SAFIYA
ARIF AMIN

EXAMINING BIOPHILIC DESIGN CRITERIA IN THE CONTEXT OF THE WELL-BEING AND SUSTAINABILITY IN AL QANA RESTAURANTS, ABU DHABI

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NEAR EAST UNIVERSITY

INSTITUTE OF GRADUATE STUDIES

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Safiya Arif AMIN

Supervisor
Assoc. Prof. Dr. Çilen ERÇİN

Co-Supervisor
Assist. Prof. Dr. Simge Bardak DENEREL

Nicosia
January 2025

Approval

We certify that we have read the thesis submitted by Safiya Arif Amin titled **"Examining Biophilic Design Criteria in the Context of the Well-Being and Sustainability in Al Qana Restaurants, Abu Dhabi"** and that in our combined opinion it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Applied Sciences.

Examining Committee	Name-Surname	Signature
Head of the Committee:	Assoc. Prof. Dr. Buket Asilsoy	.....
Committee Member*:	Assoc. Prof. Dr. Sema Uzunoğlu	.....
Committee Member*:	Assist. Prof. Dr. Ümran Duman	.....
Supervisor:	Assoc. Prof. Dr. Çilen Erçin	.....
Co-supervisor:	Assist. Prof. Dr. Simge Bardak Denerel	.....

Approved by the Head of the Department

28./01./2025

.....

Prof. Zihni Turkan

Head of the Department

Approved by the Institute of Graduate Studies

...../...../20...

Prof. Dr. Kemal Hüsnü Can Başer

Head of the Institute of Graduate Studies

Declaration

I hereby declare that all information, documents, analysis, and results in this thesis have been collected and presented according to the academic rules and ethical guidelines of the Institute of Graduate Studies, Near East University. I also declare that as required by these rules and conduct, I have fully cited and referenced information and data that are not original to this study.

Safiya Arif Amin

2/10/2024

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Safiya Arif Amin

Abstract

Examining Biophilic Design Criteria in The Context of The Well-Being and Sustainability in Al Qana Restaurants, Abu Dhabi

Amin, Safiya Arif
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Biophilic design, a concept related to the inherent desire to connect with natural systems, is explored within the context of sustainable interior design and well-being, highlighting the core of this research study. Considering the pandemic in 2020, the concern of rapidly decreasing green spaces has become significant due to urbanization. For this reason, biophilic design has become popular, its contribution towards sustainability and well-being having been researched vastly in recent years in terms of improving the lifestyle of humans and providing healing interior environments for individuals. This research aims to assess restaurant interiors within Al Qana, located in Abu Dhabi, United Arab Emirates through biophilic design, examining the connection and impact in correspondence to sustainability and well-being. This study involves utilizing the Biophilic Interior Design Matrix (BID-M) to assess the biophilic elements within restaurant interiors, alongside the sustainable interior aspects, and using the well-being interior design framework. The method of obtaining data was through a qualitative approach through observations and site analysis of each of the six restaurants chosen to be assessed for the research. Based on the data collected, the important connection between biophilic design, sustainability, and well-being in restaurant interiors has been identified in terms of how the BID-M has significantly contributed to the aspects of well-being, sustainability, and vice-versa. As a result, integrating biophilic interior design criteria in restaurants can allow people to spend their leisure time within environments that are both sustainable and enhance their well-being. The findings have shed light on the relationship between these three concepts and have resulted in a proposed table that can serve as a reference for future research on the subject matter.

***Key Words**:* biophilic interior design, restaurants, well-being, sustainability, Abu Dhabi

Özet

Biyofilik Tasarım Kriterlerinin Abu Dabi'deki Al Qana Restoranlarında Refah ve Sürdürülebilirlik Bağlamında İncelenmesi

