



# A Systematic Literature Review on Biophilic Hotel Design

## Biyofilik Otel Tasarımı Üzerine Sistematik Bir Literatür İncelemesi

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### Öz

Doğayı iç mekânlara dahil ederek yapılan biyofilik tasarımın, insanların psikolojik ve fiziksel refahı üzerinde olumlu etkileri olduğu bilimsel çalışmalarla kanıtlanmıştır. Artan insan sayısı ve hızlı kentleşme, özellikle COVID 19 dünya pandemisinden sonra boş zaman aktivitelerinde ve konaklama sektöründe değişikliklere yol açsa da bilimsel araştırma havuzunun son zamanlarda tasarlanan ve kullanılan biyofilik otellerin sayısı ile örtüşmediği görülmektedir. Bu çalışma ile literatürdeki biyofilik tasarım çalışmalarının özellikle pandemi sonrasında artmakta olduğu gözlemlenmiştir ancak ofis ve ticari alanlardaki çalışmaların sayısı konaklama sektörüne kıyasla daha yüksek artış eğimi göstermektedir. Bu çalışma kapsamında, biyofilik otel tasarımı üzerine kapsamlı sistematik bir literatür taraması yapılmıştır. Biyofilik tasarımın otellerde kullanımına ilişkin literatürde diğer alanlarda biyofilik tasarım öğelerinin değerlendirilmesine kıyasla boşluklar tespit edilmiştir. Tarama sonucunda Web of Science Core Collection ve Scopus veri tabanlarından elde edilen ilgili 14 makale incelenmiştir. Bu makaleler ayrıntılı olarak analiz edilerek yöntemler ve ortaya çıkan sonuçlar bu alandaki literatür boşluğunun tanımlanmasına yol açmıştır. Biyofilik otel tasarımını bilimsel veriler ışığında değerlendiren çalışmaların COVID-19 sonrasında artış gösterdiği gözlemlenmiştir. İncelenen çalışmaların çoğu otel lobisi örneklerine odaklanmıştır. Lobiler, otellerde ziyaretçilerin ilk izlenimi açısından önemli yerler olmasına rağmen otel odalarına odaklanan bir çalışma yoktur. Gelecekteki çalışmalar konaklama alanına da odaklanabilir. Özellikle müşteri memnuniyeti ve psikolojisinin ön planda olduğu turizm sektörü için literatürde incelenen biyofilik tasarımın veriler ışığında bilimsel etkilerinin araştırılması ve varolan çalışmalardan gerekli derslerin çıkarılması gelecek tasarımlara yön verme açısından önemlidir.

**Anahtar Kelimeler:** Biyofilik otel, biyofilik tasarım, iç mekân tasarımı, Literatür taraması, Otel tasarımı

### ABSTRACT

Biophilic design made by incorporating nature into interior spaces have proven that biophilia has positive effects on people's psychological, and physical well-being through scientific studies. Although increasing number of people and rapid urbanization have led to changes in leisure activities and accommodation sector specifically after the COVID 19 world pandemic, it is observed that scientific research pool do not align with the number of biophilic hotels recently designed and occupied. With this study, it has been observed that biophilic design studies in the literature are increasing especially after the pandemic, however the number of studies in office and commercial spaces show an augmenting trend compared to the accommodation sector. Within the scope of this study, a comprehensive systematic literature review on biophilic hotel design was conducted. Gaps were identified in the literature on the use of biophilic design in hotels compared to the evaluation of biophilic design elements in other areas. As a result of the review, 14 relevant articles obtained from Web of Science Core Collection and Scopus databases were analyzed in detail. The methods and results led to the identification of the literature gap in this field.

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*It has been observed that studies evaluating biophilic hotel design in the light of scientific data have increased after COVID-19. Most of the studies examined are focused on hotel lobby cases. Although lobbies are important places in terms of the first impression of visitors in hotels, there is no study focusing on hotel rooms. Future studies can also focus on the accommodation areas. Especially for the tourism sector, where customer satisfaction and psychology are at the forefront, it is important to investigate the scientific effects of biophilic design examined in the literature to draw the necessary lessons from existing studies in order to guide future designs.*

