spirituality, contemplation, and cultural memory. Through these spatial and sensory strategies, the Bibi Khanum Mosque functions not only as a place of worship but also as a symbolic site of national narrative, where architecture becomes a tool for soft power, communicating values such as historical continuity, aesthetic sophistication, and spiritual identity to both local and international audiences.

Fig 7: Timur and Bibi Khanum (Url-2)

5. Conclusion and Recommendations

Throughout history, the grandeur of the mosque, its pointed arches, domes, eyvans and decorative elements have left deep impressions on visitors to Samarkand, inspiring countless stories and works of art. Today, the Bibi Khanum Mosque has an identity not only as a tourist attraction, but also as an expression of the philosophy of Timurid-era architecture and the cultural codes of the city of Samarkand, combined with an understanding of original materials.

The mosque has undergone numerous restorations since its construction. The building was severely damaged in the 19th century and was included in various restoration projects during the Soviet period. In the 20th century, the mosque was again seriously damaged and remained closed to worship for many years. However, in the 21st century, the mosque was reopened to visitors in as close to its original state as possible thanks to extensive restoration work led by the Uzbek government.

Uzbekistan's adoption of Timurid architecture, an Islamic architectural style with Turkish, Iranian and Central Asian influences, and as a cultural heritage of its lands, has enabled it to codify its soft power and culture in the fields of architecture and interior design. In this sense, the Bibi Khanum Mosque has become a symbolic structure. As an element of soft power, it is possible to make this structure more attractive, to make it valuable for researchers by taking advantage of its scientific and artistic value, and to revitalize its cultural tourism.

Therefore, the mosque exemplifies how architectural restoration can contribute significantly to the formation of a state's global image when approached through an interdisciplinary lens that combines heritage protection, interior design and cultural diplomacy. In this context, Uzbekistan's investment in the architectural re-evaluation of Timurid heritage demonstrates the nuanced and strategic use of built space as a diplomatic tool, where architecture becomes both the content and the channel in

the soft power dynamics of the 21st century. Interior architecture functions as a multi-dimensional communication medium that shapes users' sensory, psychological and cultural experiences in physical spaces.

When nation-states recontextualize their cultural heritage through architectural and interior design, they do more than merely preserve local identity; they also produce strategic narratives for international audiences. The interior of the Bibi Khanum Mosque exemplifies this approach by incorporating typological features of Timurid and broader Islamic architectural traditions. The nuanced distribution of natural light, the use of glazed tile decorations, the axial positioning of the mihrab, acoustic configurations, and the implementation of symmetrical spatial compositions collectively demonstrate a sophisticated integration of historical continuity with aesthetic experience. These design elements underscore the role of interior architecture not only as a cultural expression but also as an effective tool of public diplomacy, complementing the symbolic function traditionally attributed to monumental architecture (Necipoğlu, 1995).

In this context, the architecture and interior design of the Bibi Khanum Mosque also mark an important turning point in the spatial evolution of public diplomacy at the universal level. The meticulous preservation of the interior elements and the revival of the authentic and multicultural physical language of the mosque throughout the restoration process reflect not only the commitment to historical fidelity, but also the deliberate intention to project national identity onto the global stage. Spiritually, the contemplative silence in the space combined with legends and narratives, the echo reverberating under the raised dome, the light interaction on the ceramic surfaces and the immersive spiritual atmosphere enables its interior and architecture to communicate emotionally and symbolically with both local and international society.

This study also provides insights into strategies to preserve the cultural heritage value of the Bibi Khanum Mosque and increase its visibility on a global scale. In order for the mosque to fully utilize its potential as a soft power tool in public diplomacy, it should integrate technological innovations, contemporary museum methods and global contemporary design practices into the structure. With the help of holographic and digital techniques, the museum can create intangible cultural codes by telling the legends of Bibi Khanum and Timur and inform visitors about the philosophy of Timurid architecture through the definition of design details of the style. Visitors can get more in-depth information on any subject they wish through interactive screens.

Through the use of virtual reality (VR) headsets, visitors can have a virtual journey back in time to Timurid Samarkand. By doing so, they can visually master the cultural codes and architecture of the period. Interactive maps and 3D models can be used to show the construction process and philosophical details of the mosque. In addition, periodic demonstrations can be performed through 3D mapping technology to increase awareness of the importance of the structure.With 3D Mapping technology, period information can be effectively and efficiently conveyed to users with digital animations. Bibi Khanum's life, her contributions to the design of the structure through a philosophical background on the role of women in architecture, can be visually and audibly conveyed to the walls of the mosque through light and sound projections. Technology-based narratives such as Uzbekistan architecture, narratives and perspectives on architecture about Bibi Khanum and Timur, holographic images to be created on the features of Timurid-era architecture, digital animations can attract the attention of younger generation visitors and researchers and enable them to experience the space interactively.

A store can be built for the mosque. Bibi Khanum and Timur's souvenirs designed by designers, products related to Uzbek handicrafts and small models of buildings belonging to the complex can be placed in this store. Competitions can be organized to encourage international designer candidates in this area. Scientists can be supported, and books of different levels and content can be created for children, visitors and professionals and offered for sale in this store. In this way, the mosque can be more permanent in the memories of visitors and an advertising quality can be provided by thinking that they will interact with the people around them when they return to their countries through these objects. Additionally, workshops on the art of Uzbek tile-making or calligraphy can be organised so that visitors can experience the cultural codes of Uzbekistan at first hand.

It can be suggested that this historical mosque and complex be introduced to wider audiences through future research, its cosmopolitan structure be examined, its features reflecting the characteristics of the Timurid period and the characteristics of Islamic architecture be examined, and it can be evaluated as a subject of study by scientists in order to develop new approaches that will ensure the preservation of the building structure, and various incentives such as panels, congresses and symposiums can be carried out.

Ultimately, the reframing of public diplomacy through interior architecture emerges as a contemporary communicative strategy. This paradigm acknowledges that spatial environments carry not only physical but also ideological and cultural significance. In this context, interior design becomes a form of "silent discourse" that articulates identity, heritage, and intent. The Bibi Khanum Mosque, as a case study within the Uzbek national context, reveals how historical identity can be reconstructed and internationally represented through interior spatial aesthetics. Thus, interior architecture is positioned as a rising trend in public diplomacy, opening new theoretical avenues for understanding how the disciplines of architecture and interior design can function as strategic tools for cultural representation and global engagement. The restoration of historical monuments significantly enhances the potential for cultural tourism by revitalizing heritage sites as spaces of memory,

education, and international engagement, thereby fostering both economic development and cultural diplomacy (Timothy & Boyd, 2003).

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ILLUMINANCE TESTING OF EMBROIDERED LIGHTING FIXTURES MADE FROM RECYCLED FIBERS IN DIFFERENT USAGE SCENARIOS

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1. Abstract

In this generation, global environmental issues become a serious problem, lighting fixtures play an important role in interior design. However, traditional lighting fixtures often use synthetic fiber materials, which can cause environmental pollution when produced. To improve this situation, this study explores the feasibility of recycled fiber becoming embroidered lighting in different environments.

This study selects three types of recycled fiber, one type of recycled fiber thread and linen to compare, and selected 10W and 16W builds to analyze their suitability. This study explores the feasibility and potential of recycled fiber lighting, and additionally, uses a light-intensity testing instrument 360-degree light measurement to understand the impact of different recycled fibers. The results of the research which is Bio-Based Synthetic Fiber 75d Recycled Fabric is the best fiber to produce the lighting in this five fiber. Its advantage is that it is very stable in terms of lighting, the fabric and embroidery will not block the penetration of light, and there are also many choices in color.

This study provides data from the lighting test as a reference for future designers in developing solutions and hopes to promote the application and development of eco-friendly lighting fixtures.

keywords: recycled fiber, embroidered lighting, illuminance testing, eco-friendly design

2. Introduction

This goal is to explore the application of recycled fiber materials in lighting design, combined with embroidery technology to enhance visual appreciation. As global environmental issues become a serious problem, finding eco-friendly materials has become an issue for future design. Lighting fixtures, not only are an important element of the interior of the atmosphere but also have an environmental impact from the chosen materials. Therefore, this study focuses on recycled fiber materials, investigating how to achieve both environmental sustainability and enhanced value in lighting design. Through the embroidery techniques, the study will show the Tainan, Taiwan local characteristics with sustainable design, creating lighting fixtures that are visually appealing and meet modern environmental lighting standards.

3. Research Methods

3.1Fabric Descriptions:

This study selects three types of recycled fiber, one type of recycled fiber thread and linen to compare, and selected 10W and 16W builds to analyze their suitability.

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Table 1. Recycled materials selected in this study

1. Linen fabric Linen fabric is woven from flax fibers and is stronger than cotton fabric. It is often used in embroidery works that require a rough texture.	 figue 1. Linen fabric (image source: this study)
2. Recycled PET bottle yarn Material:100% Recycled polyester Produce name: EA1158 The reason for choosing nylon-spun yarn is its excellent breathability and light transmittance. The fabric itself has a unique glossy appearance, but its translucency is slightly lower compared to other fabrics.	 Figure 2. Recycled PET bottle yarn *(Image source: This study)*
3. Bio-Based Synthetic Fiber 75d Recycled Fabric Material :100% Sorona Produce name: Q20A083-3W21MF This fabric is the same as the previous one, as both are bio-based elastic fibers. However, the difference lies in comparing the embroidery effects on the same type of fabric but in different colors.	 Figure 3. Bio-Based Synthetic Fiber 75d Recycled Fabric (image source: this study)

4. Bio-Based Synthetic Fiber 75d Recycled Fabric Material :100% Sorona Produce name: Q17A053-1K1101 This is a bio-based elastic fiber that can be recycled in any conventional recycled polyester process. It has a soft texture but lacks good elasticity recovery.	 Figure 4. Bio-Based Synthetic Fiber 75d Recycled Fabric (image source: this study)
5.100% Recycled Polyester Material: 54% sea wool yarn, 46% polyester Produce name: SWL-TG1967 Density: 147*77 According to statistics,160 million kilograms of oyster shells are from the ocean. They are combined with recycled PET bottles to produce.	 Figure 5. 100% Recycled Polyester (image source: this study)

The computerized embroidery machine used the embroidery. The pattern was designed for the sunset in Tainan, Taiwan, depicting iconic landmarks, such as the Guosheng lighthouse and Qigu Salt Mountain, Each type of fabric was embroidered in the same pattern under consistent stitching parameters, ensuring uniformity int and design.

Figure 6. Embroidery design display

3.3 Lighting analysis scene:

This study utilizes a HOBO Bluetooth illuminance recorder, with LUX as the illuminance measurement unit. To explore the impact of different light bulbs on embroidery. Each angle and material has measured the average for five minutes, using 10W and 16W bulbs in the same dark room, hanging under a light steel frame, and a lampshade is divided into four equal parts, the same operation is repeated 40 times in five lampshades, four angles and two different of lights, to research the different illuminance between different bulbs used in embroidery.

1.MX2202 HOBO Bluetooth illuminance recorder	

Figure 7. Measuring instruments

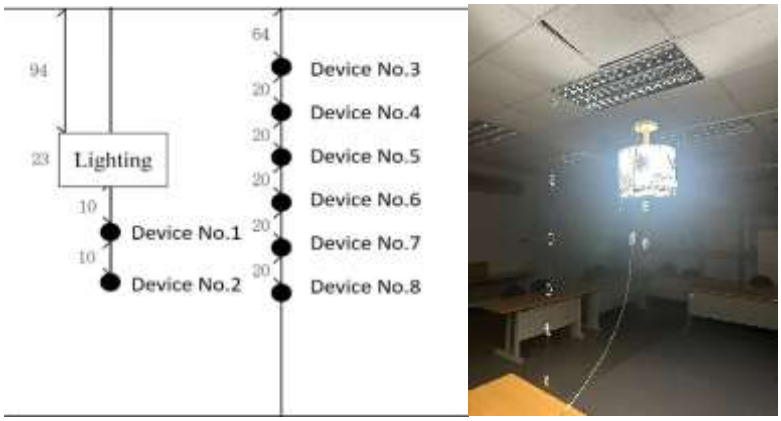

Figure 8. Measured installation diagram (Left is the measured installation distance setting (cm), right is the measured photo)

4. Research Results

4.1 Linen fabric

Linen fabric is woven from flax fibers and is stronger than cotton fabric. It is often used in embroidery works that require a rough texture.