Amin, Safiya Arif
M.Sc., Mimarlık Bölümü
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Doğal sistemlerle bağlantı kurma yönündeki içsel arzuyla ilgili bir kavram olan biyofilik tasarım, sürdürülebilir iç mekan tasarımı ve refah bağlamında incelenerek bu araştırma çalışmasının özünü vurgulamaktadır. 2020'deki pandemiyi göz önünde bulundurarak, kentleşme nedeniyle hızla azalan yeşil alan endişesi önemli hale gelmiştir. Bu nedenle biyofilik tasarım popüler hale gelmiş, sürdürülebilirliğe ve refaha katkısı, insanların yaşam tarzını iyileştirme ve bireyler için iyileştirici iç mekan ortamları sağlama açısından son yıllarda kapsamlı bir şekilde araştırılmıştır. Bu araştırmanın amacı, Birleşik Arap Emirlikleri, Abu Dabi'de bulunan Al Qana'daki restoran iç mekanlarını biyofilik tasarım yoluyla değerlendirmek, sürdürülebilirlik ve refaha karşılık gelen bağlantıyı ve etkiyi incelemektir. Bu çalışma, restoran iç mekanlarındaki biyofilik unsurları, sürdürülebilir iç mekan yönleriyle birlikte değerlendirmek ve refah iç mekan tasarımı çerçevesini kullanmak için Biyofilik İç Mekan Tasarım Matrisi'ni (BID-M) kullanmayı içerir. Veri elde etme yöntemi, araştırma için değerlendirilmek üzere seçilen altı restoranın her birinin gözlemleri ve saha analizi yoluyla nitel bir yaklaşımla gerçekleştirildi. Toplanan veriler ışığında, restoran iç mekanlarında biyofilik tasarım, sürdürülebilirlik ve refah arasında önemli bir bağlantı olduğu, BID-M'nin refah, sürdürülebilirlik ve tam tersi yönlere nasıl önemli katkı sağladığı tespit edilmiştir. Sonuç olarak, restoranlarda biyofilik iç mekan tasarım kriterlerinin entegre edilmesi, insanların boş zamanlarını hem sürdürülebilir hem de refahlarını artıran ortamlarda geçirmelerine olanak tanıyabilir. Bulgular, bu üç kavram arasındaki ilişkiye ışık tutmuş ve konu hakkında gelecekteki araştırmalar için referans görevi görebilecek önerilen bir tablo ile sonuçlanmıştır.

Anahtar kelimeler: biyofilik iç mekan tasarımı, restoranlar, refah, sürdürülebilirlik, Abu Dhabi

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List of Abbreviations

UAE:	United Arab Emirates
GCC:	Gulf Cooperation Council
SRT	Stress Reduction Theory
ART	Attention Restoration Theory
PSRT	Psychophysiological Stress Recovery Theory
SID	Sustainable Interior Design
BID-M	Biophilic Interior Design Matrix
VOC	Volatile Organic Compounds
SWB	Subjective Well-being

CHAPTER I
Introduction

This chapter describes the general information of the thesis, the statement of the problem, the research aims, the research questions, and the hypothesis. Moreover, the significance, limitations, and definition of terms will define the details of this study.

In the present day, the trend of urbanization has impacted green spaces in cities. Studies have shown that in 2016, cities such as Tokyo, Delhi, and Hong Kong comprised 54.5% of the world's population. The demand and urgency of housing spaces and infrastructure have decreased the size of natural vegetation, converting all green areas into hard concrete and asphalt (Abu Kasim et.al., 2019). Considering the stress and anxieties of managing work, school, and personal lives, this universal experience only further negatively influences people because of traffic, and pollution in the environment from crowded cities (Suess, 2024). The connection between humans and nature has decreased with the overwhelming construction of buildings and population growth. Since 90% of people spend their daily lives indoors, it creates an isolating experience from natural systems which one can only receive by stepping outside of these interior spaces. The human mind and body evolve and develop according to a sensory world which includes vegetation, animals, light, air, color, water, and landscapes. For this reason, the overall well-being of a person is directly influenced by these factors (Alkilany, 2021).

Natural environments, sustainability, and well-being in interior design have grown popular over the years as studies prove the positive effects on human beings, both in the physical and psychological aspects. The components of a human-nature relationship are ingrained in the daily lives of people while the concepts of biophilic design consist of both sustainable practices and well-being. The term biophilic design describes a movement wherein natural-based environments are implemented in interior spaces to enhance their lifestyle and provide physiological as well as psychological health (Ibrahim, 2021). Well-being in general describes a short-term outcome derived from the mood within the context of physiological, affective, and cognitive conditions. A healing environment allows humans to undergo restoration and reduce stress levels due to the intrinsic human nature to connect with natural and living environments.