**Keywords:** *Biophilic hotel, biophilic design, Interior design, Literature review, Hotel design*

## **INTRODUCTION:**

Biophilia is the instinctive tendency of humans to connect and be together with nature and other living things (Wilson, 1984). Biophilic design is the design that brings people together with nature. It is a design made by incorporating nature into interior spaces as a solution to the fact that people cannot spend enough time with nature today. Nowadays, human connection with nature has become limited. Especially in recent years, with increasing urbanization, the decrease in green areas and the fact that people spend more time in enclosed spaces whereas through pandemics, negatively affect human psychology. This is where biophilic design comes into play. Biophilic design aims to create environments that support cognitive function, reduce stress, and improve overall health by integrating elements such as natural light, vegetation, and natural materials (Huntsman and Bulaj, 2022). Research has shown that biophilic design can have positive effects on individuals, such as reducing stress, increasing well-being, and improving cognitive functions (Gillis and Gatersleben, 2015). People can benefit psychologically and physiologically from being around biophilic design components such as plants and natural patterns, which can enhance well-being and task performance (Yeom et al., 2022). Moreover, the role of biophilic design in sustainable interactions between humans and the environment is increasingly recognized (Zhao et al., 2022). Biophilic design patterns are features of the built environment that promote health and well-being; This statement highlights how biophilia can promote regenerative and sustainable architecture. Biophilic design offers a holistic framework for creating healthier and more environmentally friendly spaces by taking inspiration from nature and imitating its patterns and processes (Andreucci et al., 2021). This approach is in line with the growing trend of combining nature-based systems and engineering principles to improve environmental quality and efficiency (Africa et al., 2019). Biophilic design represents a forward-thinking approach to architecture and urban planning that prioritizes human well-being and environmental sustainability. By integrating nature into the built environment, biophilic design not only increases the aesthetic appeal of spaces, but also creates a deeper connection with the natural world, ultimately benefiting both individuals and communities. Furthermore, the implementation of biophilic design has been associated with improved natural lighting, temperature control, and air quality; all of which improve the overall well-being of both people and society (Guzzo et al., 2022). Additionally, studies have shown that the implementation of biophilic design models in learning environments improves students' psychological, physical, and social well-being (Jaheen and El-Darwish, 2021). According to Lee's (2019) research, the incorporation of such items that offer visitors a means of escape that plays a crucial role in improving client satisfaction and loyalty in hotels. Hotel managers can differentiate their offers in the hospitality business by customizing environments to fulfill visitors' emotional and experience demands via having a thorough understanding of the psychological ramifications of design decisions (Lee, 2019). This study will examine the use and effects of biophilic design in hotels. Customer satisfaction is very important in the hospitality industry. By using these positive effects of biophilic design in hotels, both healthier and exemplary spaces that increase customer satisfaction can be designed.

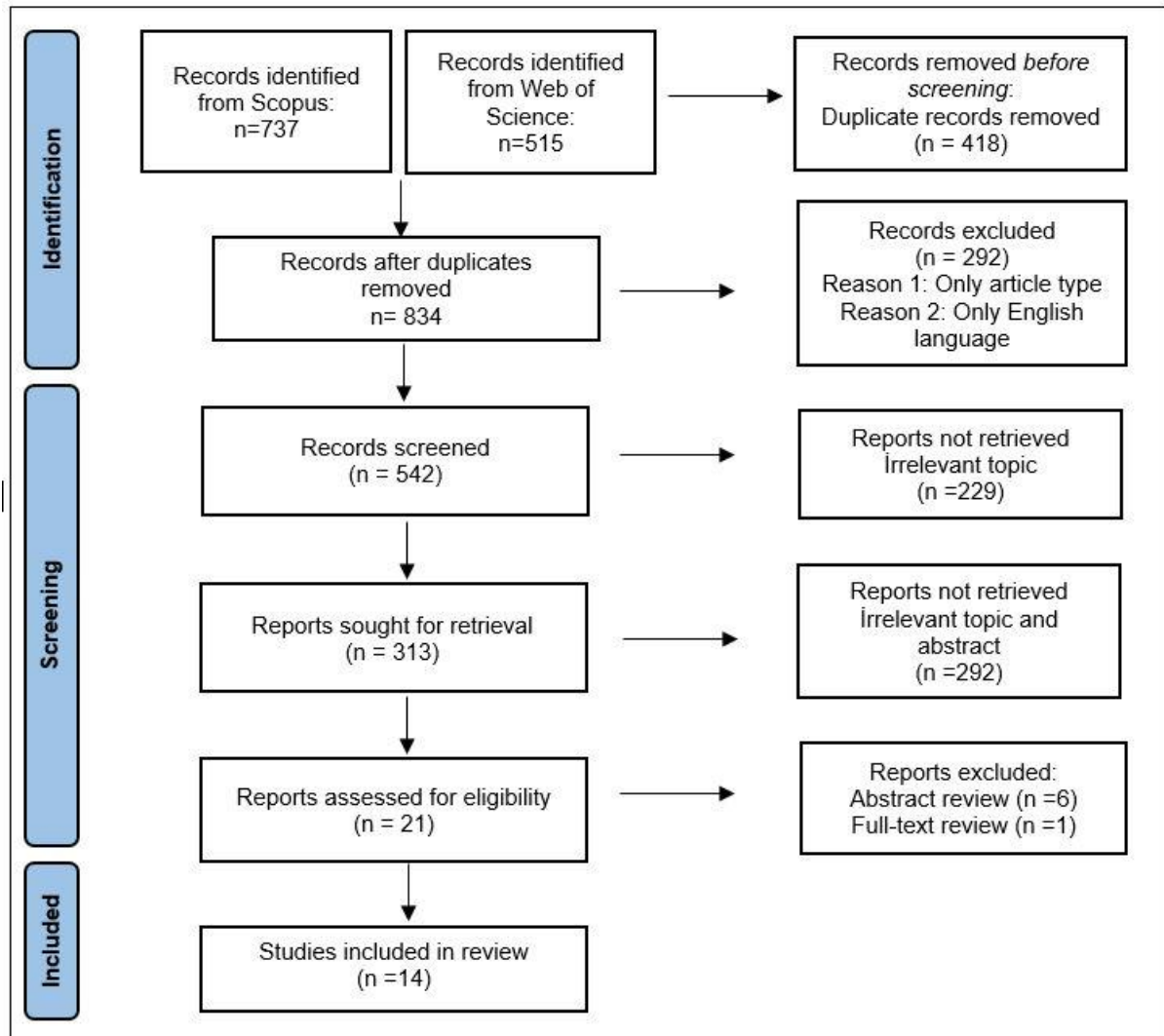
## **1. METHODOLOGY**

In this research, a systematic literature review on biophilic hotel design was conducted. The study followed the guidelines for systematic literature reviews offered by PRISMA to make reporting transparent. Via this analysis although, design-based publications and Google scholar have a bigger pool of cases, it is observed that scientific in-depth studies are limited. Systematic literature reviews can provide syntheses of the state of knowledge in a field, from which future research priorities can

be determined (Page et al., 2020). This review will lead us to identify the gap in the literature on biophilic hotel design and define future potential for a more incorporative study supporting the ones in search of scientific evidence before designing a new biophilic hotel project or conducting a biophilic hotel research study.