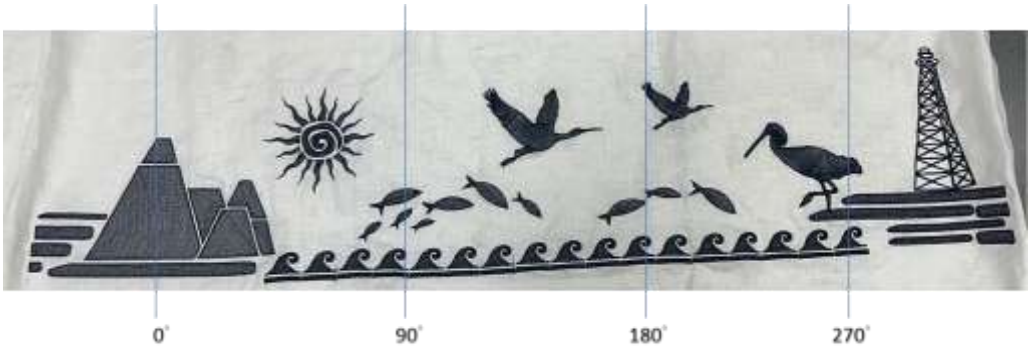

Figure 9. Linen fabric lamp wiring diagram

	Under the lighting (LUX)
Device No.1(180cm)	1116.16
Device No.2(170cm)	286.87

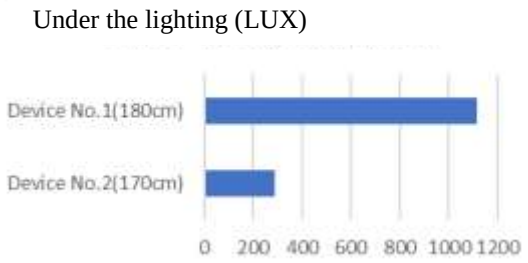

Figure 10. Data below the lamp using a 10W bulbs

	Under the lighting (LUX)
Device No.1(180cm)	1772.8
Device No.2(170cm)	393.44

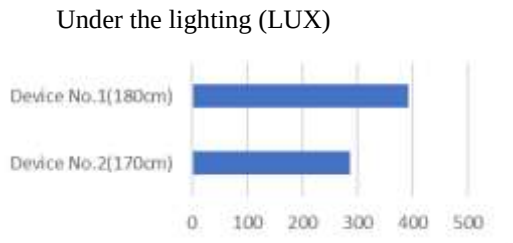

Figure 11. Data below the lamp using 16W bulbs

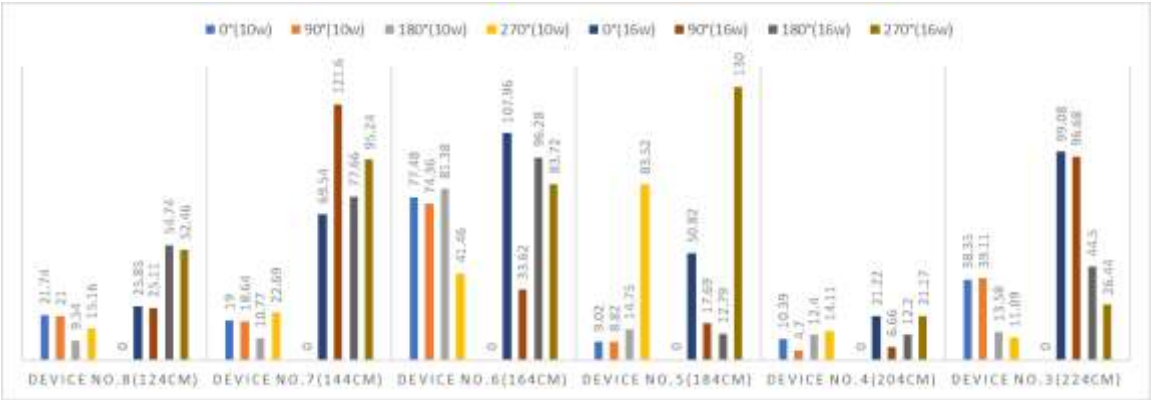

Figure12. Data beside the lamp using 10W bulbs and 16W bulbs

The data on Linen fabric shows that there is no difference between 10 bulbs and 16 bulbs. In comparison, if you want to use fabric to design recycled fiber lighting, a 10W bulb or 16W bulb is below 100

4.2 . Recycled PET bottle yarn

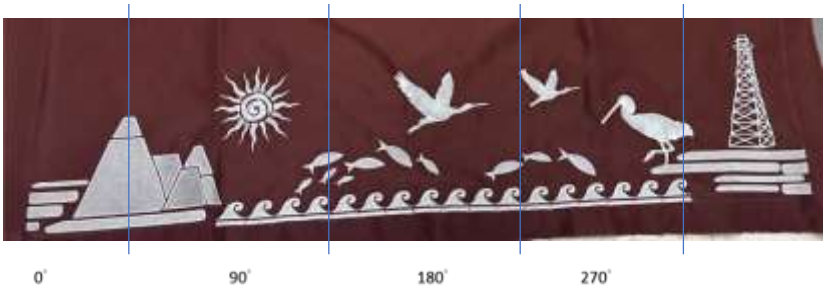

Figure 13. Recycled PET bottle yarn diagram

	Under the lighting (LUX)
Device No.1(180cm)	723.84
Device No.2(170cm)	142.6

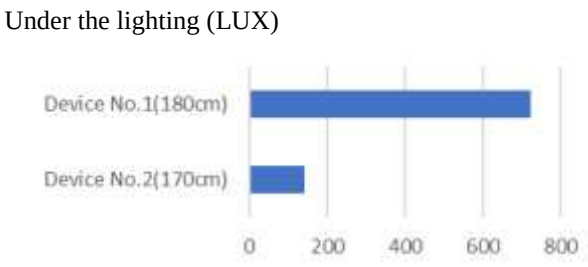

Figure 14. Data below the lamp using a 10W bulbs

	Under the lighting (LUX)
Device No.1(180cm)	1421.44
Device No.2(170cm)	270.08

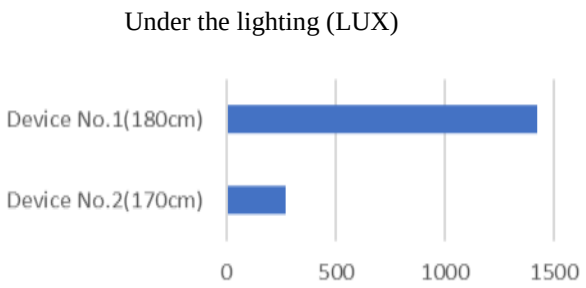

Figure 15. Data below the lamp using 16W bulbs

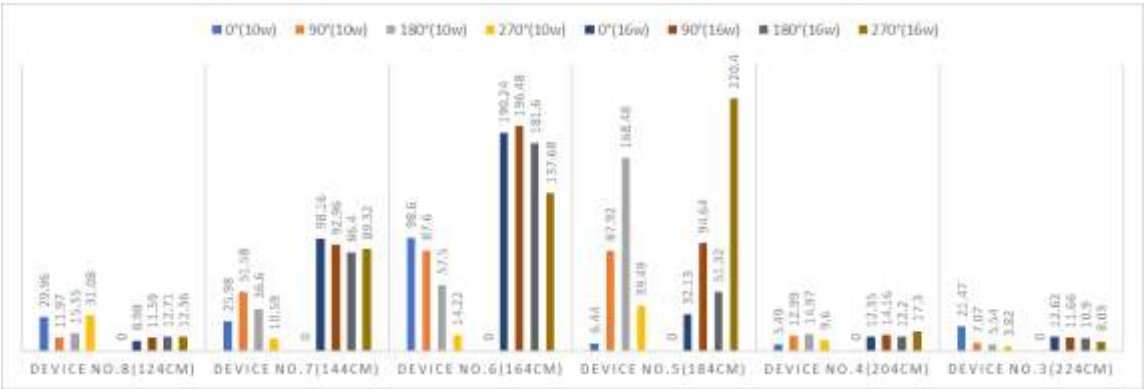

Figure16. Data beside the lamp using 10W bulbs and 16W bulbs

The data of the Recycled PET bottle yarn shows that 16W bulbs are better than 10W bulbs in lighting. In comparison, if the designer wants to use the fabric, using 16W bulbs is a better choice.

4.3 Bio-Based Synthetic Fiber 75d Recycled Fabric

It's a bio-based fiber that can be recycled in any conventional recycled polyester. When choosing embroidery thread, choose. The fabric is similar to silver, to compare whether the same embroidery thread in different colors will affect the lighting results.

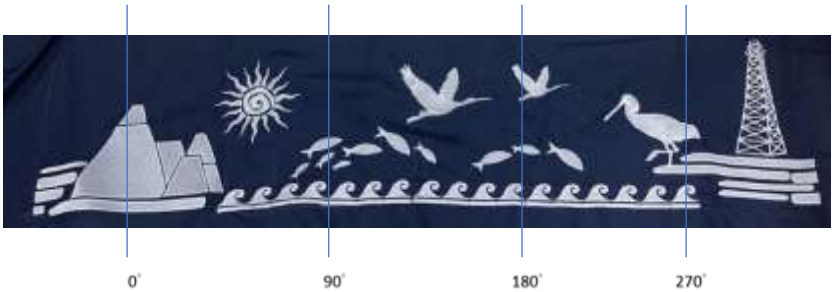

Figure 17. Bio-Based Synthetic Fiber 75d Recycled Fabric lamp wiring diagram

	Under the lighting (LUX)
Device No.1(180cm)	817.92
Device No.2(170cm)	191.28

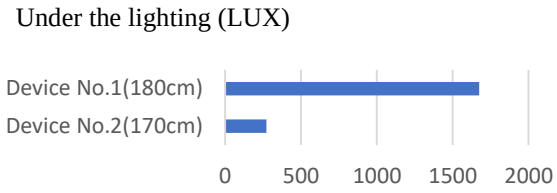

Figure 18. Data below the lamp using a 10W bulbs

	Under the lighting (LUX)
Device No.1(180cm)	1299.2
Device No.2(170cm)	291.92

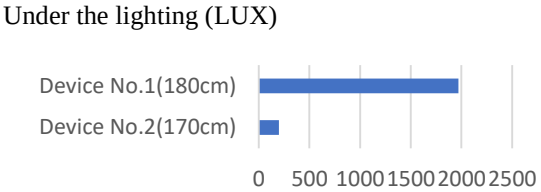

Figure 19. Data below the lamp using 16W bulbs

Figure 20. Data beside the lamp using 10W bulbs and 16W bulbs

The data shows that the illumination in the middle layer is very evenly distributed, and only the illumination at 204cm-224cm above is slightly weak, but in general, it is the best among all recycled fabrics.

4.4 Bio-Based Synthetic Fiber 75d Recycled Fabric

Bio-Based Synthetic Fiber 75d Recycled Fabric is a plant-based elastic fiber that can be recycled from any conventional recycled polyester. The color of the cloth is relatively dark, so when choosing embroidery thread, choose white which is quite different from the color.

