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Research Article

The Concept of Sustainability in Interior Design: A Review of Global Practices and The Turkish Perspective

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Abstract: Sustainability in interior design is a multidimensional approach that aims to provide long-term environmental, economic, and social benes. This design philosophy not only reduces negative environmental impacts but also lowers operational costs by optimizing energy consumption and directly improving user health and well-being. The fundamental components of sustainable interior design include the use of environmentally friendly materials, energy efficiency, water conservation, and the utilization of local and renewable resources. From a global perspective, green building certification systems such as LEED and BREEAM play a critical role in standardizing and promoting sustainable interior design practices. In Türkiye, awareness in this field has been increasing, and new projects incorporating sustainable design principles have become more prominent, particularly in major cities. However, high initial investment costs, limited professional expertise, and insufficient public awareness remain key challenges hindering the widespread adoption of this concept. This study analyzes global and local applications of sustainable interior design, the major challenges encountered, and innovative approaches in the field through a literature-based evaluation.

Keywords: *Interior design, sustainability, green building, energy efficiency, environmentally friendly materials, Türkiye*

I. INTRODUCTION

Today, rapidly changing environmental conditions and the increasingly visible impacts of climate change have positioned sustainability as a central agenda within the construction sector and the discipline of interior design. Sustainable interior design refers not only to meeting aesthetic and functional expectations but also to the process of organizing interior spaces by considering environmental responsibility, social well-being, and long-term economic efficiency (Hopwood et al., 2005). Designs developed within this framework aim to reduce environmental impacts while providing healthier and more comfortable environments for users.

In its most general sense, sustainability can be defined as the ability to maintain the balance between human needs and the natural environment while ensuring that natural resources remain available for future generations. The historical roots of this concept date back to early resource management strategies. One of the earliest documented references appears in the forestry principles proposed by Hans Carl von Carlowitz in his work Sylvicultura Oeconomica published in 1713. In this work, Carlowitz emphasized that the consumption of natural resources should not exceed the rate at which they can regenerate naturally. This principle is widely recognized as one of the earliest theoretical foundations of sustainability.

The concept gained global attention during the second half of the twentieth century, particularly as environmental degradation increased due to industrialization and rapid urbanization. The publication of *The Limits to Growth* report by the Club of Rome in 1972 highlighted the risks associated with uncontrolled economic growth and resource consumption (Meadows et al., 1972). However, the modern and widely accepted definition of sustainability was introduced in the *Our Common Future* report published in 1987 by the United Nations World Commission on Environment and Development, commonly known as the Brundtland Report. According to this report, sustainable development is defined as development that meets present needs without compromising the ability of future generations to meet their own needs.

Within the theoretical framework of sustainability, the concept is often explained through the “Triple Bottom Line” model, which integrates environmental, economic, and social dimensions. This approach emphasizes that sustainable development cannot be achieved solely through economic growth but must also incorporate environmental protection and social equity. In design-related disciplines such as architecture and interior architecture, these three dimensions form the basis for sustainable spatial strategies.

In the context of interior design, sustainability involves a wide range of strategies including environmentally responsible material selection, energy-efficient spatial planning, water conservation technologies, and the improvement of indoor environmental quality. Moreover, flexibility and variability in interior spaces are increasingly regarded as

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important principles of sustainable design, as they enable spaces to respond to changing user needs and extend their functional lifespan (Süvari & Çeliktepe, 2023). Material selection plays a crucial role in reducing environmental impacts. The use of renewable materials such as bamboo and cork, recyclable materials such as glass and metal, and non-toxic finishes with low levels of volatile organic compounds (VOCs) significantly contributes to healthier indoor environments. Additionally, the application of circular design principles allows materials to be reused or reintegrated into biological cycles at the end of their life cycles (Ellen MacArthur Foundation, 2013).

Energy efficiency represents another critical dimension of sustainable interior environments. Environmental assessment tools have become fundamental instruments for evaluating the environmental performance of buildings and supporting sustainable design decision-making (Ding, 2008). Strategies such as maximizing natural daylight, using high-performance insulation materials, integrating LED lighting systems, and employing smart building automation technologies help reduce energy consumption and operational costs. When these strategies are combined with renewable energy systems such as photovoltaic panels or geothermal heating technologies, significant reductions in carbon emissions can be achieved (Zuo & Zhao, 2014).

