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İÇ MEKAN TASARIMINDA DOĞA TEMELLİ TASARIM YAKLAŞIMLARI: KAPSAYICI BİR TASARIM ÖNERİSİ

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ÖZ

Doğa her daim, mimari tasarım için önemli bir ilham kaynağı olmuştur. Doğayı gözlemleyen mimarlar kimi zaman doğada var olanı taklit ederek kimi zaman ondan esinlenerek tasarımlarına yön vermişlerdir. Ancak son on yıllarda artan küresel iklim krizi ve doğal çevreye yönelik sorunlar ve yanı sıra insanların doğayla olan bağlarının zayıflaması sebebi mimarlar, insan ve doğa ilişkisini farklı bir boyutta ele almaya başlamışlardır. Bu anlamda mimarlar, doğa ve insan iletişimini esas alan; çevresel kaynakları korurken insan sağlığını ve refahını da göz önünde bulunduran ve ayrıca tasarımın kültürel yönlerini de dikkate alan doğa temelli tasarım yaklaşımları ortaya koymuşlardır. Sürdürülebilirliğin önem kazandığı, doğa, kültür ve insan ilişkilerinin yeniden ve farklı biçimlerde sıklıkla gündeme geldiği günümüzde, insan sağlığı, esenliği ve refahında önemli bir yer tutan bu yaklaşımlar daha sağlıklı, konforlu ve çevre dostu iç mekanların tasarımında son derece önemlidir. Bu noktadan hareketle çalışmada, akademik çevrelerce kabul görmüş olan yeşil tasarım, ekolojik tasarım ve biyofilik tasarım olmak üzere üç doğa temelli tasarım yaklaşımına odaklanılmış ve bu yaklaşımların benzerlik ve farklılıklarından yola çıkılarak, sürdürülebilir ve kapsayıcı bir iç mekân tasarım çerçevesi sunulmuştur. Bu doğrultuda nitel araştırma yöntemlerinden biri olan ve tümevarımsal bir sürece dayalı olarak işleyen gömülü teori metodu uygulanmış ve bu bağlamda ilk olarak bu tasarım yaklaşımları ve ilkeleri derin literatür taraması yoluyla açıklanmıştır. Ardından bu tasarım yaklaşımlarının benzerlik ve farkları temel alınarak iç mekân tasarımına yönelik kapsayıcı bir tasarım çerçevesi önerisinde bulunulmuştur. Çalışma, doğa temelli, sürdürülebilir özelliklere sahip iç mekân tasarım yaklaşımlarının hem iç mimarlar hem de kullanıcılar için sunduğu potansiyelleri vurgulaması bakımından önemlidir. Çalışmanın sürdürülebilir tasarım yaklaşımları ile ilgilenen iç mimarlara yeni bir bakış açısı sunacağı ve yanı sıra ilgili literatüre katkı sağlayacağı düşünülmektedir.

Anahtar Kelimeler: *İç Mimari Tasarım, Yeşil Tasarım, Ekolojik Tasarım, Biyofilik Tasarım, Doğa Temelli Tasarım*.

NATURE-BASED DESIGN APPROACHES IN INTERIOR DESIGN: AN INCLUSIVE DESIGN FRAMEWORK SUGGESTION

ABSTRACT

Nature has always been an essential source of inspiration for the architectural design. Based on their observations, architects simulated nature or get inspiration thereof to help guide their designs. Nevertheless, architects started to adopt a different perspective towards the human-nature relationship upon the aggravated global climate crisis in recent decades and the problems associated with natural environment as well as the weakened ties between community and nature. Accordingly, architects introduced nature-based design approaches based on nature and human communication that considered