### 1.1. Data Collection

The literature review data was sourced from the Scopus and Web of Science databases using keywords such as "biophilic design," "biophilic interior design," "biophilic hotel," and "green hotel interior design." No specific date limit was applied during the screening process. Refer to Figure 1 for



a diagram illustrating the data collection and screening process.

**Figure 1.** Overview of the Screening Process from Scopus and Web of Science

In the initial scanning process depicted in Figure 1, keywords from Scopus and Web of Science were utilized, resulting in 737 and 515 records, respectively. After identifying and removing 418 duplicate entries, a total of 834 records were obtained. Subsequently, filtering for English articles narrowed the selection down to 292. Further screening for relevant titles reduced the number to 313, followed by the removal of 292 more records. After a review of abstracts, 6 additional records were eliminated, and one more was removed after full-text screening. Ultimately, 14 articles were deemed relevant and included in the study.

**Table 1.** Inclusion and Exclusion Criteria Used in the Selection of Papers.

Inclusion Criteria	Exclusion Criteria
Type: Article	Duplication
Language: English	Irrelevant topic and abstract
Setting: Hotel spaces	Setting: Other environments
Biophilic design	

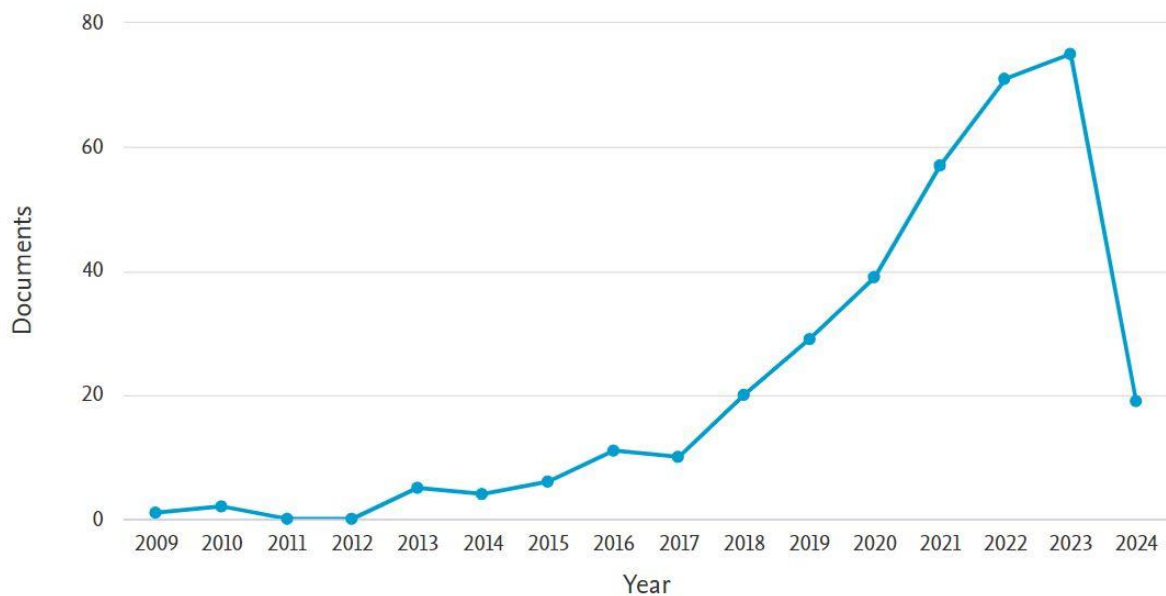
In Table 1, the rationale for adding and removing data obtained during the scanning process is presented. Duplicates found in both databases were omitted. Data in “English” and “classified as articles” were included, while irrelevant titles and abstracts were excluded. Subsequently, studies unrelated to the “hotel environment” lead to data lacking a biophilic design-hotel relationship.

### 1.2. Data Analysis

The analysis of the data obtained in this research was visualized through bibliometric analysis software programs. The graphics obtained during the scanning process were taken from Scopus and Web of Science sites. In addition, the graphics created for the keywords in the scientific mapping analysis of the research data were made from VOSviewer software.