Water conservation is also a fundamental component of sustainable interior design. The use of low-flow fixtures, sensor-based faucets, greywater recycling systems, and rainwater harvesting technologies allows buildings to significantly reduce water consumption while maintaining functional performance.

In order to standardize and measure sustainability performance in buildings and interior environments, several international certification systems have been developed. Among the most widely recognized systems are U.S. Green Building Council's LEED (Leadership in Energy and Environmental Design) certification and the BREEAM (Building Research Establishment Environmental Assessment Method) system developed in the United Kingdom (U.S. Green Building Council, 2019; BREEAM, n.d.). These certification programs evaluate buildings based on criteria such as energy efficiency, water management, material selection, waste reduction, and indoor environmental quality.

In addition to these systems, newer frameworks such as WELL, DGNB, and EDGE certification programs have further expanded sustainability evaluation criteria by focusing on aspects such as user health, life-cycle assessment, and resource efficiency (DGNB, n.d.). Globally, these certification systems have become important tools for encouraging environmentally responsible design practices and improving the environmental performance of buildings.

In Türkiye, awareness of sustainability in the architecture and interior design sectors has increased significantly in recent years. Following the ratification of the Paris Climate Agreement by Türkiye in 2021, national policies and sectoral initiatives related to sustainable construction have accelerated (ÇEDBİK, n.d.). Large-scale projects in major cities increasingly incorporate energy-efficient technologies, sustainable material use, and water management strategies.

Despite these developments, several barriers still limit the widespread implementation of sustainable interior design practices in Türkiye. In addition, regulatory frameworks and interdisciplinary collaboration play a significant role in facilitating the transition toward low-carbon and sustainable building practices (Fischer & Guy, 2009). These challenges include high initial investment costs, limited technical expertise, insufficient sectoral awareness, and the relatively slow adoption of international certification systems.

Within this context, this study aims to examine sustainable interior design practices from both global and Turkish perspectives through a comprehensive literature-based evaluation. By analyzing theoretical approaches, certification systems, and selected international and national case studies, the research aims to identify current trends, challenges, and opportunities in the field. The findings of the study are expected to contribute to the development of more effective sustainability strategies in interior design practices in Türkiye.

II. MATERIAL AND METHOD

A. Research Model

This study adopts a qualitative research approach in order to examine sustainability practices in interior design from both global and national perspectives. Within this framework, the descriptive analysis method was employed to evaluate the theoretical background, practical implementations, and current developments related to sustainable interior design.

The research is based on a comprehensive literature review supported by case study analyses. Through this approach, sustainable design strategies implemented in different geographical contexts were examined and compared. The aim of this methodological framework is to identify the fundamental principles, applications, and challenges associated with sustainable interior design practices.

The study particularly focuses on internationally recognized sustainable buildings and selected examples from Türkiye that demonstrate environmentally responsible design strategies. By examining these projects, the research aims to evaluate how sustainability principles such as energy efficiency, water management, material selection, and indoor environmental quality are integrated into interior design practices.

B. Data Collection

The data used in this research were obtained from secondary sources. Academic publications, international reports, institutional documents, and project-based technical publications related to sustainable architecture and interior design constituted the primary data sources of the study.

Within this scope, peer-reviewed journal articles, books, conference papers, and official reports addressing sustainability, green building certification systems, and sustainable interior design strategies were systematically reviewed. Additionally, technical information and design data related to selected international and national projects were collected from architectural publications, professional platforms, and institutional reports.

Particular attention was given to projects that have received internationally recognized sustainability certifications such as LEED and BREEAM. These projects provide measurable indicators of sustainability performance in areas including energy efficiency, water consumption, material use, and indoor environmental quality.