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human health and well-being while protecting environmental resources, and taking cognizance of cultural aspects of design as well. The aforementioned approaches with a strong emphasis on human health, well-being, and welfare, proved to be crucial for a healthier, more comfortable, and environmentally friendly interior design in the world today, where sustainability gains importance and nature, culture, and human relations are frequently reinterpreted in different forms. As such, the present study focuses on three nature-based design approaches, i.e., green design, ecological design, and biophilic design, suggested in the relevant literature, and presents a sustainable and inclusive interior design framework based on the similarities and differences among those approaches. In the light thereof, the grounded theory method, a qualitative research method that operates upon an inductive process, was applied and those design approaches and principles were first explained through an in-depth literature review in the context thereof. Subsequently, an inclusive design framework for interior design was suggested based on the similarities and differences among the approaches in question. The present study is important in terms of its emphasis on the potentials offered by nature-based, sustainable interior design approaches for both the interior architects, and users. The study will provide interior architects, who are interested in sustainable design approaches with a new perspective and also contribute to the relevant literature.

Keywords: *Interior Design, Green Design, Ecological Design, Biophilic Design, Nature-based Design Approaches.*

INTRODUCTION

Nature has been adopted as a guide for architects throughout the history of architecture. Based on their observations, architects simulated nature or get inspiration thereof to help guide their designs. Inspiring the architects, nature played an important role in the development of architecture. Following the second half of the 20th Century, for instance, architects considered nature beyond being merely an important source of design input as a result of problems associated with increased world population and ever-decreasing resources, global climate crisis, and environmental problems. Aiming at to protect the natural environment and resources, mitigate the damage to the natural environment as induced by the built environment, and benefit from the healing power of nature, architects gravitated towards constructing sustainable buildings and environments, and therefore, introduced a variety of design paradigms, including green design, ecological design, and biophilic design.

Previous studies suggested that the nature-based approaches sustained a positive effect on individuals' physical and mental health, increased their productivity and performance, improved their creative skills, accelerated healing processes in patients, and directly enhanced the quality of life (Annerstedt & Währborg, 2011; Browning et al., 2014; Kellert, 2012; Marcus & Sachs, 2014; Wells & Rollings, 2012). Accordingly, those nature-based design approaches have been adopted especially by interior designers.

In essence, nature-based design approaches refer to refreshing environment designs that contribute to the physical, psychological, and social regeneration of human beings (Hartig & Staats, 2005), help reduce mental fatigue and stress and thus increase productivity (Korpela, 1991), and serve as curative, therapeutic, integrative, and invigorating designs (Nousiainen et al., 2016). Aiming at to strengthen the bond between nature and human and to ensure a perfect balance between the foregoing, those innovative design approaches are crucial for the sustainability of natural environments and for people to live in healthy and comfortable places, beyond protecting nature against humans and vice versa. This is because they help human beings, who spend most of their time indoors, with contacting nature through indoor spaces and thus increase their quality of life.

Green design, ecological design and biophilic design as suggested in the relevant literature, are at the forefront of designs inspired by nature and address nature based on a sustainable framework. All the three design strategies overlap with each other in that they essentially take nature as the basis. Nevertheless, there are also differences by content and primary objectives. Accordingly, the present

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study aimed to investigate nature-based design approaches in interior design, emphasize their importance, review their similarities and differences, and suggest a novel and inclusive interior design framework based on those similarities and differences. The study will provide the interior designers with a new perspective as regards nature-based and sustainable design approaches and also contribute to the relevant literature.

METHODOLOGY

Purpose and Importance of the Study

The present study suggested an inclusive interior design framework on the pillars of nature-based, sustainable design principles and the three design strategies in question upon a comprehensive literature review. The primary aim of the study was to investigate nature-based design approaches, introduce their principles, review their similarities and differences, and emphasize the importance of those approaches in the context of interior design. Another important aim of the study was to suggest a sustainable and inclusive interior design framework based on the similarities and differences of those nature-based approaches.