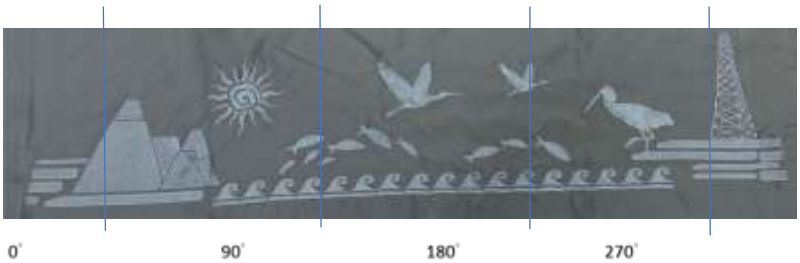

Figure 21. Bio-Based Synthetic Fiber 75d Recycled Fabric lamp wiring diagram

	Under the lighting (LUX)
Device No.1(180cm)	1656.24
Device No.2(170cm)	236.88

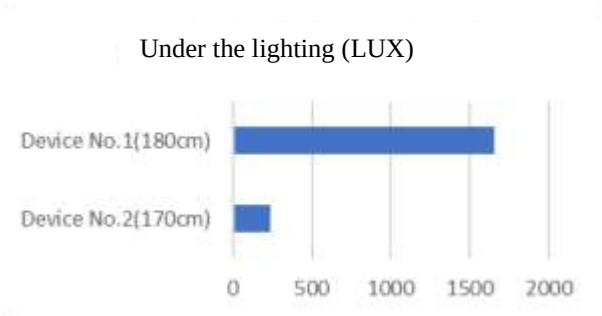

Figure 22. Data below the lamp using a 10W bulbs

	Under the lighting (LUX)
Device No.1(180cm)	676.8
Device No.2(170cm)	183.92

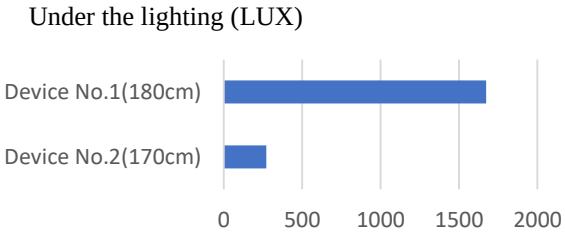

Figure 23. Data below the lamp using 16W bulbs

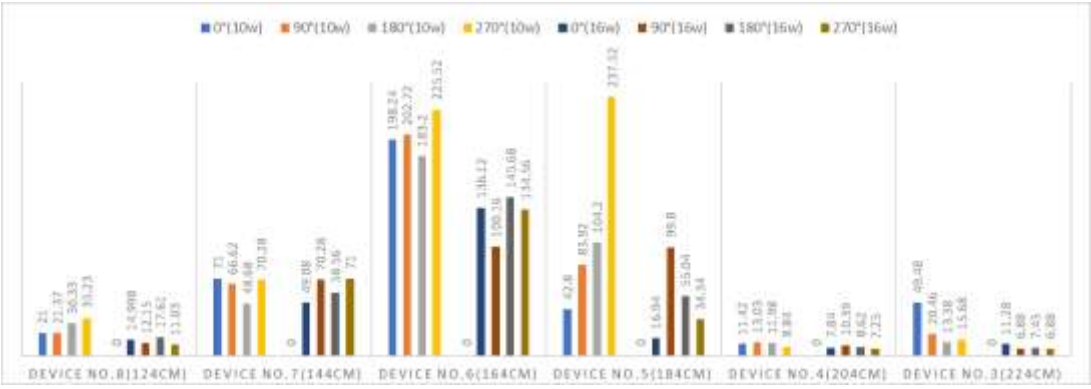

Figure 24. Data beside the lamp using 10W bulbs and 16W bulbs

The data shows that the illumination in the middle layer is very evenly distributed. Only in the upper 204cm-224cm and below 124cm, the illumination is slightly weak, but in general, it is second only to the third one.

4.5 100% Recycled Polyester

Oyster shells recycled from marine waste are used, ground through nanotechnology, combined with recycled plastic bottles, and drawn into marine fibers. When choosing embroidery thread, silver embroidery thread is used to match the silk feel of the fabric itself.

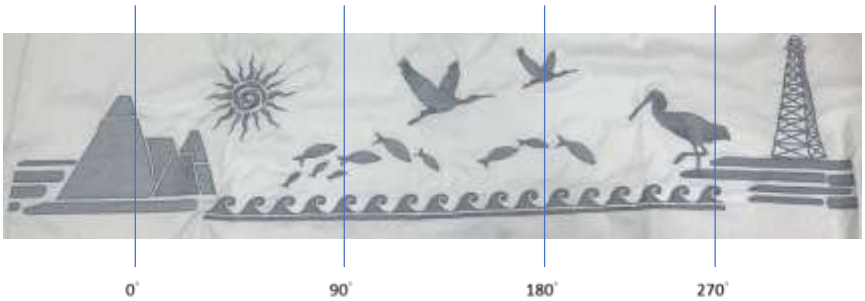

Figure 25. 100% Recycled Polyester lamp wiring diagram

	Under the lighting (LUX)
Device No.1(180cm)	1970.56
Device No.2(170cm)	199.92

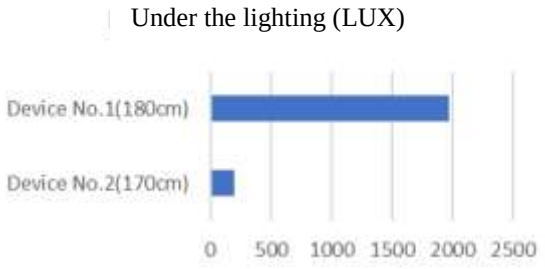

Figure 26. Data below the lamp using a 10W bulbs

	Under the lighting (LUX)
Device No.1(180cm)	272.24
Device No.2(170cm)	1674.24

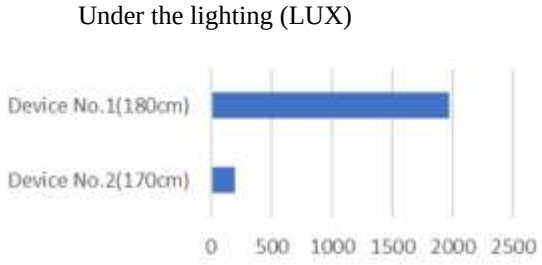

Figure 27. Data below the lamp using 16W bulbs

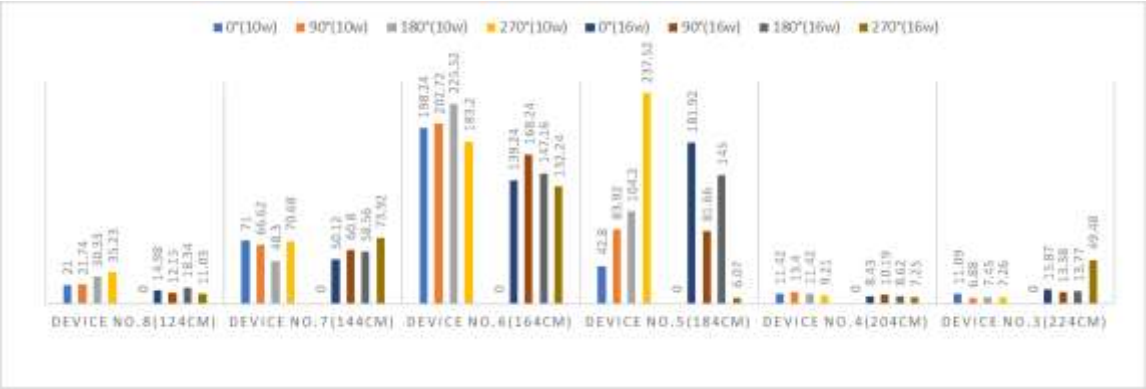

Figure 28. Data beside the lamp using 10W bulbs and 16W bulbs

5. Conclusions

The final result of the research is that ***Bio-Based Synthetic Fiber 75d Recycled Fabric*** is the best material for making recycled fiber lighting. The ***100% Recycled Polyester*** is the second one**.** It performs best in terms of the stability of illumination data, and it is also better than traditional fiber. The data can provide a reference for future designers' needs.

6. Acknowledgment

I would like to express my sincere gratitude to the National Science and Technology Council, R.O.C.and University Social Responsibility Project-Shi-Shuei Kuenshen for providing me with this opportunity can start the research. And I am also deeply thankful to Professor Huang Shih-Pin from the National Pingtung University of Science and Technology. His opinions inspired me a lot. Also, I want to thank the manufacturers who provided Farbic for free, which are Artshirt, u-long tech textile, and Zig Sheng Industrial Co., LTD.Thanks for the generosity. Both of them are important. Without their encouragement and opinions, this work would not been possible.

7. Literature Review

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EVALUATING THE PUBLICNESS OF PUBLIC SPACES: A LITERATURE REVIEW AND A CRITICAL PERSPECTIVE

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Abstract
This study examines the debates on evaluating publicness in public spaces by analyzing various academic perspectives in the existing literature. The literature presents various perspectives on how the social, cultural, political, and economic dimensions of public space interact and shape one another, as well as on the evolution of public spaces. Debates between scholars who argue that public space is coming to an end due to factors such as privatization, commercialization, and security policies, and those who contend that public space is evolving into different forms while still fulfilling important functions, remain prevalent in the literature. In this context, the need to develop concrete and measurable criteria to make public spaces more inclusive and accessible emerges as a significant perspective. This study aims to examine the existing methodologies in the literature for measuring public spaces, evaluate their effectiveness, and develop a critical perspective.
© 2025 Selection and/or peer-review under responsibility of the scientific committee
Key Words: *public; space; publicness; dimensions of publicness; evaluating the publicness.*

1. Introduction

Discussions on public space span a wide spectrum and are addressed from various academic perspectives. This diversity highlights the distinct significance of the social, cultural, political, and economic dimensions of public space, demonstrating how these aspects are interwoven and mutually influential. The privatization, commercialization, and security policies surrounding public spaces have been among the most debated issues, raising questions about whether privately owned spaces that foster public life can still be considered public spaces. In response to these concerns, some scholars in the early 1990s declared the "death" of public space, which in turn spurred increased academic interest in the topic [1]. Scholars who argue that public space is in decline contend that its functions have been weakened due to factors such as privatization, commercialization, and growing social segregation [2-6].

In contrast, some scholars have opposed the notion of the "end of public space," arguing that public space has not disappeared but has instead evolved into different forms. Langstraat and Van Melik contend that the involvement of the private sector in urban spaces has not necessarily led to the demise of public space; rather, when properly managed, such spaces can continue to fulfill their public functions [7]. Paddison and Sharp [8] argue that research focusing on city centers may overlook a broader understanding of public space and that the inclusivity of local public spaces is not necessarily under threat. These scholars advocate for a dynamic conception of public space that is shaped by varying local conditions, governance strategies, and social contexts. Such studies highlight the complex and dialectical nature of the production and use of public space, revealing its ongoing debates and contradictions [9, 10].

These scholars, who oppose the notion of the end of public space, argue that public spaces continue to serve important functions and aim to develop concrete, measurable criteria to create more inclusive and accessible spaces. This has been regarded as a critical step in the creation of public spaces that provide social benefits and can be utilized by broader communities. The aim of this study is to examine the existing methodologies in the literature for measuring public space, evaluate their effectiveness, and open them up for discussion.