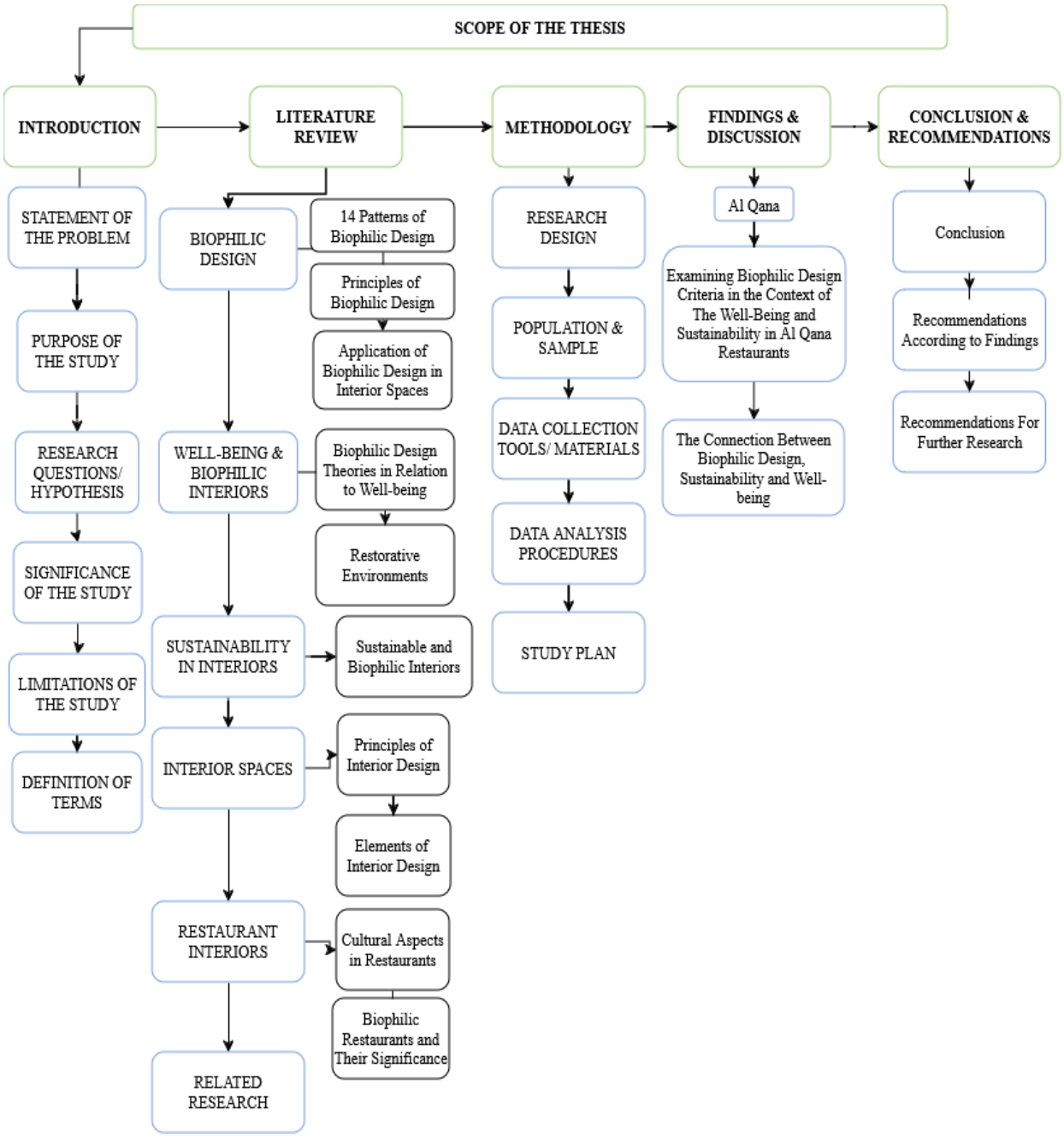
The thesis conducted is titled “Examining Biophilic Design Criteria In The Context Of The Well-Being And Sustainability In Al Qana Restaurants, Abu Dhabi”. The research examines and interprets the presence of biophilic design in restaurants within the context of sustainability and well-being in interiors, utilizing a qualitative study through observation and field analysis. This evaluation is based on the Biophilic Interior Design Matrix, the sustainable interior aspects, and the well-being interior design framework. Moreover, the research is described below in six subsections including:

- Chapter One: The introduction of the study with general information about the research including the significance and purpose of the study
- Chapter Two: The literature review and analysis of the previous research related to the study, the concepts, definitions, and approaches.
- Chapter Three: The methodology wherein the information about the research design, data collection, analysis procedure, and the analysis of the findings are described.
- Chapter Four: The findings displayed from the process of data collection within the scope of the study.
- Chapter Five: The discussion section where the findings are compared according to the related research and existing research on the subject matter.
- Chapter Six: The conclusion and recommendations section which describes the information obtained throughout the research, drawing conclusions and suggestions according to the findings as well as recommendations for further research.

A summary of this information can be found below in the scope of the thesis, as seen in (Figure 1). The framework is described through the six chapters, including the subheadings within each section to portray the qualities of the research.

Figure 1

Scope of the Thesis



(S.A. Amin, 2024)

Statement of the Problem

The United Arab Emirates (UAE) is a country that experiences a mostly dry and humid climate, and due to urbanization and the general preference for remaining indoors, many of the interiors are well-designed to keep customers entertained. Especially in Middle Eastern culture, dining, socializing and leisure time are

significant elements of their daily lives. Statistics show that 40% of food service establishments in the Gulf Cooperation Council (GCC) region include quick service or fast-food restaurants. In general, the UAE had the highest number of restaurants in the GCC. However, after the COVID-19 pandemic, the gastronomy sector has been impacted the most, while the concept of ordering in rather than eating out has become more common with the rise in food delivery apps (Statista, 2024). Furthermore, the pandemic has shone a light on how buildings and neighborhoods impact human health, but the issue remains in the fact that even if biophilic design is implemented, most are not aware of the right tools and knowledge in how to properly integrate the design in interior spaces. There can be a disconnect between biophilic design principles and how they affect health (Andreucci, 2021). Studies regarding youth have shown instances of mental illness, depression, anxiety, and eating disorders. However, since there is a stigma present regarding medical treatments and therapy, many refuse to seek help (Barbato et.al, 2021).

The main statement of the problem and why this study is significant is that restaurant design elements are beneficial for the overall well-being of customers who enjoy dining out and spending their leisure time in restaurants. Additionally, the concept of eating at home has become more favorable than eating in restaurants, while it is more common for people to spend their time indoors due to the heat. Furthermore, it is well known that there is a lack of knowledge and tools in implementing biophilic design to improve well-being and sustainability. There are a variety of setbacks, and the design may not be as effective without a proper analysis. Moreover, youth were most impacted by the pandemic, and their physical and mental health is important in terms of their development.

Purpose of the Study

The aim and purpose of this study are to enhance well-being and sustainability in Al Qana restaurants in the city of Abu Dhabi through biophilic interior design. Objectives of this research include analyzing the effects and impact of design criteria in terms of biophilic design principles, and elements, and how they play a role in the well-being and sustainability of interior spaces such as restaurants. Additionally, this research will aid in highlighting how biophilic design principles are integrated into restaurants to make healthier indoor environments. These are

important because they help create sustainable spaces, which is significant in the UAE's goal of achieving sustainable goals. The aim of this study is as listed below:

1.) To understand and define the biophilic design criteria implemented in interior spaces.

2.) To identify the effects and importance of biophilic design on the sustainability and well-being of restaurant interiors.

3.) Inviting the public to connect with natural indoor environments while enhancing people's lifestyles by motivating them to spend time outside of their homes.