The spaces, which play a crucial role as regards the human health, well-being, and welfare, should be addressed through a healthier, more comfortable, and environmentally friendly design approach today, where sustainability gains importance and nature, culture, and human relations are frequently reinterpreted in different forms. In the context thereof, the present study is important in terms of its emphasis on the potentials offered by nature-based, sustainable interior design approaches for both the interior architects, and users. The study will provide interior architects, who are interested in sustainable design approaches with a new perspective and will also contribute to the relevant literature.

Study Method

The grounded theory method, a qualitative research method that operates upon an inductive process was used for the purposes of the study. Accordingly, first the nature-based design approaches, including green design, ecological design, and biophilic design and the principles of these approaches were reviewed by means of an in-depth literature review. This was followed by a review of shared attributes and differences between those design approaches. Finally, an inclusive design framework for interior design was suggested vis-a-vis the similarities and differences among the nature-based design approaches in question. The study method is illustrated in Figure 1.

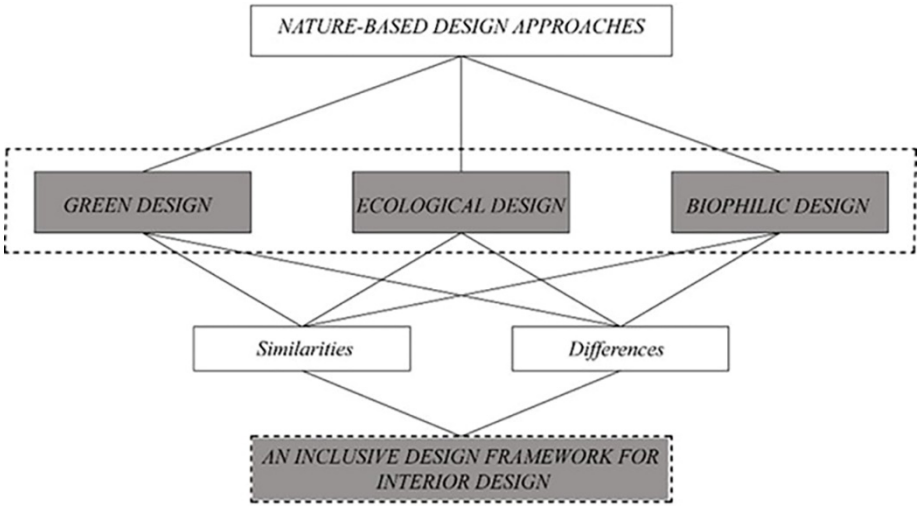

Figure 1. Methodology of the study.

NATURE-BASED DESIGN APPROACHES IN INTERIOR DESIGN

The relationship between architecture and nature can be traced back to the early periods of human history. Historically people created spaces by imitating or by inspirations from nature, and other times incorporated the beauties of nature to their spaces by means of imitation and inspiration.

The uses of inspiration from nature were gradually developed in the course of history (Özkaban et al., 2020). For example, until the industrial revolution, natural forms, shapes, colors, and textures were mostly used as decorative elements in interiors. Examples include capitals with Acanthus leaves in Ancient Greece, windows with rose motifs, one of the important elements of Gothic architecture, and vegetal motifs of Baroque and Rococo styles. By the 20th century, nature found a differed reflection in architectural design. In this period, prominent architects, including Louis Sullivan and Frank Lloyd Wright benefited from biological analogy and started the organic architecture movement (Collins, 1998). Advances in technology allowed designers to construct a number of vegetative forms, including structural features (Rian & Sassone, 2014).

Towards the end of the 20th century, the global climate crisis and the problems regarding the natural environment on the one hand, and the weakened ties between the community and nature on the other, urged designers to consider the relationship between humans and nature from a different perspective Therefore, this gave a rise to certain design approaches, including, green design, ecological design, and biophilic design, which allowed individuals to live in a healthy, comfortable and productive environment, and also demonstrated a respectful, protective, and sensitive stance towards the natural environment. Despite the fact that those design approaches maintained a shared ground in terms of helping people to re-establish their ties with nature and advocating an environmentalist approach, there are important differences from a broader framework. The aims and principles of those three design approaches are reviewed in detail in the below sub-headings.