2. Debates on Public Space in the Literature

The concepts of public, public realm, public sphere, and public space each have distinct meanings and contextual uses. However, these terms are often used interchangeably, leading to shifts in meaning. While the terms "public realm" and "public sphere" focus on social dimensions such as societal interaction and political participation, "public space" emphasizes physical and spatial characteristics. Equating "public space" with "public realm" can obscure the distinction between perspectives that focus on social spaces and those that incorporate political concerns [11]. Recognizing these conceptual differences is crucial for defining public "space" and establishing appropriate evaluation criteria for assessing its publicness.

The discussion of public space from an urban and spatial perspective was pioneered by Jane Jacobs in her seminal work The Death and Life of Great American Cities [12]. Jacobs emphasized the importance of public spaces in urban life and examined how physical public spaces shape social interaction and quality of life [12]. Similarly, William H. Whyte, in his work Securing Open Space for Urban America [13], focused on the preservation and functionality of urban open spaces.The 1970s marked a turning point in the study of public space. During this period, Henri Lefebvre, in his influential book The Production of Space [14], argued that space is not merely a physical entity but is intrinsically linked to social relations, power, and control.

His ideas had a profound impact on urban studies, reshaping how public space is understood and analyzed. Jacobs [12] defined public spaces as "streets, parks, and other shared spaces," emphasizing their role as the centers of urban social life. Whyte highlighted the function of public space in contributing to urban life, arguing that such spaces should facilitate social interaction and the formation of social bonds [13]. Relph [15] described public space as places where people feel a sense of belonging and meaning, distinguishing between "place" and "placelessness" while discussing the cultural and psychological significance of public spaces. Sorkin [5] defined public space as "areas where public life and social interaction take place," addressing the shifting functions of space due to commercialization and privatization. Punter [16] characterized public space as "an embodiment of a city's social, cultural, and political life," examining how urban design influences social interaction. Similarly, Crawford [17] viewed public spaces as "sites where everyday life, cultural identities, and social relationships are shaped," analyzing their impact on social life.

In light of this information, some studies have proposed criteria for determining publicness by referring to the physical aspects of public space. Based on these criteria, various methodologies have been developed to assess the publicness of spaces.

3. Methodological Approaches to Evaluating the Publicness of Public Space

Public spaces exist both as common areas accessible to everyone and as spaces shaped by specific power structures and regulations. This duality suggests that the meaning of public space can change over time, evolving according to the needs and expectations of different social groups. The fluid nature of publicness indicates that public spaces cannot be strictly defined by fixed boundaries and will continue to be reshaped in response to various social processes.

Benn and Gaus [18], in their seminal work *Public and Private in Social Life*, explained that the distinction between public and private is shaped by the dimensions of "access," "agency," and "social interest." Building on their work, Madanipour [19, 20] defined public space through three key dimensions: "accessibility," "activity," and "social interest." Similarly, Kohn [21] identified "ownership," "accessibility," and "inter-subjectivity" as fundamental aspects of public space. Carmona [22] further expanded this framework by incorporating "function" and "perception" into his analysis.The table below (Table 1) presents the different dimensions of publicness examined in various studies.

Table 1: Key dimension of publicness mostly mentioned in the literature (created by author).

Researchers	**Dimensions**				
Madanipuor	Agency	Accessibility	Interest		
Nemeth and Schmidt	Ownership	Management	Users		
Varna and Tiesdell	Ownership	Control	Physical Configuration	Maintenance	Animation
Brill and Carr	Diversity	Density	Classless	Democratic	
Langstraat and Van Melik	Ownership	Management	Accessibility	Inclusiveness	
Miller	Ownership	Accessibility	Openness	Democratic	
Rapoport	Variety	Flexibility	Permeability	Authenticity	

It is observed that later studies on publicness [7, 23-25] have focused on these dimensions and further advanced the existing body of research.

Van Melik et al. [10] focused on indicators related to the management dimension of public space in six-dimensional diagram, comparing two contrasting types of managed public spaces: "secured" and "themed" (Figure 1). This intuitive approach to quantifying a fundamental issue concerning public space has played a significant role in shaping the foundation of this research.

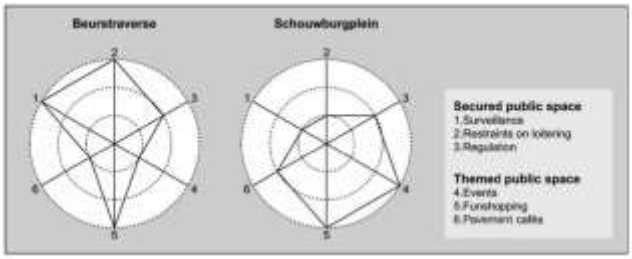

Figure 1: Six-dimensional diagram[10].

Nemeth and Schmidt's [26] Three-Axis Model evaluates publicness across three dimensions: ownership, management, and use/users. The model represents levels of publicness on a continuum from less to more by using three intersecting axes that extend outward from the center (Figure 2).

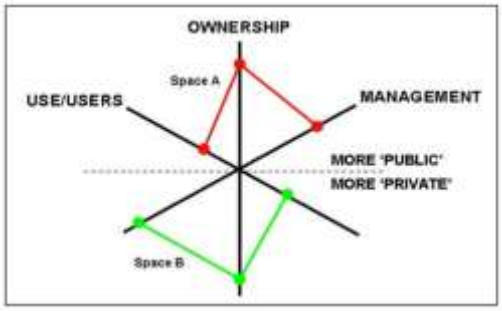

Figure 2: Three-Axis Model [26].

It is understood that this model focuses specifically on the theme of control within public space rather than the overall "publicness" of publicly accessible places. Consequently, all indicators serve only this purpose.

The *Star Model of Publicness*, developed by Varna and Tiesdell [25], identifies five dimensions to assess the publicness of public spaces: ownership, control, civility, physical configuration, and animation (Figure 3). By visually integrating these dimensions, the model enables a quantitative measurement of publicness and facilitates comparisons between different spaces. The authors emphasize that the model can be useful for evaluating public spaces and examining the factors influencing them. Additionally, while highlighting its applicability in urban planning and design, they acknowledge the need for further research and development.

Figure 3: Star Model [25].

Langstraat and Van Melik's [7] OMAI model represents publicness using a pie chart (Figure 4). This model is based on four dimensions of publicness: ownership, management, accessibility, and inclusivity. In the OMAI model, each dimension occupies an equal portion of the circle. Larger segments indicate a higher level of publicness, while smaller segments reflect a more private condition within that dimension.

Figure 4: OMAI Model [7].

In conclusion, these models aim to understand the multilayered and dynamic nature of public spaces while proposing methods to evaluate their accessibility and inclusivity. Each model seeks to measure the degree of publicness by comparing public spaces in different cities or regions. In doing so, they emphasize the potential for more informed and timely decision-making regarding the design, management, and use of public spaces.

A common aspect of these studies is the attempt to quantitatively measure qualitative data, such as user behaviors and perceptions, in assessing publicness. To achieve this, each criterion is assigned a value—either a numerical score or a categorical rating (e.g., low-medium-high)—to evaluate the publicness of a space. The resulting score is then visualized within a model to facilitate a comprehensive understanding of the findings.

4. Conclusion

Although these studies aim to quantitatively assess publicness and visualize it within a model, numerical data alone often prove insufficient. Features such as social interaction, perceived security, and patterns of use are complex and difficult to reduce to quantitative measures. Therefore, when applying predefined criteria to public spaces, it is essential to interpret them in-depth, considering the specific context of each location.

These studies suggest that such models provide a practical tool for measuring and comparing different spaces. However, as the Star Model highlights, although these criteria are derived from an attempt to define a universal concept of publicness, they inherently reflect the subjective evaluations of the researchers. Consequently, these models are flexible and open to further development. It is evident that criteria should be determined based on local context, as the characteristics of a space influence both the assessment criteria and the evaluation method itself. For instance, while most studies emphasize the importance of accessibility in public spaces, only the OMAI model explicitly considers it as an independent criterion. In other models, accessibility is assessed indirectly as part of other dimensions. The lack of a distinct focus on accessibility, despite its fundamental role in defining public spaces, is considered a key limitation. As a result, some models fail to provide a clear framework for ensuring accessibility in public spaces.

The Three-Axis Model, the “users” criterion is explicitly addressed, whereas in other models, it is considered indirectly. However, incorporating the subjective dimension of publicness into such studies is argued to complicate the analysis. A space perceived as public by one user may not align with another user's perspectives, leading them to avoid that space. Consequently, the density of users in a given space may not provide accurate data on its degree of publicness. Additionally, tracking demographic factors such as ethnicity, gender, and age can yield misleading results, as these factors fluctuate depending on the time and context of measurement. In cities experiencing high levels of migration, some neighborhoods may become ethnically homogeneous, potentially leading to a misrepresentation of their publicness in terms of user diversity. For these reasons, it is suggested that publicness assessments focus primarily on the physical attributes of spaces, while avoiding subjective and variable factors such as perception, demographics, and cultural context in the evaluation criteria.

In conclusion, using a universally applicable set of criteria to assess the publicness of public space may overlook the physical characteristics and contextual factors of each space. Applying the same evaluation criteria to all locations can be misleading, as it would equate distinct spaces, such as coastal areas and inland sites, without considering their unique attributes. For instance, the accessibility, security, and user interactions of a public space on the coast cannot be assessed in the same way as those of an inland space. Accessibility in a coastal setting requires a more nuanced approach with broader subcategories. Therefore, the assessment of public spaces should involve context-specific criteria and in-depth qualitative interpretation. These criteria should be adaptable to the physical structure and surroundings of the space, allowing for flexibility based on local conditions. By adopting this approach, the publicness of public spaces can be evaluated in a more context-sensitive and flexible manner, ensuring that each space’s unique physical characteristics are adequately considered.

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READING MIGRATION SPACES AS IN-BETWEEN SPACES IN URBAN CONTEXTS THROUGH THE CONCEPTS OF PLACE AND OTHERNESS

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Abstract
This study focuses on the spatial conditions resulting from migration, a significant social phenomenon in today's world. It interprets the spatial tension created by migrants and refugees in their efforts to secure their existence through their own memory, sociality, and actions within the space designated by the sovereign, as an in-between space. These spaces are places where fixed identities, social orders, and cultural bonds become uncertain, marking the beginning of transition and redefinition. Migrant and refugee camps, beyond being mere physical settlements, are dynamic spaces where identities are shaped, social relations are reestablished, and cultural interactions occur.
The phenomenon of migrants transforming space offers hidden potential not only through the uniqueness of their spatial experiences but also through the multilayered structure of culture, which has the ability to hybridize space. In this context, the in-between space simultaneously encompasses both destruction and construction. The theoretical framework of the study is built upon this rupture and duality experienced within space. The research method of the study examines the refugee and migrant camps assigned by the sovereign, interpreting them beyond the static form idealized by Cartesian space. It reads the reactions of migrants and refugees towards these spaces through their own perceptions and actions as a phenomenological approach and aims to reveal the dynamism embedded in the in-between space. This

perspective seeks to open a door to not only examine how the subject behaves within the space but also to contemplate how the space itself behaves. Therefore, a dual reading approach will be established among all theoretical approaches discussed within the study. The intellectual foundation of this perspective forms the in-betweenness, as a relationship where both parties nourish each other and are nourished by one another, much like space itself. Through the relationship and network of relations potentially read between these concepts, the phenomenon of migration has been spatially questioned. In considering in-betweenness as a concrete phenomenon, architectural space has been used as a tool to produce representations of the migration phenomenon. In this way, by overlapping the potentials embedded within the migrant and refugee condition with the well-established codes of space and city, the spatial dimension of migration, which is often overlooked, and the migration mobility, subject, and space interaction, aimed at uncovering the spatial possibilities created.

Key Words: *In-Between Space, Otherness, Place, Settlement, Migration*

1. Introduction

In-betweenness can point to borders, transitions, or a space, while also revealing a hidden dynamism through states of being undefined, ambiguous, placeless, or foreign. The experience of both belonging and not belonging to something simultaneously adds potential to the concept of in-betweenness, offering liberation.