4.) Developing guidelines to create healthy and sustainable interiors that enhance well-being.

5.) Positively impacting restaurant businesses and the user experience.

Research Questions / Hypothesis

The main aim of this research includes analyzing the effects and impact of design criteria in terms of biophilic design principles, elements, and the impact of natural systems on well-being and sustainability in interior spaces such as restaurants. For this reason, this thesis will outline and address the following research questions:

1.) How are the biophilic design criteria implemented in restaurants?

2.) What are the benefits of biophilic design in restaurants and how they do create sustainable environments that improve the well-being of people?

3.) Which aspects of biophilic design are most significant in improving well-being?

4.) How does biophilic design relate to sustainability and well-being within the restaurant interiors?

The research questions formulate a framework for an evaluation of the concept of biophilic design, sustainability, and well-being within the parameters of Al Qana restaurant interiors. To validate these research questions, listed below are the hypotheses.

H1: Biophilic design criteria relate to sustainability and well-being features, and all three aspects interrelate with each other within interior spaces.

H2: Integrating biophilic interior design criteria in restaurants will allow people to spend leisure time within environments that are sustainable and enhance their well-being.

Significance of the Study

Although the UAE is quite competent and is popular regarding the variety of leisure activities, there is an underlying theme of urbanization present. In terms of restaurant interiors, the most common design trends include minimalistic concepts, futuristic, biophilic design, cultural fusion restaurants, sustainability, technological integration, industrial styles, and artistic themes. For this reason, it is important to discuss if biophilic design is implemented properly in restaurants, especially considering it is not as popular in comparison to other trends found in restaurants. In most cases, biophilia can be seen in the use of greenery in interior spaces alongside emphasis on natural lighting. However, the aspects of biophilic design consider multiple elements derived from natural systems which all influence and serve different functions. By studying these principles and attempting to integrate them properly, it will be more effective in enhancing the user experience. Due to an overwhelming number of restaurants, cafes, and fast-food places, similar design trends can make it seem repetitive as well. Moreover, biophilic design can be integrated into a variety of ways according to the ambiance of the restaurant, and analyzing how restaurants can be differentiated will be a guideline for future purposes. The particular significance of this study involves a proposal for restaurant businesses and will inspire them to be sustainable, improve their physical and emotional health, and allow them to relieve stress.

Limitations of the Study

The main limitation of this research regards how some restaurants did not allow an inspection to be conducted within the interiors and did not allow any pictures to be taken. For this reason, the restaurants chosen to be evaluated were limited according to permission from the staff members. Another limitation is the qualitative analysis of the research because biophilic design can be a unique experience for individuals. It may be overstimulating according to some people who have an aversion to smell, visuals, and particular sounds, which may decrease their appetite while disturbing their overall experience. However, due to the restrictions of the restaurants and the cultural and religious aspects of the country, a quantitative approach through a questionnaire can be difficult.

Definition of Terms

To proceed with the research, it is important to examine the terms involved and define them clearly to understand the concepts involved in the research.

Biophilia

Biophilia is derived from the Greek word ‘philia’ which translates to ‘love of’. The term ‘biophilia’ translates to ‘love of life’, and this relates to living organisms and nature. American biologist Edward Wilson describes biophilia as evolutionary adaptation and the connection between the living world and nature. At the same time, German Psychologist Erich Fromm explains how biophilia is the psychological orientation of an attraction between what is alive. The Biophilia Hypothesis was an essay written by Stephen R. Kellert and Wilson in 1993, entailing the idea of a human craving for aesthetic, intellect, cognition, and spiritual meaning. They described the past and how human life began with our ancestors living within nature and animals, which could explain the theory of biophilia (Barbiero, 2021).

Well-being

Well-being can be defined as the various ways people experience and personally perceive their lifestyle. In some instances, well-being is related to happiness or the feeling of contentment with one’s own life. In other instances, well-being is referred to as wellness which entails the physical and mental aspects of health. The concept of well-being is complex, and countless studies have attempted to define and measure its qualities, especially since it involves a broad level of aspects and may not be so easily measured. Furthermore, well-being is more than the evaluation of an individual’s perception of emotional or cognitive state, and factors such as personal needs are vital as well (Tov, 2018).