## 2. RESULTS

Documents by year



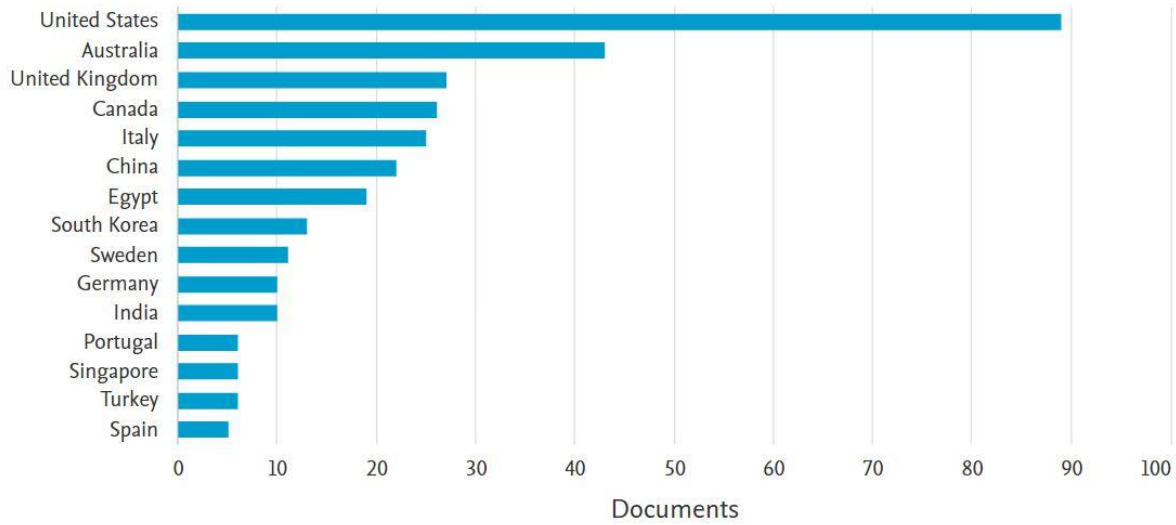
### 2.1. Results of Scopus Database

**Figure 2** Document by Year (Scopus, 2024)

Figure 2 illustrates the distribution of 349 data points obtained from Scopus by year. It is notable that the majority of the data is from 2023. There has been a consistent increase in the number of data

### Documents by country or territory

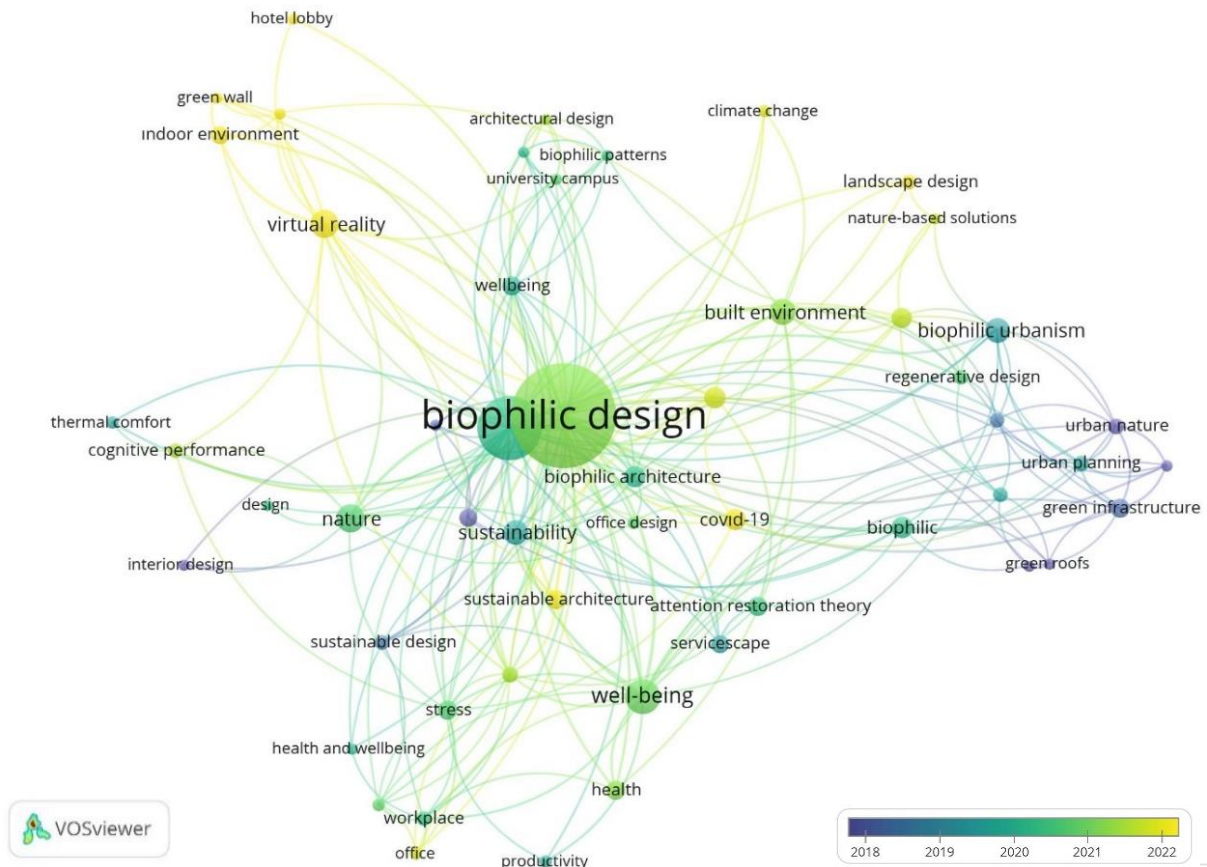
Compare the document counts for up to 15 countries/territories.



points since 2017, with the highest peak occurring in 2021. Consequently, it is observed that interest in biophilic design has increased following the COVID-19 pandemic.

**Figure 3** Document by Country or Territory (Scopus, 2024)

Figure 3 illustrates the distribution of data obtained by country. The USA leads with 89 data points, followed by Australia with 43, and the United Kingdom with 27. Turkey has a relatively small number of English publications in this field, with only 6.







a positive impact of COVID-19 on this subject's rising publication number

**Figure 6** Web of Science Keyword Map (VOSviewer, 2024)

Figure 6 illustrates the keyword map derived from the Web of Science database. The analysis reveals that prevalent keywords encompass biophilic design, biophilia, and well-being. Notably, the term "hotel lobby" has gained prominence among recent keyword trends.