C. Case Study Selection Criteria

The case studies included in this research were selected based on several criteria in order to ensure that they adequately represent sustainable design strategies in interior environments. The main selection criteria include:

- Projects recognized for their sustainability performance at an international level,
- Buildings that incorporate advanced energy efficiency and environmental technologies,
- Projects integrating biophilic design principles and renewable energy systems,
- Buildings that have obtained internationally recognized green building certifications.

Based on these criteria, internationally recognized projects such as the Bullitt Center, Bosco Verticale, Parkroyal on Pickering, and One Central Park were selected as global examples.

In addition, projects implemented in Türkiye such as Zorlu Center, Allianz Tower, and Maslak No.1 Office Tower were included in order to represent the national context.

D. Data Analysis Method

The collected data were analyzed using the qualitative content analysis method. Within this framework, sustainability practices implemented in the selected case studies were examined according to four primary evaluation criteria:

- Energy efficiency strategies,
- Water conservation systems,
- Sustainable material selection,
- Indoor environmental quality and user comfort.

The projects were systematically analyzed by comparing their environmental performance and design strategies. Through this comparative approach, similarities and differences between global and Turkish sustainable interior design practices were identified.

The results obtained from this analysis provide a comprehensive evaluation of the current status of sustainable interior design practices and highlight potential areas for improvement within the Turkish context.

III. RESULTS AND DISCUSSIONS

A. Sustainable Interior Design Practices Worldwide

An examination of global applications indicates that projects are generally integrated with net-zero energy targets, biophilic design approaches, and advanced technological automation systems.

A. 1. Bullitt Center (USA)

Described as “the greenest commercial building in the world,” the building was designed with a net-zero energy target. The entire energy demand is met through photovoltaic panels, while interior materials were selected from locally sourced, non-toxic resources.




Figure 1. Interior Design (left) and Façade Design (right) of the Bullitt Center, Seattle, USA (Bullitt Center, n.d.).

A. 2. Bosco Verticale (Italy)

Constructed in Milan under the "Vertical Forest" concept, this project represents one of the most prominent examples of biophilic design. Dense vegetation integrated into the façade provides natural insulation, reducing energy consumption, while recyclable materials are preferred within interior spaces (Stefano Boeri Architetti, n.d.).




Figure 2. Terrace Design (left) and Façade Design (right) of Bosco Verticale, Milan, Italy (Stefano Boeri Architetti, n.d.).

A. 3. One Central Park (Australia) & Parkroyal on Pickering (Singapore)

Both projects integrate green spaces into vertical architecture within dense urban environments. At One Central Park, natural ventilation strategies and water-recycling systems are prominent. In contrast, in the Parkroyal project, layered greenery on the hotel façade serves as a natural barrier, helping reduce energy consumption (Ateliers Jean Nouvel, n.d.).




Figure 3. Interior Design (left) and Façade Design (right) of Parkroyal on Pickering, Singapore (Archello, n.d.).




Figure 4. Terrace Design (left) and Façade Design (right) of One Central Park, Australia (Ateliers Jean Nouvel, n.d.).

A. 4. The Crystal (United Kingdom) & Eden Project (United Kingdom)

The Crystal, located in London, holds both LEED Platinum and BREEAM certifications and operates as a fully electric building incorporating rainwater harvesting systems. The Eden Project, on the other hand, functions as an education-oriented sustainability center that maximizes the use of natural daylight through its transparent dome structures (Grimshaw, n.d.). The project also demonstrates how architectural form and environmental education can be integrated to promote sustainability

through climate-responsive design and biodiversity conservation (Eden Project, n.d.).




Figure 5. Interior Design (left) and Façade Design (right) of The Crystal, London, United Kingdom (Parametric Architecture, 2025).


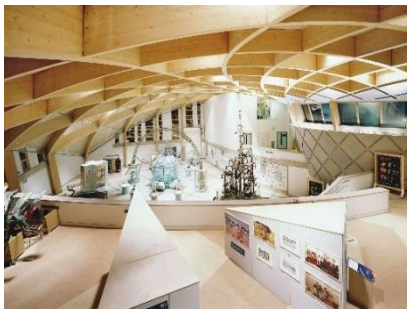


Figure 6. Interior Design (left) and Façade Design (right) of the Eden Project, Cornwall, United Kingdom (Grimshaw, n.d.).