Green Design

Green design was envisaged as a solution for the problems caused by the decreased amount of resources vis-a-vis increased global population (Aktaş, 2012). It was associated with the efficient use of resources and the creation of a healthy built environment pursuant to ecological principles (Stitt, 1999). Furthermore, green design approach represented a healthy and comfortable living space and thus aimed to improve human health (Allen et al., 2015). Accordingly, green design is characterized by a balance maintained between natural environment, human health, and comfort. Green design considers a building as a living entity with a life cycle from the pre-construction phase to the decommissioning phase.

Green design also features aesthetic qualities in terms of its relationship with nature (Yasar, 2023). Therefore, green design also offers an inspiring and rich potential for interior designers in the context of interior design. Design elements, including natural lighting, natural ventilation, use of natural and local materials, natural colors, organically growing plants, and natural geometry and patterns are all examples of the foregoing attribute of green design approach (Figure 1).

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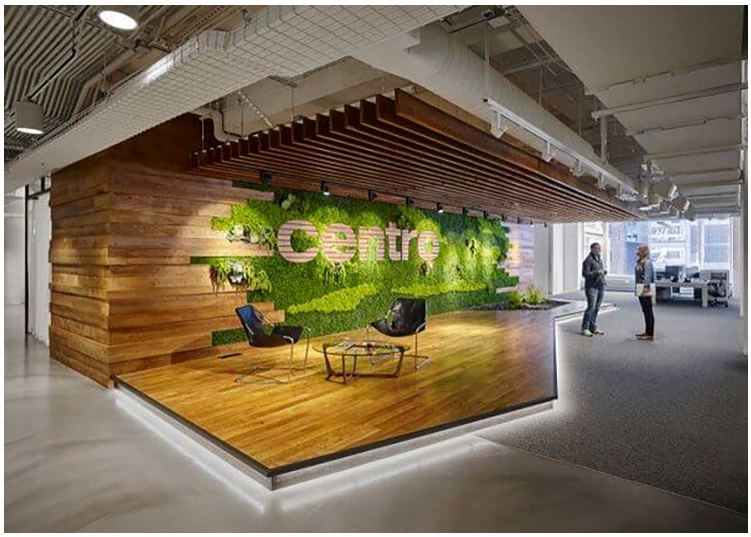

Figure 1. Green design interior example (Design Desk).

Previous studies suggested various principles with regard to green design. Those principles can be listed as follows (Aktas, 2013; Dennis, 2010; Han, 2022; Ni, 2017; Ojo-Fafore et al., 2018; Zhang, 2020).

- The principle of individualization: The design should not be generalized, it should fit the individual aesthetics and values of the users, and the design should consider the living habits of the users.
- Eco-friendly materials principle: Environmentally friendly materials should be used on floor, wall, and ceiling surfaces and natural and local materials should be preferred for the purposes of interior design.
- Resource efficiency and waste management principle: Renewable energy sources should be prioritized as well as waste generation should be reduced and recycled back into resources, wherever it is possible.
- Indoor Heating, Ventilation, and Air Conditioning principle: User comfort should be considered in the design, and in the context thereof, the interiors should be provided with natural lighting and natural ventilation.
- Economic principle: Eco-friendly low-cost construction materials, advanced scientific structural technologies, and construction equipment with lower energy consumption should be used in the design.
- Water principle: The water element should be incorporated into the design.
- Principle of optimum color usage: Colors that would evoke nature and sustain positive effects on human psychology should be used in interior design.
- The principle of 'plant use indoors': Locally produced, organically grown indoor plants, and wherever it is possible, plans that would contribute to energy efficiency should be included in the design.