Study	Country
Suess et al. (2024)	United States
Carusa (2023)	Malta
Bilgic & Ebbini (2023)	United States
Zhong et al. (2023)	Netherlands
Nanu & Rahman (2023)	United States
Che Abdullah et al. (2023)	Malaysia, China
Shin et al. (2022)	United States
Gupta & Lee (2022)	India, United States
Song et al. (2022)	United States
Guzzo et al. (2022)	United States
Khozaei et al. (2022)	Oman, Germany, Iran, South Korea
Lee et al. (2022)	United States
Nanu et al. (2020)	United States
Lee (2019)	United States

### 2.3. Analysis of the Studies Included in the Review

**Table 2.** The Included Studies' Background Information.

The analysis of the 14 articles in the review revealed that 1 was published in 2024, 5 in 2023, 6 in 2022, and the remaining in 2020 and 2019. The result shows that there is an increasing number of studies in this field and that there may be a need for further expansion of the literature in this

Study	Method	Context
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particular area.

### 3. SELECTED DOCUMENTS FROM SYSTEMATIC LITERATURE REVIEW

**Table 3.** Methods and Contexts of the Included Studies

Suess et al. (2024)	Conjoint analysis	Urban hotel context
Carusa (2023)	Qualitative approach and a case study	High-end hotel
Bilgic & Ebbini (2023)	Quantitative surveys, qualitative interviews, VR simulations	Hotel lobby
Zhong et al. (2023)	Case studies, interviews, and thematic analysis	Green spaces
Nanu & Rahman (2023)	Surveys and statistical analyses	Hotel lobby
Che Abdullah et al. (2023)	Mixed-methods approach	Hotel environment
Shin et al. (2022)	Comparative analysis and qualitative approach	Luxury servicespace
Gupta & Lee (2022)	Technical analysis (TI2F-AHP method)	Hotel environment
Song et al. (2022)	Quantitative approach, statistical analysis	Hotel lobby
Guzzo et al. (2022)	Qualitative data collection and thematic analysis	Urban hotel context
Khozaei et al. (2022)	Quantitative surveys and qualitative interviews	Hotel environment
Lee et al. (2022)	Quantitative data collection and analysis	Luxury and mid-segment hotel
Nanu et al. (2020)	Quantitative surveys and qualitative interviews	Hotel lobby
Lee (2019)	Quantitative surveys and qualitative observations	Upper midscale hotel

Table 3 defines the methods and contexts of selected biophilic hotel publications. The methods are survey studies, interviews, observations, case study, VR simulation. According to the detailed analysis of 14 publications, the environment focused on the study is hotel lobby in 4, hotel ambience in 3, urban context in 2, economic context and biophilic design relationship in 4, and green spaces in 1.

After a detailed review of the most relevant literature on biophilic hotel interiors, the available sources were indicated along with the current methodologies followed. Then, other literature on biophilic design was divided into subheadings. These are classified as the effects of biophilic hotel design on customers, employees and hotel contexts, biophilic design in the Post-COVID-19 Era and biophilic lobby design in hotels.

### 3.1. Effects of Biophilic Hotel Design in Customer, Employee and Hotel Contexts

As seen in Table 3, the majority of the identified/selected studies are studies aimed at investigating the effects of hotels on customers, employees and the hotel context. Various survey studies, observations, case studies and analyses were conducted to determine these effects. In the context of hotels, Lee's research attempts to investigate if the application of biophilic design enhances visitors' emotional reactions, perceived quality, and behavioral intentions. According to his findings, biophilic designs outperform ordinary designs in evoking more favorable emotional and behavioral reactions. Customers also thought that hotels with biophilic design were of higher quality. Additionally, the study demonstrates to hotel operators that there are some clear links between biophilic architecture and visitor behavior (Lee, 2019). In their study, Song et al. examined the psychological effects that biophilic design had on patrons in the setting of hotels as well as the connection between patron satisfaction, self-image congruence, and subjective well-being. According to their findings, there was no discernible difference in the psychological responses and subjective well-being of customers when biophilic features were used. The study only looked at how customers' psychological responses and behavioral intentions were affected by water and natural light. It has been explained that water and natural light do not alter the psychological responses and subjective well-being of patrons (Song et al., 2022). This finding, however, runs counter to van den Bosch and Sang's (2017 in Song et al. 2022) investigation into the advantages of natural factors for human wellbeing. Lee and colleagues looked at how biophilic design affected experiential values like aesthetics, escape, economic value, and hotel