Sustainability

The Latin word ‘sustinere’ translates to ‘to hold’, and it is the root word for the term ‘sustainability’, which is related to the words ‘maintaining’ and ‘supporting’. The term sustainability is a concept that is founded on the cultural and vernacular themes of societies around the world. It was first introduced in 1972 by the United Nations Conference on Human Environment, describing the ability to maintain, support, and enhance ecological systems as well as social systems by

understanding how the two aspects interact and interrelate. For this reason, reviewing feedback and dynamics of socio-ecological systems, including human society, ecosystems, the economy, communities, and natural resources is vital. Sustainability is rooted in how humanity acts in terms of how ethically, and efficiently natural resources can sustain the present needs and well-being without compromising future generations (Sakalasooriya, 2021)

CHAPTER II

Literature Review

This chapter of the thesis entails the theoretical framework and related research. Moreover, biophilic design, well-being and biophilia, sustainable interiors, interior spaces, and restaurant interiors will be discussed. Biophilic design will be defined alongside how well-being relates to biophilic design. Similarly, sustainability in interiors is explored, its relationship with biophilic design, and the principles and elements of interior design. Once this is covered, the approaches of restaurant interiors and biophilic restaurants are vital to aid in the research. Additionally, five related research from different case areas were chosen to evaluate how biophilic design, sustainability, and well-being are investigated in restaurants.

Theoretical Framework

This research includes the 14 patterns, elements, and importance of biophilic design. Furthermore, this chapter highlights the aspects of well-being, sustainability, the principles and elements of interior design, and the application of biophilic design in interiors. Then, restaurant design criteria will be discussed, the importance of biophilic restaurants, and what they entail. Lastly, five related examples and case studies will be analyzed to understand all aspects of this research.

Biophilic Design

Biophilic design is the integration of the natural environment with architectural spaces, creating a connection between the inhabitants interacting with these areas. This design approach utilizes technology and nature to create healthier environments to increase productivity. Moreover, in 2006, biophilic design became intertwined with the idea of green buildings and sustainability, developing the psychological comfort and well-being of humans through light, thermal control, plants, and water (Almusaed, 2022).

Furthermore, the concept of biophilic design has gained popularity because it involves environmental psychology, marketing, and health. Within the context of hospitality areas, studies prove there is a correlation between biophilic design and attention recovery levels. Natural lighting, views of nature, indoor plants, and indoor

water features have all shown healing benefits and boosted positive emotions and outlooks (Suess, 2024). It is common for biophilia to be integrated into office design, educational spaces, hospitality, healthcare, homes, and retail spaces. In office spaces, the overall well-being increases by 13%, and productivity by 8%. As for educational areas, concentration and participation are increased while learning is boosted by 20-25%. For hospitality, guests and visitors prefer biophilic hotel rooms and can pay up to 23% for these rooms. Post-operative recovery time in healthcare decreased by 8.5% and the desire for pain medication was lowered by 22%. Property prices for homes can be increased by an average of 4-5% while in retail, customers pay around 8-12% more for any vegetational elements or landscaping (Oduncu, 2020).

14 Patterns of Biophilic Design

Terrapin Bright Green, a sustainability consulting firm, defined 14 patterns of biophilic design. These patterns are divided into three categories: Nature in the Space, Natural Analogues, and Nature of the Space. The design patterns provide a foundation for tools in understanding design opportunities, the science related to each pattern, and the strategies on how to apply each pattern. The 14 patterns apply to indoor environments and exteriors. The main aim of introducing patterns is to address human health involving stress, hormone imbalance, and creativity (Browning et.al., 2014). These 14 patterns are listed below:

1.) Visual connection with nature: Provided views of natural systems
2.) Non-visual connection with nature: It is related to sounds, tastes, and other stimuli that refer to nature
3.) Non-rhythmic sensory stimuli: connections with nature that cannot be predicted such as swaying grass or water rippling
4.) Thermal and airflow variability: This describes air temperatures, humidity, and surface temperatures that are present in nature
5.) Presence of water: When it is possible to hear, see, or touch water in spaces
6.) Dynamic and Diffuse Light: Lights and shadow mimicking natural processes
7.) Connection with natural systems: seasonal changes and natural processes
8.) Biomorphic forms and patterns: Patterns, textures, and numbers found in nature