A.5. Other Notable Applications

The California Academy of Sciences in San Francisco is recognized globally for its green roof system and LEED Platinum certification; Marina Bay Sands in Singapore stands out with its advanced water recycling systems; and Chhatrapati Shivaji International Airport (T2) in India represents a significant reference project due to its natural lighting strategy achieved through extensive glass façades (Renzo Piano Building Workshop, n.d.).




Figure 7. Interior Design (left) and Façade Design (right) of the California Academy of Sciences, San Francisco, USA (Renzo Piano Building Workshop, n.d.).




Figure 8. Terrace Design (left) and Façade Design (right) of Marina Bay Sands, Singapore (Marina Bay Sands, n.d.).




Figure 9. Interior Design (left) and Façade Design (right) of Chhatrapati Shivaji International Airport (T2), Mumbai, India (World-Architects, 2014).

A. 6. Analytical Evaluation of Global Practices

The examined international case studies demonstrate that sustainable interior design has evolved beyond isolated environmental interventions toward integrated design strategies combining energy efficiency, biophilic principles, renewable energy systems, and advanced technological solutions. These projects reveal that sustainability is most effective when environmental performance, user well-being, and architectural innovation are addressed simultaneously within a holistic design framework. Furthermore, the successful implementation of such strategies indicates that interdisciplinary collaboration and early-stage sustainability integration play a critical role in achieving high-performance built environments. These global practices provide an important reference framework for evaluating the current state and development potential of sustainable interior design applications in Türkiye.

B. Sustainable Interior Design Practices in Türkiye

In contrast to the global examples discussed above, sustainable interior design practices in Türkiye demonstrate both emerging opportunities and context-specific challenges.

Sustainable interior design practices in Türkiye have gained momentum in recent years, particularly with the increasing environmental awareness and growing demand for green building certifications (LEED, BREEAM). Recent academic studies also indicate that sustainability has become an increasingly important topic in interior architecture education and professional practice in Türkiye (Kara, 2024).

B. 1. Commercial and Mixed-Use Projects

Zorlu Center and Allianz Tower in Istanbul, both LEED-certified, stand out for their greywater recycling, rainwater harvesting, and energy-efficient lighting systems. Similarly, projects such as Akasya Shopping Mall and Ege Perla in İzmir emphasize the use of natural daylight and preference for recycled materials (Proplan, n.d.).




Figure 10. Terrace Design (left) and Façade Design (right) of Zorlu Center, Istanbul, Türkiye (Emre Arolat Architecture, n.d.-b).




Figure 11. Interior Design (left) and Façade Design (right) of Ege Perla, İzmir, Türkiye (Emre Arolat Architecture, n.d.-a).




Figure 12. Interior Design (left) and Façade Design (right) of Allianz Tower, Istanbul, Türkiye (Arkiv, n.d.- a).

B. 2. Analytical Observation

These Turkish projects indicate that sustainable interior design is increasingly being implemented in commercial contexts, with a focus on energy and water efficiency, as well as material sustainability. However, compared to global examples, the integration of advanced automation systems and holistic biophilic strategies is still limited, highlighting opportunities for further innovation and capacity building within the local sector.

B. 3. Commercial Buildings

Akasya Shopping Mall in Istanbul emphasizes the use of natural daylight and recycled materials, integrating sustainable strategies in large-scale retail environments.




Figure 13. Interior Design (left) and Façade Design (right) of Akasya Shopping Mall, Istanbul, Türkiye (Proplan, n.d.).

B. 4. Office Buildings

Turkey's first LEED Gold-certified offices, Tekfen Tower and Maslak No/1, meet healthy indoor environment criteria through the use of low-VOC paints and waste management strategies. The Turk Telekom Headquarters in Ankara is another key example in this category, featuring energy-efficient HVAC systems (Atasarım Mimarlık, n.d.).





Figure 14. Interior Design (left) and Façade Design (right) of Tekfen Tower, Istanbul, Türkiye (Fitmax Gym, n.d.).