attitudes. They also looked at how the hotel industry and its environmental ideals about eco-friendly behavior affected relationships. According to Lee et al.'s (2022) findings, biophilic design is superior in terms of aesthetics, escapism, and economic values for luxury hotels. However, it does not yield a noteworthy consumer benefit for mid-segment hotels. Shin et al. bridge the gap between sustainability and luxury in their study, and the findings indicate that biophilic design can raise the perceived value and aesthetic appeal of luxury. They emphasize that businesses can incorporate biophilic design as a feature that enhances the value proposition while guaranteeing the sustainability of buildings and the welfare of their occupants. They also stress how biophilic interior design engages with the surrounding environment (Shin et al., 2022). The impact of sustainable interior design parameters on user hedonic consumption and hotel operational performance effectiveness is examined in the study by Che Abdullah et al. (2023). Seven essential factors for sustainable interior design have been identified by the research, including biophilic components, ergonomics, green awareness, energy efficiency, water usage, health and social flexibility. These results imply that incorporating these standards into hotel architecture can improve operational effectiveness and make visitors' stays more pleasurable. Hotels may enhance their overall performance and satisfy the growing demand for eco-friendly and user-friendly spaces by giving priority to these components of sustainable interior design (Che Abdullah et al., 2023). Through the perspective of prospective hospitality workers, Guzzo et al. (2022) examined the idea of biophilic design in urban hotels and emphasized the significance of incorporating natural elements into hotel environments. The study investigates the potential effects of these design elements on the industry's marketing tactics, hospitality, and inventiveness. The study offers valuable insights into the advantages of biophilic design beyond its visual appeal by exploring the perspectives of those aspiring to work in the hotel sector. In addition to emphasizing the benefits of creating environments that encourage a sense of connection with nature, the study offers suggestions for how these design elements could improve employee wellbeing and productivity. According to the findings, implementing biophilic design concepts in urban hotel settings may provide businesses with a competitive edge by encouraging a more engaging and sustainable visitor experience. It may also help to address problems with staff burnout and physical injuries (Guzzo et al., 2022). Suess (2024) explores how restorative experiences are impacted by biophilic urban hotel architecture in the field of hospitality and tourism studies. The study investigates how various combinations of biophilic design components affect visitors' perceptions of restoration aspects like relaxation, energy levels, and mental clarity. It does this by drawing on the Stress Recovery hypothesis (SRT) and the Prospect-Refuge hypothesis. The study shows how particular arrangements of biophilic features in hotel rooms can impact visitors' overall restorative experiences through conjoint analysis. This study offers insightful information on hotel design, emphasizing the need of using biophilic components to create spaces that encourage visitors to unwind and revitalize (Suess et al., 2024). A new method for selecting biophilic materials in hotel establishments is the Trapezoidal Interval Type-2 Fuzzy Analytical Hierarchy Process technique, recently introduced by Gupta and Lee (2022). This paper investigates the use of this method to improve design selection procedures. The results of the research highlight the potential of advanced computational techniques to accelerate the selection of biophilic features resulting in more eco-friendly and nature-inspired designs for the hotel industry. This creative method highlights how important it is for the hospitality industry to integrate biophilic features for enhanced visitor experiences and environmental sustainability (Gupta and Lee, 2022). Studies show that regenerative sustainability (RS) principles are being adopted by the hospitality sector in a significant way (Caruso, 2023). This literature study examines the development of the hospitality industry, highlighting the important role that RS has played in influencing novel business strategies. Regenerative sustainability is an across-the-industry methodology for sustainable practices that takes into account social, environmental, and economic factors. Analyzing the transition to regenerative hospitality highlights new issues and trends in the industry while

demonstrating the significance it is to embrace sustainable and ecological approaches in order to be effective in the long term (Carusa, 2023). Zhong et al. (2023) emphasize the value of integrating natural components into architectural structures in their biophilic design and sustainability research. They examined a hotel with biophilic elements as a case study. By combining sustainability concepts with biophilic design frameworks, architects can design environments that improve human well-being and environmental protection while also enhancing aesthetic appeal. This strategy represents a movement toward more ecologically responsible and holistic architectural methods, where sustainability and utility are as important to design as aesthetics. A step closer to balancing human-made environments with the natural world is the exploration of three-dimensional green spaces in architecture that fosters a mutually beneficial coexistence between human settlements and the earth (Zhong et al., 2023). Findings from studies indicate that, especially in upscale environments, biophilic design in hotels positively impacts guests' emotional responses, perceptions of quality, and desired behaviors. Although one research indicates that there is no noteworthy influence on the psychological reactions of customers, other studies highlight the possible advantages of biophilic design, such as enhanced visual appeal and enhanced efficiency, particularly in high-end facilities. Adding biophilic elements gives businesses a competitive edge in the hospitality sector by improving visitor experience and boosting employee productivity and well-being in urban hotel environments (Lee, 2019; Song et al., 2022; Lee et al., 2022; Che Abdullah et al., 2023; Guzzo et al., 2022; Shin et al., 2022; Suess et al., 2024).

### 3.2. Biophilic Design in the Post-COVID-19 Era

As seen in Table 3, the majority of the identified/selected studies were conducted after COVID-19. In addition, as seen in Figure 2 and Figure 5, an increase in the biophilic hotel literature was observed in the post-COVID-19 period. People have got more separated from nature than ever due to the COVID-19 epidemic. Spending further time indoors has also increased people's passion for nature. The research emphasizes that biophilic design is necessary to alleviate the negative effects of the pandemic and increase emotional well-being in difficult times (Dzhambov et al., 2021). By integrating nature into interior spaces, biophilic design provides a means to produce surroundings that promote internal health and enhance connection with the natural world, especially when access to the outside is limited (Afacan, 2021). The relationship between COVID-19 and biophilic hotel design has come a subject of adding interest due to the impact of the epidemic on the hospitality industry and the adding recognition of the benefits of biophilic principles in design. Khozaei and colleagues emphasize that perceived stress during the COVID-19 Epidemic is an important factor that cannot be ignored. In their research, they examined tourists' exposure preferences to nature and hotels with biophilic properties, and the results showed that this significantly affected tourists. They also emphasize that the point of hotels can be an important factor in meeting people's requirements to connect with nature (Khozaei et al., 2022). Biophilic design in hotel surroundings has become indeed more important during the COVID-19 epidemic, emphasizing the significance of well-being and sustainable development (Zhao et al., 2022). Incorporating biophilic principles into hotel design can lead to better aesthetic comprehensions, escapes, and positive stations toward the hotel, eventually adding guest satisfaction (Lee et al., 2022). It has been observed in the literature that there has been an increase in this area after COVID-19 and other future epidemics can trigger the demand for biophilic design aligned with biophilic hotel design research (Figure 1).