In-between space creates opportunities for spatial experiences, and these experiences are unique and new for each body. The relationship between the body and space constantly transforms, interacts, reveals hidden potentials, and gains new dimensions. A space without rigid boundaries evolves into another space with each experience, being reproduced anew each time. In-between space is not constraining or limiting for the body and its movements, but it signifies that the subject experiencing it will not remain the same at the beginning and end of the process. The body is not merely an observer of space; it is a part of it and integrated with it. Through this multilayered relationship, the body and space mutually shape and transform each other.

In this study, migration and refugee camps will be analyzed as spaces of in-betweenness, how these spaces shape social identity and how changing social relations transform space. In this context, the phenomenon of migration is first analyzed philosophically and sociologically to create a conceptual framework. By focusing on the duality of not being able to leave and not being able to stay, it deals with the situation created by the potential of displacement, displacement and displacement on the displaced individual. In each case, there is a state of alienating and alienating togetherness. Within this network of relations, since the study is informed by a critical urban theory, the work of post-1968 radical urban scholars is consulted. With the onset of social change, the globalization of capital, the shaping of new conceptions of governance, the intensification of the crisis and the onset of transformation, this period can be defined as a period of unrest in which social change and struggles spread across the globe. Therefore, it can be said that the urban theories of the late 1960s are still relevant for understanding today's contemporary context. In this context, it will be possible to provide a different perspective on migration through Deleuze and Guattari's concepts of nomadic thought and dispossession, and to decode the social power relations and the codes that permeate space through Lefebvre's and Heiddegger's different meanings of space, settlement, locating, foreignness and otherness in order to connect with spatial practices while expressing the framework of the space of in-betweenness. Thus, the spatial impact of the potential possibilities of migration will be revealed. Following this methodological approach, in the second stage, in order to create an interpretive lens, the basic concepts and criticized evaluations in the literature were scanned through the Scopus database with the keywords migration-identity-migrant-identity-space and those related to betweenness were examined in detail (Table 1). By revealing the similarities and differences in the ways of settlement of migration subjects with the places of migration, the relationship of belonging established with space was questioned, spatial boundaries within the city were examined in the relationship between space - individual - society, and these areas defined as spaces of in-betweenness were divided into 3 groups. In the last stage, the ways in which migrants and refugees infiltrate into the urban space, articulate with the space, and establish belonging were examined through migration spaces in the context of the city and camp areas as spaces of conflict and reconciliation, and thanks to this conceptual network of relations, migration, being an immigrant and refugee was made to coincide with the established codes of space in the city. In this way, the potentials of migration and immigration and the possibilities of mutual transformation of spatial effects will be revealed.

Table 1. References that relate migration-identity-migrant-belonging-space based in between (created by the authors)

Notion	Theoretician	Explanation
Boundary	Hegel	The border creates contradictory space
Threshold,change, transformation, permeability	Walter Benjamin	Experienced temporary permeable space
Liminality,in-between, transitivity	Victor Turner	The space where temporary identities are constructed
Space of meeting and dialogue	Herman Hertzberger	Space for dialogue
Space of freedom	Georg Simmel, Stavros Stavrides	Space of emancipation formed in the field of encounter with otherness

Space of communication, unpredictable	Bourdieu, David Harwey	Social comprehension and communication space
In-between space	Aldo van Eyck	Space of continuity
In between zones	Richard Sennet	incomplete space
Cracks, transitional space	Josette Feral	Virtual other space, performative act
Other space, Heterotopia	Michael Foucault	An interstitial space between the real and the unreal
Porous space	Stavros Stavrides	Space of rhythms
Being-Becoming	Deleuze, Guattari, Bergson, Heidegger	Space of becoming and movement
In between space	Elizabeth Grosz	Two spaces touching each other, compression
Space of tension – in between space	Bernard Tschumi	Contradictory space between the old urban fabric and the new
Space of transparent	Sou Fujimoto	transparent space formed in between

According to Lefebvre (1974/2016: 25), space consists of codes and 'connects the mental with the cultural, the social with the historical'. [1] In Heiddegger's understanding of space, it is related to the boundaries set as it depends on the mind of the perceiver. He states that what is important is the experience of inhabitation by revealing the relationship between space and place. While some borders are definite and certain, some borders are temporary and indeterminate. As simultaneously visible and invisible spaces, borders are where the identity, values and belonging of users begin. According to Deleuze and Guattari (1990/1980: 80), the life of the nomad is like a rhizome, it has no beginning and no end, the flow is in the middle and it is constantly becoming. When studies on migration are examined, it is generally seen that the beginning and end points are emphasized and the event is analyzed in a cause-and-effect relationship. Here, however, the potentials offered by dynamic and fluid becoming, which is an important dimension of the phenomenon, are ignored. Therefore, in this study, rather than analyzing the phenomenon, the potentials of becoming are explored. This is similar to the rhizome method. It establishes a dynamic connection between subject and space with the combination of the removal of the perception of boundary, mutual transformation and infinite collision. In the spontaneous space, the border is blurred and variable. The infiltration of the city through migration begins to carry the cultural codes of the migrant and refugee into the city. The space is thus shaped by different behavioral codes in a fragmented and interrelated manner. Each interaction realizes production with different dynamics. Here we are talking about a spatiality of in-betweenness in a state of flux, and this spatiality carries countless potentials within it.

The concept of the space of in-betweenness, which corresponds to multi-layered meanings such as temporal and social as well as spatial, offers a framework through which different spatial practices can be analyzed from an analytical perspective. This framework points to three perspectives of spatial in-betweenness in the urban context, despite being located in different scales and contexts. (Figure 1) The first of these is spaces of tension, such as spaces created by migration, refugee camps, informal settlements and geopolitical borderlands. In these urban spaces, one encounters architectural features such as residential compounds transformed by users with limited resources, permanentization of temporary tent camps, or concrete border walls separating political zones. These are spaces where communities marginalized as a result of economic inequalities and local and global policies become visible. In addition to discussing these contexts in the studies that deal with the issue of migration as architecture, in practice, while formations such as think-tank organizations seek spatial solutions to infrastructure problems and housing problems in slum settlements, the studies of DAAR (Decolonizing Architecture Art Residency), which examines physical, social and psychological factors in refugee camps such as in the Bati Seria, or studies on physical - political borders in cities invite us to rethink architecture in socio-political and economic terms.

The second spatial in-betweenness is the potential for socio-spatial organizations in spaces that have been left idle, deprived of social life and out of use due to various reasons such as changing urban policies and limited economic conditions. These spaces can be defined as spaces of uncertainty. The decisive common point of these spaces, which are mostly temporary, is that they aim to strengthen social relations as well as being a means of experiencing collective life. In abandoned spaces, it is common to construct temporary public installations using simple materials, or to make existing idle structures usable with a different function. For example, in 2018, Raumlabor installed The Floating University in a stormwater basin in Tempelhof, Berlin for a limited period of time, where students, academics and practitioners seek answers to urban problems, while the spatial interconnectedness created by the structure creates a potential for social organization.

The third spatial in-betweenness is the interaction space positioned as a public ground where unexpected uses and social encounters occur as a result of small-scale and short-term actions. An example of these spaces, which reflect a social upheaval but are also the result of an in-between situation, are the spaces of the Gezi protests.

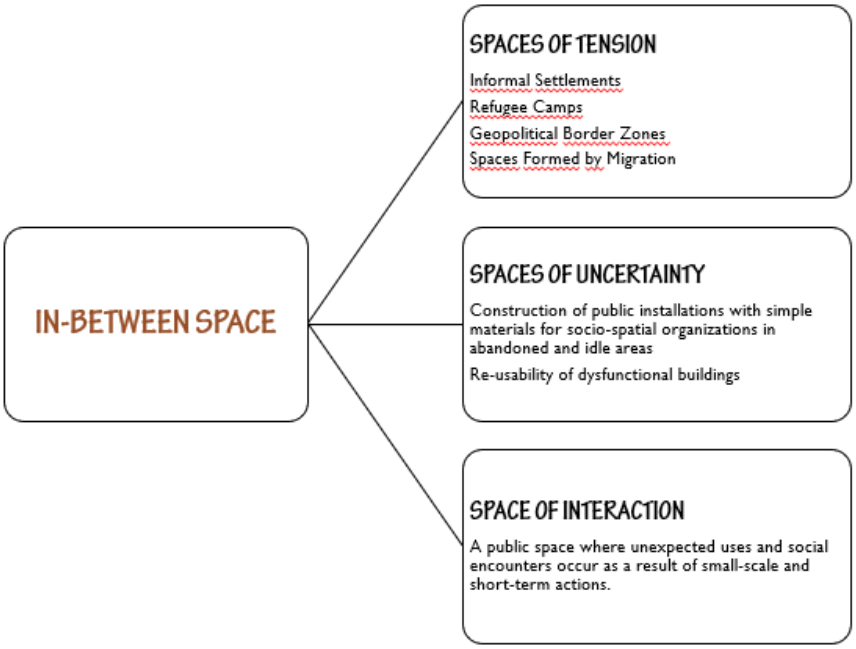

Fig. 1. Diagram of the perspective of the in-between space in the urban context (created by the authors)

2. In-Between Space: Settling, Relocating, and Changing Place in the Placeless Individual

Immigrant and refugee camps are hybrid spaces where tensions, contradictions, and ambiguities coexist, forming a dynamic environment. As the users change, both the appearance and the identity of these spaces, as well as the relationships established within them, evolve, creating a dialectical interaction between the city image and the immigrant. The settlement area allocated by the authority also defines a way of life, establishing boundaries. Immigrants must continue their lives within these defined spaces. This situation, in essence, represents a form of exclusion and a state of in-betweenness, incorporating the immigrant. Over time, social segregation between these communities and urban dwellers increases, and both visible and invisible physical and mental boundaries become more pronounced. As the immigrant begins to adapt to the rational spaces, which represent a Cartesian philosophy detached from their roots, the practices of space production reflect traces of their identities. This is a manifestation of self-realization through space. In Foucault's words, immigrants reveal who they are, not just through their identities, but through their creative capacities. In this sense, they re-create space. Thus, there is an effort to transform this Cartesian space into a “place” according to their actions. According to Lefebvre (2020), "each subject settles into a space they recognize, or have lost, and consequently either use or alter" [1]. This parallels Norberg-Schulz's concept that space is a result of social actions and is conceptualized as a place.

Despite being in different cultural relationships and the transient nature of their experiences in the city, immigrants create constructs within the spaces they occupy, allowing them to feel a sense of belonging. As a result, new possibilities for action emerge, enriching the relational dynamic between the subject and the space. Instead of a spatiality defined by static order such as rooting, continuity, or stagnation, a dynamic structure arises from fluidity, mobility, and temporary feelings of belonging. Mobility also creates hybridity. The individual transforms the space, and the space transforms relationships. Unlike the fixed, the creative process that allows change leads to a continuous state of spatial experience. The spatialization of temporality is directly related to the relationship between time and space. The time factor determines the overlapping characteristic of formation on space. As a result of repeated experiences over time, space becomes perceivable, meaningful, and subsequently recognizable. Space transforms with the immigrant’s presence. Thus, an abstract space begins to form, one that cannot be confined by boundaries but rather is shaped by experiences in flux. This transformation is not fixed or one-time but instead contains continuity through the effects of change and temporality. The immigrant can create their sense of belonging by transitioning from a “place” defined by identity to a “place” perception that transcends identity through mobility. In this way, the space experienced in the present offers a new spatial experience with a liberating effect. In this relational network, neither the individual nor the space remains the same; both change and transform, adopting a different form within this state of flux.