The green design approach mitigates the environmental impacts and offers a number of benefits (Abioso, 2020). Its principles mandate a systematic and general understanding of all the environmental impacts that might occur throughout the life cycle of the building, and demand the improvement of environmental performances in the course of each and every stage of the building life cycle. (Kostic et al., 2015). In addition, all those above-mentioned principles embody crucial implications for human health. Ecological design is another nature-based design approach. In essence, ecological design has many shared points with the green design approach.

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Ecological Design

The ecological design term was coined by Sim van der Ryn and Stewart Cowan in their 1996 book, namely *Ecological Design*, by which the authors advocated the seamless integration of human activities into natural processes to mitigate the destructive environmental impact (Kallipoliti, 2018). Ecological design was defined as a design form that adopted integration into living processes as a principle and aimed to minimize negative impact on environment (Van der Ryn & Cowan, 2013), as such, it attaches great importance to comfort and aesthetics as well as to the goals of resource-saving and environmental protection (Liu & Wang, 2012).

Physical and cultural characteristics specific to the place are also taken into consideration along with the built-in ecological principles. Its broad perspective helps designers with liberating their minds to envisage the building in its natural and environmental context. Offering a balanced perspective on environmental awareness and human-nature relationship, in this approach *place* is considered a crucial concept along with the use of renewable and efficient resources. Therefore, the cultural and physical characteristics of the place should also be made use of for the purposes of the design (Figure 2).

Figure 2. Ecological design interior example (Shamanth Patil).

The principles suggested by previous studies on ecological design can be listed as follows (Feizi et al., 2014; Orr, 2007; Shu-Yang et al., 2004; Van der Ryn & Cowan, 2013).

- Solutions grow from place principle: The unique cultural and physical characteristics of the *place* should be preserved in the design and those elements should be incorporated into the design.
- Ecological accounting policy: The design process should take the environmental and social factors in consideration together with financial criteria.
- Design with nature principle: The design should accommodate applications inspired by nature. Examples include natural patterns, objects, natural material, and landscape, etc.
- Community design principle: The design should be performed with the active participation of a range of stakeholders. Design process should be carried out in collaboration with all the stakeholders.
- The principle of ‘making nature visible’: Natural systems and processes should be incorporated into the design and nature should be visible and accessible to everyone.
- Principle of ‘renewable and efficient use of resources’: The design should focus on recycling, reuse, and efficient use of materials and energy.

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- 'Environmental literacy' principle: Applications that would contribute to the environmental awareness of users from all age groups should be included in the design.

Ecological design philosophy aims to combine design at spatial and temporal scales as can be understood from the above principles. One of the important objectives of ecological design is to consider natural environment and humans in a harmonious unity, while reducing the adverse human impact on nature, and protecting the long run vital partnership between humans and nature.

Biophilic design is another design approach that focuses on human and nature interaction along with green design and ecological design. Similar to green design and ecological design, the biophilic design approach considers design in the context of both anthropogenic, ecological, and healthy living environments.

Biophilic Design

Biophilic design is a design philosophy based on the proposition that connection with nature plays a critical role in ensuring the physical and mental health and well-being of people (Kellert, 1993; Kellert, 1997; Wilson, 1986). The objective of biophilic design is to create better living spaces that would offer health and well-being, and allow that a satisfying experience of nature can be lived within the built environment. Continuous interaction with nature is a priority in the design of those spaces. Accordingly, the connection established with nature by means of design features both physical, and emotional dimensions. As a matter of fact, previous studies reported that exposure to natural environments and natural characteristics had positive impact on human health and well-being (Bowler et al., 2010; Gillis & Gatersleben, 2015; Gray & Birrell, 2014; Ryan et al., 2014).

In biophilic design, it is important to benefit from the inherent connection that people sustain with the natural world and to make them feel like they are within the natural world. In the sense thereof, direct and indirect connections and experiences with nature along with cultural and ecological elements specific to the place are considered to occupy an important place in biophilic design (Figure 3).

Figure 3. Biophilic design interior example (DSL Studio).