### 3.3. Biophilic Lobby Design in Hotels

As seen in Table 3 half of the studies identified are concentrating on hotel ambiance and hotel lobby specifically. Lobbies are the intersection where guests and staff first come into contact, as well as the first point of impression about the hotel (Nanu et al., 2020). That's why lobby design is of great

importance for the hotel. In their study, Nanu et al. aimed to understand which elements of hotel lobby design affect guests' booking intentions. The study came to the conclusion that booking intention is significantly impacted by lobby interior design styles, both conventional and contemporary, across various generations. It has been revealed that millennials are more satisfied with hotel lobby styles than non-millennials. It also revealed that millennials prefer modern-looking designs; however, the addition of plants did not affect their emotions and satisfaction levels. According to Nanu et al., although the addition of plants to the lobby design did not have a significant effect across different generations, the addition of plants in general had a positive effect on the satisfaction of all participants. It will be possible to ensure customer satisfaction in lobbies by using biophilic design. In their study, Nanu and Rahman investigated how health consciousness affected how hotel visitors felt about the biophilic architecture in hotel lobbies. Their results show that biophilic design elements can increase willingness to pay, and plants even have a positive effect on mood when exposed to it. They also show that when biophilic design creates inner calm, relaxation, and a better mood, the person will tend to spend more time and concluded that booking a hotel with a biophilic lobby would increase consumers' monetary value compared to a standard lobby (Nanu and Rahman, 2023). Through the use of experimental design, Song et al. examined the impact of biophilic design on the harmony, pleasure, and subjective well-being of the consumer. The collected results did not demonstrate any discernible variation in the influence of these biophilic aspects on the customer's subjective well-being and psychological reactions. The study specifically looked at how customers' subjective well-being, harmony in their self-image, and enjoyment from green plants were affected by additional water and natural light. The findings indicate that customers are not considerably impacted by water or natural light (Song et al., 2022). In their 2023 study, Bilgic and Ebbini examine how virtual interior arrangements can strike a balance between complexity and restoration in a hotel lobby, and specifically draw attention to how users perceive organized complexity in biophilic design. The study highlights the importance of personal preferences and basic responses in determining the benefits associated with this particular feature of biophilic design. The study hypothesizes that an individual's background and personal preferences may have an impact on how they respond to structured complexity, rather than being a uniform experience. This highlights how people respond differently to different design aspects, suggesting that the best way to maximize the benefits of biophilic design principles is to adopt a customized approach that takes individual differences into account (Bilgic and Ebbini, 2023). Recent research suggests that hotel lobby design significantly influences guests' booking intentions, with both conventional and contemporary styles impacting satisfaction across generations. Plants and other biophilic design elements have been shown in some studies to boost pleasure and willingness to pay, although the effects may not be as great in other hotel lobbies. To completely grasp how biophilic design improves guest experiences in hotel lobbies, more research is necessary.

## DISCUSSIONS AND CONCLUSION

Although increasing number of people and rapid urbanization have led to changes in leisure activities and accommodation sector specifically after the COVID 19 world pandemic, it is observed that scientific research do not align with the number of biophilic hotels recently designed and occupied. In this study, a systematic literature review was conducted in the field of biophilic hotel design. Following the study conducted through Scopus and Web of Science databases, 14 related articles were examined and analyzed. Table 3 shows the methods and contexts of these studies. By analyzing these articles in detail, methods and outcoming conclusions lead to define the literature gap in this field identified. In the analysis, it was determined that there was an increase in the number of studies in this field, especially after COVID-19 (see in figure 2 and figure 5). Khozaei et al. states in their study that the demand for biophilic buildings will increase in the post-COVID 19 period (Khozaei et al.,

2022). This information is confirmed in line with the analysis obtained as a result of this study. Although the concept of biophilic design in hotels is a developing concept today, it seems that only a limited number of studies have been conducted in this field (Lee, 2019). There are few studies focusing on biophilic design, especially in the context of hotel interiors, there is a potential to focus on biophilic features in hotel lobbies and other hotel interior contexts.

When we look at the biophilic elements focused on in the studies examined, it is seen that some studies focused on a single biophilic element, while some examined multiple elements. It was seen that Nanu and Rahman (2023) and Nanu et al. (2020) focused on a single biophilic element "landscape". Shin et al. (2022), Lee (2019), Gupta and Lee (2022), and Bilgic and Ebbini (2023) took into consideration the elements of water, natural light, and landscape. Song et al. (2022) studied by focusing on water and natural light. Guzzo et al. (2022) focused on natural light, landscape nature, and indoor landscaping. Suess et al. (2024) continued their studies on 7 biophilic features. These are: indoor landscaping, water, natural light, vertical greenery, decor, outside view, and outdoor terrace. Khozaei et al. (2022) addressed the relationship between biophilic design and COVID-19 in their study. Zhong et al. (2023), Carusa (2023), and Che Abdullah et al. (2023) focused on sustainable design. Lee et al. (2022) focused on green interior design. Gupta and Lee found that hotel guests preferred the presence of plants over other biophilic elements. In addition, it is emphasized that the synergy goal can be achieved if biophilic elements such as water, greenery, and light are simultaneously considered in the decision process of choosing a hotel design theme (Gupta and Lee, 2022). In future studies, the biophilic elements to be examined can focus on more than one element, so that the effects of biophilic design can be observed more clearly by using more than one element emphasizing a pattern (Browning et al., 2014). Most of the studies examined are focused on hotel lobby cases. Although lobbies are important places in terms of the first impression of visitors in hotels, there is no study focusing on hotel rooms. Future studies can also focus on the accommodation area. Biophilic design appeals to the five basic senses, and biophilic elements that appeal to these senses can be examined in more detail. In addition, biophilic hotel designs should not only focus on hotel guests, but also consider their effects on employees. It would be beneficial to learn lessons from the effects of biophilic design examined in literature, especially for the tourism design sector, where customer satisfaction and psychology is at the forefront.