The memory of what is left behind and the sense of belonging defined through new experiences reflect the temporal influence of space. With this approach, immigrant and refugee camps describe a state of coexistence temporally and a state of becoming spatially. In this relationship, there is no final destination, making the cycle endless and dynamic. Thus, space

can be witnessed at any moment but cannot be confined, can be experienced but cannot be pinned to a specific point. It is formed over time but contains a broad time that begins in the present and continues. Here, identity and experience are continuously transformed over time. This transformation is facilitated by the space itself, the individual, and the process. With these characteristics, immigrant and refugee camp areas are in-between spaces.

3. Being The Other: In-Betweenness as The Space of Otherness

In societal space, individuals or communities who cannot be coded as "local" are reduced to the status of the "other." However, otherness defines a relational condition, and the "other" exists both inside and outside. In this sense, otherness is a state of becoming. Harvey characterizes the relationship with the other as a spatial-temporal construct in all cases. Stavrides emphasizes that instead of confronting the other as something distinct, we should perceive it as evolving identities.

According to Sennett (2017), in order to understand the other, one must accept themselves as incomplete [2]. In this way, an intermediary identity will be defined in the meeting space. In these spaces, concealment is not an option; instead, a self is constructed through encounters. The individual does not separate themselves from others but strives to understand what is different from themselves. Stavrides (2021) defines this space as a threshold and points to a potential movement toward otherness [3]. Approaching the other involves temporal and spatial transitions. According to Benjamin (1992), the flâneur perceives these transitions as crossroads [4]. Thus, otherness is not a threat, but rather promises new hopes. These spaces reveal encounters between different life trajectories.

Immigrant and refugee camps define a spatial transformation process characterized by the uncertainty and liminality inherent in otherness. The long-term state of temporariness in these spaces leads to the settlement of migrants, while the acceptance of exclusion and the inability to return hinders the sense of settlement. The feeling of being stuck between two worlds dominates the individual. Within camp spaces, a liminality induced by tension exists. Refugees from the same country but from different ethnic groups cluster together by forming connections between spaces, creating their own “other” within. With this othering, interaction is simultaneously formed, and a new relationship is defined. Cultures meet, creating areas of contact and conflict. According to Bhabha (1994: 38), these spaces are "contradictory spaces where cultural systems and identities are synthesized." The existence of complex societies in these spaces results from their being places where discourses far from ‘self’ and ‘other’ are produced, and pluralism is observed [5].

Another dimension of camp areas is that, spatially, despite efforts to create two different societies by means of segregation, commercial relationships stretch these boundaries. For example, in the West Bank, the wall constructed by Israel is described by Omer Faruk Gunenc (2015) as a "wall of shame" (Figures 2). According to him, this wall not only separates but also destroys. For Gunenc, who views the wall from two opposing sides, it is both an open prison for the Palestinians and, at the same time, a prison for Israel itself. These two forms of existence, although oppositional, define each other and thus reproduce the network of relationships. Gunenc’s statements are significant for the conceptual framework created: "Both forms of existence—impermeability and flexibility—produce two opposing and yet cohesive ideas and practices/relationship networks. The effort to create two different societies by spatially segregating them results in the formation of an impermeable society. However, this effort, or in other words the impermeability relation, is actually leaking in the process of attempting to create an isolated society" [6].

Fig. 2. (a) Wall of Shame - the entry/ checkpoint between Jerusalem and Ramallah (Gunenc, 2015); (b) Wall of Shame - a section within the city of Bethlehem (Gunenc, 2015)

In The Foreigner (Sennet, 2011), Sennett exemplifies the seclusion of Jews in Venice at the end of the Middle Ages, where they were confined to a ghetto, and explains that these outsiders built a collective character within the ghetto. Thus, spatial separation and limitation take on a new meaning. Life in the ghetto became a form of urban existence. The space of the Other became the root space. In this context, the camp area creates a new form of urbanism.

There is also a tense relationship between the camp and the city. Migrants and refugees working in the cities as cheap labor and returning to the camps after work is a sign of changing identities and in-betweenness throughout the day. The migrant is an actor in the city during working hours, while upon returning to the camp, they take on their other, more enclosed identity. This fluctuating identity, in turn, creates a fluctuating life, defining the camp areas as in-between spaces. Petti (2015) describes camps as "a space caught in between, a place in limbo" [7]. In these spaces, concepts like habitation, othering, identity, and belonging are dynamic, which creates a tense situation. In the words of Pelin Tan (2015), citing Michel Agier (2002), "… camps are places where a power system, social life, and spatial organization persist that are nowhere else. Because no existing concept fits for this paradoxical and hybrid space, I will use the term 'camp-city' (camps-villes) to conceptualize it" [8]. This defines camp areas as socio-spatial spaces.

Immigrants fluidify space by dissolving the rigid boundaries of sedentism through the creation of hybridity, thus rendering space dynamic and removing it from its rational state. "Spatial forms and processes are created by the dynamics of the social structure as a whole" [9]. Space is no longer static; it is variable, plural, and independent of time. In this context, the power to create new relational forms and, consequently, new types of spatialities emerges. Here, rather than boundaries, social space is re-produced as a free act. Space composed of boundaries engages in reciprocal interaction with the inclusion of the body and experience, leading to a blurring of boundaries and a transition to a state of becoming. Both contact and dialogue exist here. The body and space liberate and redefine each other. The in-between space generates opportunities for spatial experiences, and this experience is distinct and new for each body. The relationship between body and space constantly transforms, interacts, uncovers hidden potentials, and gains new dimensions. A space without rigid boundaries evolves into another space with each experience and is re-produced anew every time. The in-between space is neither coercive nor restrictive for the body and its movements, but it indicates that the subject who experiences it will not remain the same at the beginning and end of the process. The body is not an observer of space but is part of it, integrated with it. Through this multilayered relationship, the body and space mutually shape and transform one another. From this perspective, the in-between space is a creative interval produced through reciprocal transformation. (Figure 3)

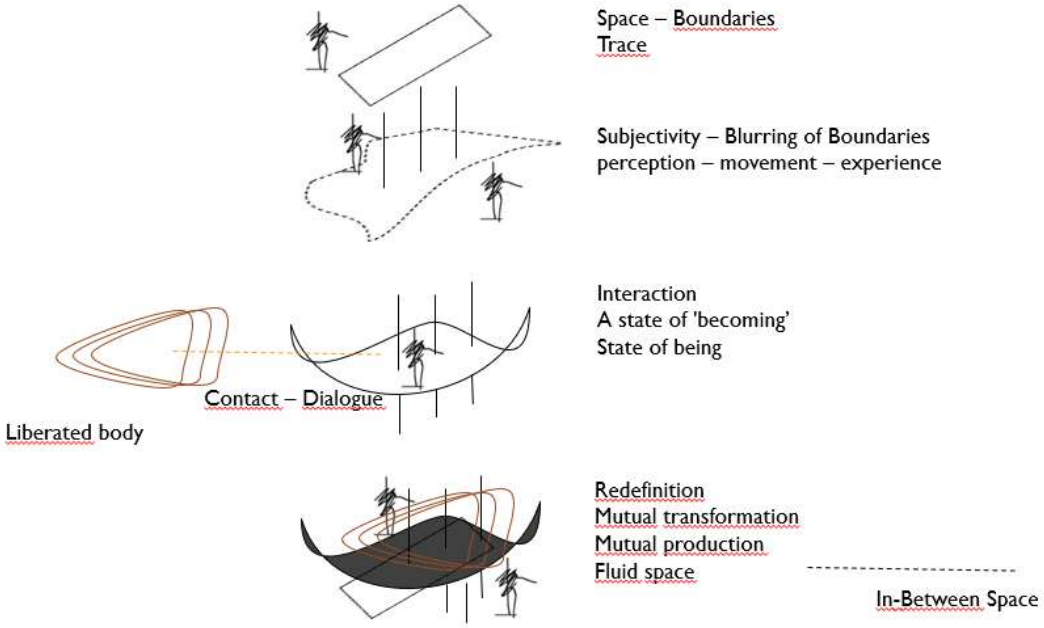

Fig. 3. Diagram of the in-between spaces (created by the authors) Immigration dissolves the boundaries of sedentariness by creating hybridity and fluidizes space. The fluidized space and the body mutually change and transform each other. In this transformation, a space of in-betweenness is produced.

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Conclusion

The dynamics of the social structure shape space. Therefore, understanding the relationship between users and space, beyond physical requirements, is the first condition for analyzing space in all its dimensions. Space is heterogeneous and plural; thus, it is always in the process of construction and is never finished. In this context, when the framework of the space of in-betweenness, Deleuze and Guattari's views on nomadic thought, being out of place, being in becoming and being in flux, and Lefebvre's and Heiddegger's codes of social power relations and space through the different meanings of space, settlement, being located, being foreign and other are analyzed, it is evaluated that the spatial impact of the potential possibilities of migration is in line with these views.

Since the study focuses on the spatial situations experienced as a result of migration, which is an important social phenomenon of today's world, it reads the spatial tension created by migrants and refugees in the space allocated by the sovereign in an effort to ensure their own existence with their own memory, sociality and actions as a space of in-betweenness.

With its complex social networks and concepts such as belonging and identity, space transitions from being measurable and static to a dynamic state that produces and is re-produced by movement. When the spatial boundaries within the city are analyzed within the framework of this becoming, with the relationship between the individual - society - space, spaces of in-betweenness are formed and these spaces are divided into 3 groups as spaces of tension, uncertainty and interaction. The first of these are spaces of tension such as spaces created by migration, refugee camps, informal settlements and geopolitical border zones. The variable relationships that immigrants and refugees form with space reveal the clues for the re-production of space and its potential. This epistemic and spatial shift transforms refugee and migrant camps, constructed as spaces of otherness, by building a new urban individual and space. Migration spaces stretch and produce new relationships, and these relationships, in turn, give way to social change and spatial transformation, forming a new mode of representation. Thus, a reciprocal interaction and transformation take place. The study aims to define a new form of urbanity through the dynamic nature of in-between spaces, offering a forward-looking perspective based on these tensions and potentials. Migration and refugee camps, as spaces of in-betweenness, are dynamic environments where experience, movement, and temporality converge. Through the network of relationships individuals establish with these spaces, not only does the space itself undergo transformation, but individuals also enter a process of self-transformation. These spaces, shaped by moments, encounters, and possibilities, extend beyond the visible, offering an exploration of spatial boundlessness. In this context, the spatial and social interactions generated by migratory movements, along with the evolving practices of settlement, embody significant potential. The second form of spatial in-betweenness emerges in the context of abandoned, socially disconnected, and disused spaces, which, due to shifting urban policies and constrained economic conditions, hold potential for socio-spatial reorganization. These spaces are defined as spaces of uncertainty. The third form of spatial in-betweenness manifests in interactional spaces—public grounds where small-scale and short-term actions give rise to unexpected uses and social encounters. These spaces serve as ephemeral yet transformative arenas where transient interactions and spontaneous social formations take place.

This study aims to shift the focus from predefined spaces and their users to the role of migration in the continuous reproduction of space, revealing the potential of these spaces as sites of shared experiences, encounters, and interactions. By bringing these dynamics into discussion, the study seeks to uncover the transformative possibilities embedded within spaces shaped by migration.