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Certain principles were adopted for successful implementation of biophilic design. Those principles consist of a total of 24 topics under three main themes (Downton et al., 2017; Kellert & Calabrese, 2015; Ryan & Browning, 2020).

- Direct Experience of Nature: Use dynamic and diffuse light; ensure heat and airflow variability; incorporate water element; include plants; allow animal life; expose to natural landscape; use fire element.
- Indirect Experience of Nature: Allow representative image of nature; use natural materials; prefer natural colors; simulate natural lighting and natural ventilation; give place to natural shapes and forms; make use of design features that would evoke nature; offer rich options and opportunities in design; include design strategies that would reflect the feeling and experience of the passage of time in design; use natural geometries; incorporate biomimetic forms and functions that would offer solutions to human needs and problems.
- Experience of Space and Place: Use design strategies that would allow visual connections between interior spaces and ensure safe and sheltered environments; create environments that would express places rich in options and opportunities and create a sense of orderly complexity; offer environments/designs, where different parts form an integrated whole; plan clear connections between spaces; envisage clearly understood routes and points of entry and exits that foster mobility and sense of security; include site-specific cultural and ecological elements in the design.

The above-listed biophilic principles are important not only in protecting and sustaining both natural and human-made environments, but also in improving the quality of life for humans. Biophilic design principles serve as a guide for the designers. The spaces designed in line with those principles also aimed to offer satisfactory environments for the users.

A NATURE-BASED INCLUSIVE DESIGN SUGGESTION FOR INTERIOR DESIGN

Nature-based design approaches that value the natural environment and focus on the healing power of nature on human health aim to increase the quality of life of people and also attach importance to social and environmental values. Accordingly, the present study focused on nature-based design approaches with their respective practical and theoretical implications and suggested a design framework that would guide the design of inclusive, integrative, healthy and comfortable spaces especially for the purposes of interior design. Table 1 shows the principles and explanations presented in this inclusive interior design suggestion, based on the similarities and differences of nature-based design approaches. The table also indicates which design approach the relevant principle belongs to.

Tablo 1. A Nature-based inclusive design framework for interiors.

Principles	GD	ED	BD	Description
Individualized design principle	+	+		Interior design should consider aesthetic and cultural values, living and working habits, and requirements of the user. Commons should be determined in multi-user-space settings and the design process should be carried out in cooperation with all stakeholders.
Place-specific design principle		+	+	In interior design should incorporate design elements, including materials, colors, and textures that would reflect local and cultural characteristics, and spatial arrangements should be planned in cognizance of social values, traditions, and customs.
'Environmental literacy' principle		+		Interior design should allow activity spaces, including hobby gardens, botanical gardens, and recycling workshops that would increase the environmental awareness of individuals of

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				different age groups as well as accommodating pleasant and productive leisure activities.
Resource efficiency principle	+	+		Scarce resources, including water and fuel, should find efficient use in interior design. Accordingly, indoor water consumption should be reduced and recycled, where possible. Furthermore, design strategies that can make optimum use of natural ventilation and natural lighting should be incorporated into the design.
Principle of eco-friendly material use	+	+	+	Interior design should opt for environmentally friendly, recyclable materials that would not harm human and environmental health.
Economic principle	+	+		Interior design should consider financial criteria during both the production and use of the space. Therefore, low-cost construction materials, advanced scientific building technologies and low-energy construction equipment should be used in the production of the space, as well as technologies that would allow users to save on water and electricity expenditures.
The principle of 'making nature visible'		+	+	Interior design should allow open and semi-open spaces including gardens, courtyards, terraces, verandas, balconies, etc., where natural landscapes, vertical gardens, water elements, various ecosystems are located should be accommodated for users can contact and observe nature.
Principle of design with nature	+	+	+	Interior design should be comprised of layouts, patterns, forms and shapes, textures, and colors that would evoke nature.