The role of education in expanding the literature in the field of biophilic hotel design field should not be forgotten. The fact that future designers learn more about biophilia through design education will enhance their knowledge for better incorporating the idea for their future designs. The increase of expertise in this field and the expansion of literature are all interrelated. Our future study on the subject of biophilia focuses on the educational process of biophilic hotel design via Browning et al.'s systematic biophilia classification (Browning et al., 2014).

### **Compliance with Ethical Standards**

**Conflict of Interest:** *The author(s) declare that they do not have a conflict of interest with themselves and/or other third parties and institutions, or if so, how this conflict of interest arose and will be resolved, and author contribution declaration forms are added to the article process files with wet signatures.*

**Ethics Committee Permission:** *This article does not require ethics committee approval. The approval form indicating that a wet-signed ethics committee decision is not required has been added to the article process files on the system.*

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## EXTENDED SUMMARY

### Research Problem:

The aim of this study is to conduct a systematic literature review in the field of biophilic hotel design, to discover gaps in the literature and to guide future research.

### Research Questions:

Are the resources in the literature in the field of biophilic hotel design sufficient? What are the gaps in the biophilic hotel design literature? What are the suggestions for future studies when the biophilic hotel design literature is examined?

### Literature Review:

Due to extended periods of confinement indoors brought on by the COVID-19 epidemic, people's alienation from nature has risen, increasing their yearning for natural environs. The importance of perceived stress during the pandemic and its influence on travelers' choices for exposure to environment and hotels with biophilic characteristics are highlighted by Khozaei and colleagues (2022). They stress how crucial a hotel's location is to satisfying guests' need to get back in touch with nature. The abundance of research on this subject that has emerged since COVID-19 demonstrates that biophilic design improves hotel identities and promotes health, especially in the post-pandemic period. According to Nanu et al. (2020), lobby design plays a critical role in influencing visitors' initial perceptions and intents to make reservations. According to their research, booking intentions are strongly influenced by lobby styles, both traditional and modern, with millennials expressing greater pleasure with modern layouts. Although adding plants might not have a significant emotional impact, it usually raises satisfaction levels. Furthermore, according to Nanu and Rahman (2023), biophilic design elements like plants increase desire to pay and have a good impact on the mood, which increases customer spending. Regarding the impact of biophilic elements like water and natural light on subjective well-being, Song et al. (2022) discover conflicting results. To completely comprehend how biophilic design improves visitor experiences in hotel lobbies, more investigation is required. Studies by Lee (2019) and Song et al. (2022) show no discernible effect on guests' psychological reactions, although biophilic design in hotels improves visitors' emotional reactions, perceived quality, and behavioral intentions. But according to Lee et al. (2022), biophilic design improves luxury hotels' aesthetics, escapism, and financial qualities. Shin et al. (2022) go on to emphasize how biophilic design can guarantee sustainability while enhancing the perceived value and aesthetic appeal of luxury hotels. According to Che Abdullah et al. (2023), there are seven key components of sustainable interior design, such as biophilic elements that enhance visitor happiness and operational performance. The advantages of biophilic design for urban hotel environments are examined by Guzzo et al. (2022), who highlight

the benefits for worker productivity and well-being. In general, adding biophilic components to hotel design improves sustainability, competitiveness, and guest experience especially in higher-end settings.

### **Methodology:**

A systematic literature review was conducted in this research. The study followed the guidelines for systematic literature reviews offered by PRISMA to make reporting transparent. This review will lead us to identify the gap in the literature on biophilic hotel design and will help to determine the priorities on which future studies should focus on. The scanning was done using keywords determined from Web of Science and Scopus databases. As a result of the screening, 14 articles were selected to be examined in this study. The analysis of the selected articles and the data obtained during the scanning process were supported by graphics obtained by Web of Science, Scopus and VOSviewer software.

### **Results and Conclusions:**

A thorough assessment of the literature was done in response to the growing interest in biophilic hotel architecture. Even while there has been a noticeable increase in research activity, especially after COVID-19, some fields, like hotel lobby design, still have very shallow levels of inquiry. This review's main goal is to identify these gaps in the literature and offer a direction for further research. It's obvious that in order to better understand the consequences of biophilic design components, more thorough analyses are urgently needed. Moreover, it is critical to consider the effects that biophilic hotel designs have on staff, which calls for an all-encompassing approach to study and implementation. Given the critical role that education plays in promoting progress in this area, initiatives to develop knowledge and broaden the scope of design education are of utmost importance. Accordingly, our next research project will focus on the educational component of biophilic hotel design with the goal of supporting the body of current knowledge and encouraging more investigation into this exciting area.