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EVALUATION OF ENERGY PARAMETERS IN TRADITIONAL ERZURUM HOUSES "YELLOW MANSION HOUSE"

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Abstract
The geography of Turkey has historically been home to many ancient civilizations, resulting in built environments dominated by historical textures and monuments that systematically reflect the various layers of architectural culture. The preservation of traditional structures and their transfer to future generations with their original texture depends not only on the correct restoration processes, but also on energy efficiency and user comfort. Since rapid urbanization and other external factors create negative pressures on historical fabrics, incorrect advice to meet modern comfort requirements often accelerates the deterioration of traditional buildings.
In the context of conservation, this study examines Sarı Konak, a traditional Erzurum house, and evaluates the current energy values using the Design Builder simulation program. Various scenarios have been created using traditional materials and improved traditional composite materials. These scenarios are in line with the guidelines set by Historic England and other historic environment approaches, which are categorised according to the proposed criteria. The results were then evaluated in terms of energy efficiency, scale of intervention, and potential benefits of using locally sourced, natural materials. The findings underscore how minimally invasive methods, combined with modern materials research, can reduce both energy losses during building operation and the energy footprint of material procurement. The findings showed that the improvement of traditional natural materials improves energy efficiency even in the least intervention method and the importance of the method-determining role of simulation programs before the implementation of restoration projects.
Keywords: Thermal Comfort in Traditional Erzurum Houses, Energy Efficiency in Traditional Erzurum Houses

1. Introduction

Increasing energy consumption worldwide inevitably imposes significant environmental and economic burdens. As resources become scarce, research on reducing and controlling energy consumption in buildings has become critical. According to a 2018 report published by the Global Alliance for Buildings and Construction, in 2017, 36% of global energy was consumed by the construction and operation of buildings, while about 40% of carbon dioxide emissions from energy use originated from the built environment.

Estimates show that 15% to 40% of the global building stock consists of historical, traditional structures [1]. Most of the energy in our built environment, from large cities to small settlements, is consumed in residential areas [2]. However, the energy needs, comfort requirements, and carbon emissions associated with historic buildings vary greatly, largely influenced by geographical location [3].

Unlike modern buildings, historic buildings require different strategies to improve energy performance. Such improvements should remain within the parameters of "ethical restoration" set by various conservation boards to ensure that the authenticity of historic structures is not lost. Over the centuries, traditional buildings have evolved to maximize thermal comfort through culturally specific building systems, plan layouts, and strategic use of local materials. Modern restoration projects therefore face the challenge of balancing the necessary comfort upgrades with minimal structural or material changes that could compromise historic value.

Despite laws, regulations and established conservation principles, many heritage buildings are still being restored or adapted without adequate analysis of comfort and energy requirements. This study focuses on evaluating the thermal comfort and energy performance of a traditional Erzurum house (Sari Konak) using a modeling approach that accounts for both the building's original materials and potential composite material alternatives.

1.1. Hypothesis

Many renovations use modern or non-traditional materials to address functionality or comfort issues without a thorough building analysis. Although these interventions can prolong the physical existence of the building, it can reduce its historical authenticity. Over time, such buildings can still deteriorate, forcing residents to make unauthorized adjustments.

Therefore, by integrating comfort and energy-performance analyses into the earliest stages of heritage building restoration, stakeholders can identify the best methods and materials to maintain authenticity and ensure long-term sustainability.

1.2. Purpose, Scope and Method

This study analyzes the energy and comfort performance of a historical mansion in Erzurum, whose restoration will be projected and compares various scenarios involving different degrees of intervention and material change. Using the Design Builder simulation program, different envelope configurations (original and improved material) have been evaluated in terms of energy consumption, heating load, and carbon emissions. Building energy modelling is based on the entry of data constituting the building's energy expenditure into the computer program and the analysis of annual, monthly, daily energy consumption through simulation. In this process, Design Builder stands out by offering an integrated interface with EnergyPlus, which is continuously updated by the US Department of Energy. Especially in complex historical building projects and energy efficiency optimization processes, the detailed analyses and 3D modelling capabilities provided by Design Builder contribute to energy-efficient building design by supporting decision-making processes [4].

Main objectives:

- Compare the thermal performance of conventional materials with new, composite variants.
- Evaluate different intervention modalities in line with international conservation approaches (Historic England guidelines).
- Demonstrate how combining simulation outputs with historical and architectural considerations can guide restoration strategies.

1.3. Comfort and Energy Improvements in Historical Buildings

According to Web of Science data, "energy" is the subject of more than four million publications, while "energy performance in buildings" is featured in more than 55,000 publications. However, only some of these studies are especially related to historical buildings. Even fewer mention "energy comfort performance in historic homes," indicating that this remains an under-researched task that requires more extensive research.

1.4. Materials and Methods

A key goal is to develop solutions that improve energy efficiency while preserving the authenticity of traditional structures. This article uses Historic England's four-level scale of intervention, ranging from minimal to substantial intervention, which weighs both cost and technical risk [5].

- Active Systems: Technological advances such as modern heating, cooling and ventilation.
- Passive Systems: Interventions to the building envelope, e.g. improved insulation or window reinforcements.

We tested the scenarios in the Design Builder simulation program using climate data from Erzurum, which is compatible with Zone 4 in the Turkish TS 825 insulation standard. Three-dimensional modeling, hourly heat gain/loss analysis and energy load/carbon emission calculations were performed for each scenario. The "Zone Sensible Heating" output in Design Builder served as the metric for heating, while the "total energy" metric provided an overall consumption perspective. The targeted gain values in the intervention in the structure are graphed in table 2.

Table l. Degrees On the Scale of Historic England; Impact Assessment (Revised by the author) [6].

DEGREE 0	Current status determinations of the structure (Document of the current energy efficiency of the structure)
DEGREE 1 (Improvement of thermal performances applications - low cost and low risky options)	Improving the use of natural and artificial lighting Insulation of sloping roofs at the ceiling level Insulation of flat or slightly sloping roofs Wall repair Adding blinds to Windows
DEGREE 2 (Improvement of thermal performances applications - Some costs or options that involve risks)	Plaster, paint Insulation between the roof rafters, Under and above the roof Decking Cladding with panels on interior walls Adding a second joinery to the Windows and doors Insulation in floor coverings
DEGREE 3 (Improvement of thermal performances applications – High-risk or high-cost options)	Insulation walls Insulation of hollow walls Insulation of frame system elements Window replacement, glass replacement Underfloor insulation that sits on the floor Layered insulation in floor coverings

Table 2: Energy and carbon emission targets

Results	Scenario I (Current situation	Scenario 2 (Grade I interventions	Scenario 3 (2nd degree interventions
TotalEnergy consumption (kWh/ m^2-yI)	203	120	80
Heating load (kWiI/ m^2-yI)	192	100	60
Carbon Emission (kg/m^2)	60.192	30.587	20.478

2. TRADITIONAL ERZURUM HOUSES

2.1. Typology and General Features

The concept of "Turkish house" in Anatolia has been shaped by cultural traditions, religious influences, local materials and climatic conditions. In Erzurum, extreme cold, economic conditions, dependence on agriculture and animal husbandry have caused a different typology characterized by stone walls, thick earthen covers, and an inner courtyard.

Among these traditional Erzurum houses are:

- One-Storey Houses: Includes a room, a tandoor, a courtyard, and a barn area.
- Two-Storey Houses: There is a tandoor area downstairs and seating upstairs.
- Mansions (Konak): Larger complexes, usually with harem-selamlık (private and guest) sections, sometimes more richly decorated.

When the basic materials and techniques used in the construction of buildings are examined, it has been determined that three different types of stone were used, namely karataş (black stone), boztaş (grey stone), and kamber taşı (kamber stone). While the ground floors and corner sections of the buildings were generally constructed with cut stone, rubble stone and sometimes brick material were used in the upper floors. Soil, which is one of the basic building materials of the structures, was used as a binding element both in the main covering of the structures and in the construction of the walls. Wood material, on the other hand, is another important type of material used in the outer facades and especially in different sections of the interiors.

2.2. Yellow Mansion House

In this study, Sarı Konak located in Mirza Mehmet Neighborhood of Yakutiye District of Erzurum Province was examined. The mansion is located on a rectangular plot with an east-west direction, with the northern façade on Hacı Ali Street and the eastern facade on Hüseyin Efendi Street.

Fig. 1. Aerial view of the house and its immediate surroundings. [7]

Plan and Architecture Sari Konak exhibits its characteristic two-story building layout. The main living areas are on the ground floor (including the tandoor room), which is also connected to a courtyard or garden. The barn and storage areas usually occupy part of the same level. An internal staircase leads to an upper floor that provides additional rooms for the family or guests.

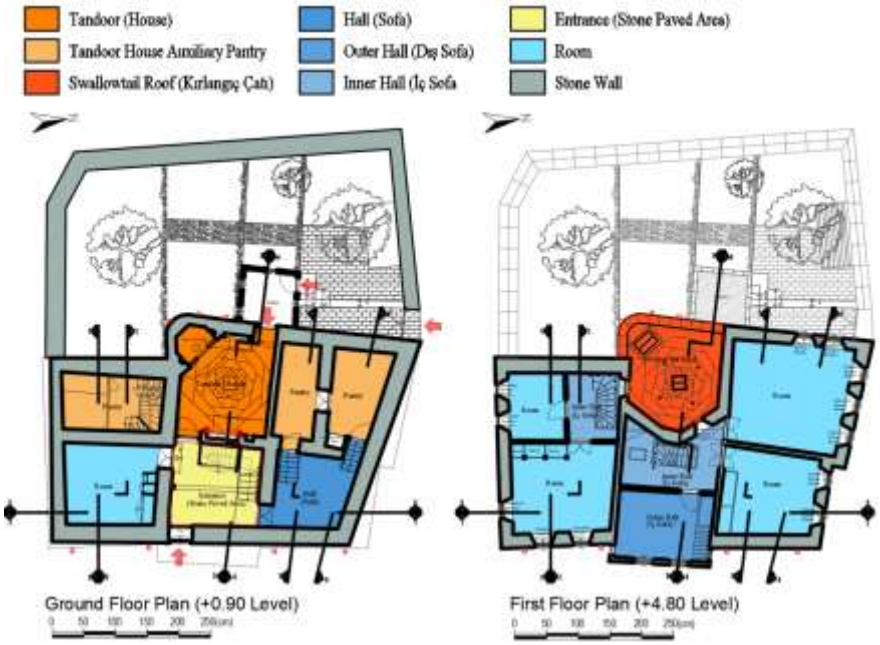

Figure 2: Spatial organization and plan shaping of the floor plans of the “Sarı Konak” building. prepared by the author, 2023.

The spatial organization of the “Sarı Konak” building is one of the examples of the characteristic plan scheme and spatial arrangement of traditional Erzurum houses that have survived unchanged to the present day.

It is clearly seen that the ground floor plan is shaped around the tandoor house. In the winter months, it serves as the living space of the household. The spaces closest to the tandoor house are auxiliary spaces (cellar-storage etc.). In the winter months,

the room on the ground floor is used for multiple purposes (such as resting-sleeping and socializing). It is possible to reach the spaces where the needs are met in the winter months (storage-woodshed etc.) on the ground floor from the inside. As can be seen, cold climate conditions have shaped the plan organization.