The above-mentioned principles in the scope of interior design offer an approach that aims to protect the user as well as the natural environment, strengthen the bond between nature and people, and thus, increase the health, well-being, and prosperity of the users. Aesthetic and cultural aspects of the user are taken into consideration along with functional aspects thereof in a sustainable framework for the purposes of this approach. Accordingly, it is necessary and important for interior designers to apply the above-mentioned principles in their designs, both for the protection of the natural environment and for allowing users to live in healthy and comfortable spaces.

CONCLUSION

Interior design is, by its very nature, directly associated with the quality of life of a person. Therefore, interior design approaches based on nature and human communication can make a significant contribution to the creation of healthy and comfortable interior spaces and the physical, psychological, and social regeneration of users. Those design approaches also maintain social and environmental values. The present study aimed to review nature-based design approaches, which prioritized unity of nature and humans, aimed to create sustainable interiors, consider human health and well-being while protecting environmental resources, and also recognized the cultural aspects of design, and to suggest an inclusive framework for interior designs in the scope of the aforementioned design paradigms with similar goals.

One of the important topics as regards the interior design framework as suggested in the present study is to adopt a user-oriented approach for the purposes of design. In the context thereof, the user's lifestyle, habits, and standard of judgments should be comprehensively analyzed and the resultant designs should strengthen the user's sense of belonging and develop a sense of attachment to the place. For multi-user spaces, the needs of all the stakeholders should be considered and commons should be taken as a basis in the design.

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Second important subject is the preservation of local and cultural characteristics and reflecting the same onto the design. This is important for ensuring cultural continuity. As such, design elements and practices that are unique to the site of design, which have become traditional over time, should be included in the design. As a matter of fact, space is also considered a cultural product and value.

Increasing environmental awareness and consciousness among users is another important topic within the suggested design framework. In this context, interior designs should incorporate places and spaces, where users can interact with the natural environment and engage in activities within the natural environment.

The suggested design framework also included the principle of efficient use of resources, reduction of fuel and water consumption, and the use of renewable resources. Accordingly, climatic factors, including wind, sun and rain should be made use of, and design strategies that would allow optimum benefit from natural ventilation and natural lighting should be developed.

Another topic of the suggested framework is the selection of environmentally-friendly materials which would not harm human health. Interior designers should choose reusable, non-toxic, long-lasting and low-maintenance materials.

A further topic is associated with the economy of design. Interior designers should be in cognizance of financial criteria in their designs. The economy of design is not only a parameter of implementation but should consider the life cycle of the end product from the user perspective as well. In this respect, users should include technologies that would reduce energy consumption and provide savings as to water and energy consumption.

Users' contact with nature is another crucial topic within the suggested design framework. Here, it is important for users to have access to open, semi-open areas where they can see, touch, and smell nature. Interior designers should definitely include architectural elements such as gardens, courtyards, terraces, patios and balconies in their spatial planning, and where this is not possible, natural elements such as vertical gardens, water elements, and plant use should be considered for interior spaces.

The last topic is associated with making use of rich natural patterns, textures, and colors. Accordingly, it is important that the interior designers incorporate elements that would evoke nature in their designs, use design elements such as color, texture, shape, geometry, and patterns reminiscent of nature in furniture and details, as well as on the surfaces such as ceilings, walls and floors.

In conclusion, should the interior designers adopt a certain approach in their designs that would feature a protective attitude towards the natural environment, make a connection between nature and design by utilizing natural elements such as form, shape, light, sound, landscape, and material, this would strengthen the connection and communication between human beings, an important part of nature, and the natural environment. Such an approach would also provide the design with a distinctive character. As a matter of fact, nature is an important source of inspiration for design.

It is also important for future generations that interior designers adopt nature-based and sustainable principles in spatial design. A comprehensive and sustainable interior design will not only contribute to the protection of natural resources and the natural environment, but also to raising awareness of the users. This is because of the fact that interior spaces, which reflect the aesthetics of nature and offer healing and refreshing environments for users, will improve the awareness of individuals along with their taste, and reinforce their feelings of respect and care for nature.

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