Figure 15. Interior Design (left) and Façade Design (right) of Maslak No/1 Office Tower, Istanbul, Türkiye (ArchDaily, 2016).





Figure 16. Interior Design (left) and Façade Design (right) of Turk Telekom Headquarters, Ankara, Türkiye (Atasarım, *n.d.).*

B. 5. Public and Cultural Buildings

Yapı Kredi Culture & Arts Center, redesigned to comply with energy-efficiency standards, exemplifies sustainable renovation practice. Projects such as the Eskişehir Metropolitan Municipality Service Building and the ongoing İzmir Opera House reflect the public sector's sustainability vision through solar energy and natural ventilation strategies. Moreover, sustainability principles are being integrated into educational buildings, as seen on university campuses such as ITU and İYTE.


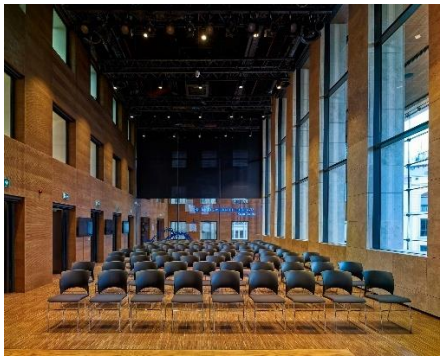


Figure 17. Interior Design (left) and Façade Design (right) of Yapı Kredi Culture & Arts Center, Ankara, Türkiye (Arkiv, n.d.-b).

B. 6. Analytical Evaluation of Global Practices

Sustainable interior design practices in Türkiye, particularly in commercial, office, and public/cultural projects, successfully integrate core strategies such as energy efficiency, water management, and material selection. However, compared to leading international examples, the implementation of advanced automation systems, biophilic design, and holistic sustainability approaches remains limited. While global projects place sustainability at the core of architectural identity, practices in Türkiye tend to prioritize energy and environmental efficiency.

This situation highlights significant opportunities for enhancing Türkiye's sustainable design capacity. Learning from global best practices, fostering interdisciplinary collaboration, and integrating sustainability at early design stages are key strategies to improve environmental performance and user satisfaction in local projects. Consequently, the future of sustainable interior design in Türkiye holds the potential to develop solutions that are both aligned with global standards and tailored to the local context.

IV. CONCLUSION

Sustainable interior design has become an essential paradigm for reducing environmental impact, enhancing user comfort, and promoting economic efficiency. The analysis of global case studies demonstrates that the most successful projects adopt integrated sustainability strategies, combining energy efficiency, biophilic design principles, renewable energy systems, and circular material use. Early-stage integration and interdisciplinary collaboration are critical factors in achieving high-performance interior environments.

In the Turkish context, the adoption of sustainable design principles is gradually increasing, particularly in large-scale commercial, office, and public/cultural projects. Although significant progress has been made, the integration of advanced automation systems, holistic biophilic strategies, and net-zero energy approaches remains limited. High initial investment costs, limited professional expertise, and insufficient public awareness are still key barriers to the widespread adoption of sustainability practices.

Based on the findings of this study, several recommendations are proposed to enhance sustainable interior design practices in Türkiye:

1. Promote and support internationally recognized green building certifications such as LEED, BREEAM, and YeS-TR in both public and private projects.
2. Encourage the production and use of locally sourced, environmentally responsible materials to reduce carbon footprint and support the national economy.
3. Integrate sustainability principles in interior architecture curricula and professional training programs to improve sectoral expertise.
4. Increase public awareness and participation in sustainability initiatives through campaigns, workshops, and community projects.
5. Foster interdisciplinary collaboration between architects, engineers, environmental specialists, and policymakers to ensure holistic and efficient design solutions.

Finally, future research should focus on longitudinal studies that measure the long-term environmental, economic, and social impacts of sustainable interior design practices in Türkiye. Additionally, experimental studies assessing user comfort, indoor environmental quality, and energy efficiency in newly designed sustainable interior spaces will provide valuable insights for both academics and practitioners.

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