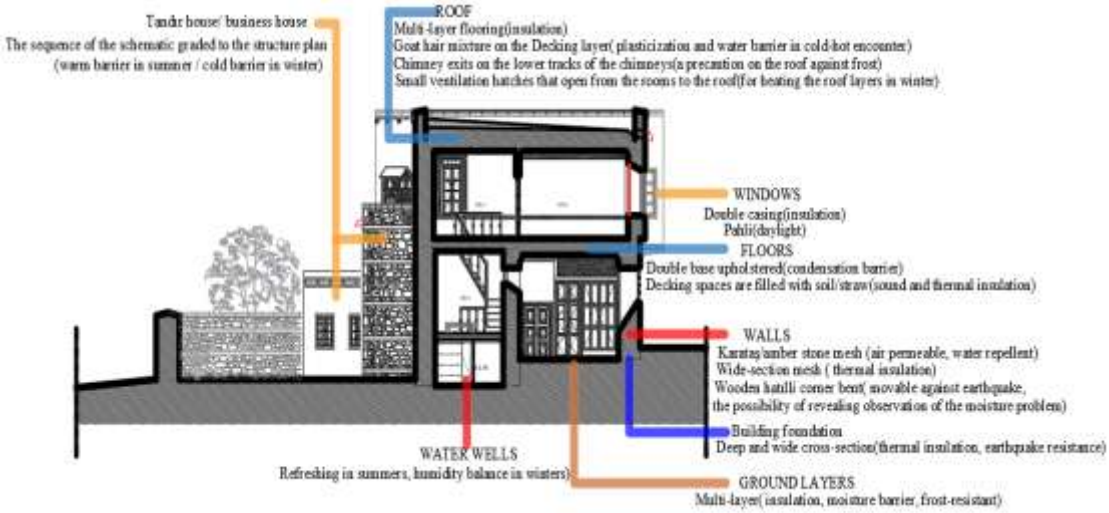

Figure 3: Evaluation of the thermal comfort elements of the building elements of the "Sarı Konak" house on the cross-section, prepared by the author, 2023.

As seen in Figure 5, the structural elements and construction techniques in traditional houses are the reflection of the experiences gained over many years. The reflection of this information on the structure;

- On the walls: Black stone/amber stone mesh (air permeable, water retaining), wide section wall mesh (heat insulation), wooden beam corner dam wall (movable against earthquake and the possibility of observing the moisture problem). The ground floor, which is protected by thick stone walls, provides the thermal comfort of the spaces after the stone-soil layer and the ground floor, which is raised with wood.
- On the roof: Multi-layered flooring (insulation), goat hair mixture in the middle layer (plasticization and water barrier in cold-hot encounters), chimney outlets in the lower traces of gargoyles (roof water drain channel) (precaution against frost on the roof), small ventilation covers opening from the rooms to the roof (for heating the roof layers in winter).
- The water wells located in the tandoor house section meet the water needs of the house life while also providing cooling in the summer and moisture balance in the winter.
- All the structural elements have more than one function and benefit. For this reason, it is very important to preserve the original details along with the construction systems in the restoration applications of the buildings.
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Fig. 4. Entrance gates from Haji Ali Street.

Fig. 5. Internal staircase that closes the height difference between the garden and the ground floor.

Fig. 6. Main tandoor area.

Fig. 7. The south wall of the tandoor section shows a traditional door.

Fig. 8. Upstairs hallway, view from the tandoor area.

Fig. 9.: Various rooms upstairs.

2.3. Erzurum Province: Energy and Climate Data

Erzurum experiences long and harsh winters with the lowest extreme temperatures. According to the General Directorate of Meteorology, the region falls under Climate Zone 4 according to TS 825 standards, requiring high insulation values and careful detailing to minimize heat loss.

Table 3: The annual number and rate of snowy and frosty days in Erzurum Province 2023 (MGM).

Months	Number of Hail Days	Number of Snowy Days
January	30.7	11.5
February	27.8	12.3
March	28.0	13.9
April	17.0	4.9
May	4.8	0.4
June	1.2	-
July	-	-
August	-	-
September	1.4	-
October	14.3	1.4
November	25.2	4.4
December	28.9	12.8

Annual rainfall in Erzurum is 453 mm. The least precipitation falls in the winter period. The precipitation of this period is in the form of snow, the number of snowy days is 50 and the duration of the snow cover on the ground is 114 days. The rainiest seasons are spring and summer. The annual average number of snow-covered days in Erzurum is around 113.6 days. Days when the minimum temperature is -0.1 ° C and lower are called "Frost Days". Frost is seen every day in the province, especially in winter, and varies between 5-28 days in spring and autumn.

Tablo 4: Average Temperature Values in Erzurum Province (1950 - 2015) (MGM).

ERZURUM	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average temperature	-9.3	-7.9	-2.3	5.5	10.6	14.9	19.3	19.4	14.6	8.0	0.7	-6.1
Average highest temperature	-4.0	-2.4	2.9	11.2	16.9	21.9	26.7	27.3	22.7	15.3	6.7	-1.0
Average lowest temperature	-14.3	-13.0	-6.9	0.1	4.1	7.1	11.0	10.8	6.0	1.5	-4.3	-10.6
Average sunshine duration	3.1	4.3	5.1	6.3	8.0	10.2	11.2	10.7	9.0	6.7	4.7	3.0
Average number of rainy days	11.3	11.1	12.8	14.2	16.6	11.0	6.4	5.3	5.0	9.9	9.2	10.8
Average monthly total rainfall	19.6	23.1	32.0	51.5	70.3	46.7	25.8	16.5	22.5	46.8	30.7	20.5
Highest temperature	8.0	10.6	21.4	26.5	29.1	32.2	35.6	36.5	33.3	27.0	17.8	14.0
Lowest temperature	-36.0	37.0	-33.2	-22.4	-7.1	-5.6	-1.8	-1.1	-6.8	-14.1	-34.3	-37.2

Erzurum Province climate; It has a distinct continental climate structure as a province that draws attention with its high altitude and distinct cold climate in the geography of Turkey. The characteristic features of this climate structure include low temperature values and heavy snow cover in the winter months and high temperature levels and low humidity rates observed in the summer months. According to regional data, it has been determined that Erzurum is covered with snow for a period of approximately two to three months. The beginning of the summer season becomes especially evident in June and continues until mid-July. The average annual precipitation was measured as 460 mm per square meter. The hydrological cycle of the streams in the region is supported by water resources originating from melting snow water to a significant extent [8].

Erzurum topography; It attracts attention as one of the provinces with the highest average altitude (1900 meters) in the Republic of Turkey and has a geographical structure exhibiting plateau characteristics. Erzurum, which has the highest settlement elevation among metropolitan cities in Türkiye, is one of the rare examples of such a high settlement in the mid-latitude zone on a world scale. The province is surrounded by distinct mountain ranges, including the Palandöken Mountains in the south and the Kargapazarı Mountains in the north. Other mountain ranges such as the Dumlu Mountains, Güvercin Mountains and Mescit Mountains are also located within the provincial borders [9].

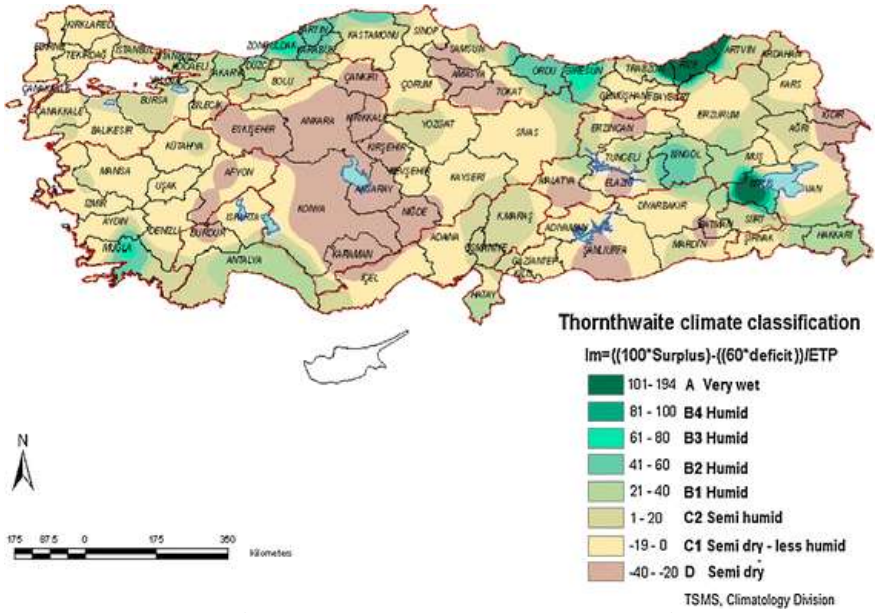

Fig. 10.: Map of Turkey according to Thornthwaite climate classification [10]

3. ANALYSIS

The research team created 3D geometric models of Sarı Konak using the Design Builder simulation program. Materials were defined by their thermal properties (U-values, specific heat, etc.). Scenarios included:

- Original Building Envelope: Traditional stone, earthen roof and minimal internal insulation.
- Enhanced Traditional Envelope: Includes enhanced soil or composite plaster and minor insulation on the roof/floor if permitted under conservation guidelines.

Annual heating loads, total energy consumption and carbon emissions were calculated. The "Zone Sensible Heating" data in Design Builder represented the baseline for heating, while the "total energy" metric offered an overall consumption perspective. These outputs were then compared across intervention scenarios.

Table 5. Energy and carbon emission findings

Results	Scenario I (Current situation	Scenario 2 (Grade I interventions	Scenario 3 (2nd degree interventions
Total energy consumption (kWh/ m2-yI)	203	79 61% energy saving	62 69% energy saving
Heating load (kWiI/ m 2-yI)	192	58 70% energy saving	49 74% energy saving
Carbon Emission (kg/m2)	60.192	19.587 67% energy saving	12.478 79% energy saving

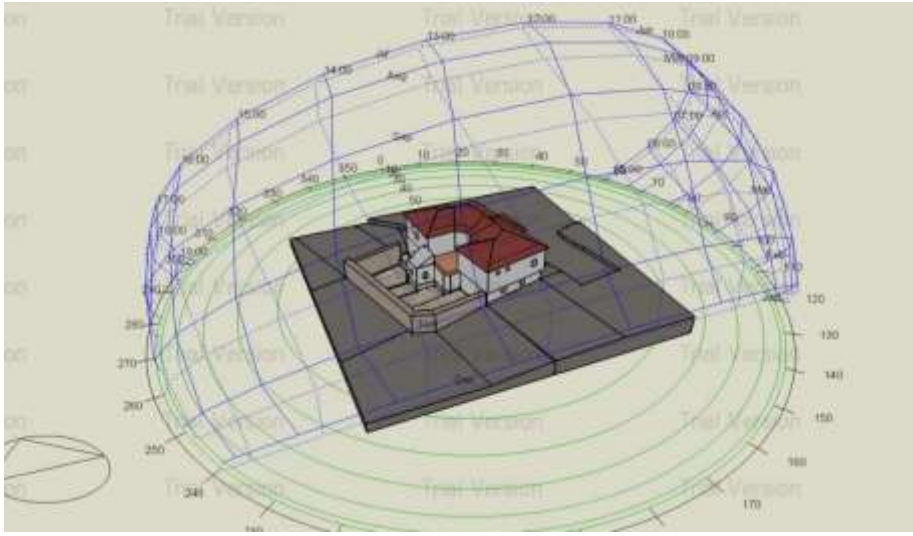

Fig 11. Display from Design Builder

4. CONCLUSION

Traditional buildings in cold climates such as Erzurum were initially optimized for their surroundings through thick masonry, earthen roofs, and strategic spatial organization. Their survival over the centuries shows built-in sustainability; However, urban development, air pollution, and changing user needs create challenges for continued conservation.

The simulation-based data in this study showed that combining original materials with natural, composite improvements can significantly improve the building's energy performance without reducing its cultural value. Additionally, using local sources for composites can reduce the energy embedded in the materials themselves. These findings suggest that before implementing restoration or repair projects, heritage buildings should undergo extensive simulation for:

- Determining the most suitable material selections.
- Identify the least intrusive interventions that align with ethical standards.
- Ensure long-term sustainability and user comfort, so that repeated unauthorized changes are avoided.

In the context of these results, the simulation scenarios are connected to the specifications by the official institutions and historical environmental protection boards before the restoration application projects and requested from the contractor architects and project companies will increase the awareness in restoration applications. In addition, the addition of simulation programs to the education processes of institutions providing Architectural Restoration education (universities, etc.) will support awareness and expertise in the coming years.

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