9.) Material connection with nature: materials and elements that reflect the local ecology and make the space unique

10.) Complexity and order: sensory information taken from nature

11.) Prospect: The view of a large space

12.) Refuge: An area for those who wish to be away from activity or environmental conditions, where they are protected and safe

13.) Mystery: The idea of there being a deeper and intriguing aspect in the environment that is hidden and compels individuals.

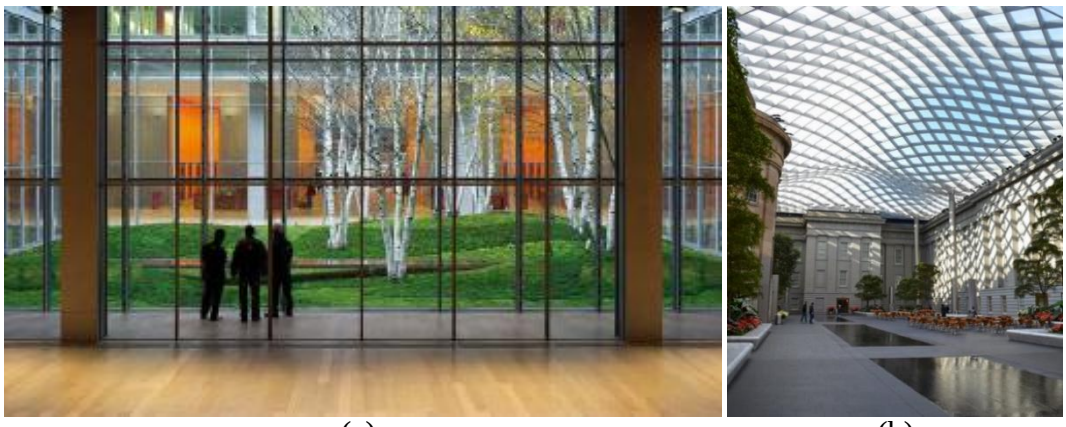
14.) Risk/peril: An unknown threat with the reassurance of feeling safe in the environment

Nature in the Space is the first group of patterns in biophilic design. The presence of nature is within the context of greenery, water, animal motifs, breezes, sounds, the smell of nature, and natural elements. Examples of Nature in the Space include indoor plants, gardens, water features such as fountains and aquariums, and indoor landscaping with green walls. This pattern is implemented through diversity, movement, and multi-sensory interactions and can be seen in (Figure 2a) and (Figure 2b) below (Browning et.al., 2014):

Figure 2

a. New York Times Building in New York

b. Robert and Arlene Kogad Courtyard in the Smithsonian American Art Museum



(a) (b)

(Browning et.al., 2014)

(Table 1) below describes the Nature in the Space patterns and how they influence humans according to stress reduction, cognitive performances, emotion,

mood, and preferences. A variety of studies explain how biophilic design creates healthier spaces for human beings, which can be seen in the table. Visual Connection with Nature lowers blood pressure and heart rate, improves mental engagement, and positively impacts attitude alongside the feeling of happiness. Non-visual Connection with Nature reduces stress hormones and blood pressure, positively impacts performances in the context of cognition, and improves mental health. Non-rhythmic sensory stimuli have a positive impact on heart rate as well as the nervous system. It is observed in the parameters of attention and exploration. Thermal and Airflow Variability influences comfort, well-being, and productivity while also improving perceptions of spatial pleasure. The presence of water reduces stress, increases tranquility, concentration, and memory restoration, and creates emotional responses. Dynamic and Diffuse Light positively impacts the circadian systems while Connection with Natural Systems enhances health responses.

Table 1

Biophilic Design and Biological Responses to Nature in The Space

14 Patterns	Stress Reduction	Cognitive Performance	Emotion, Mood, and Preference
Visual Connection with Nature	• Lowered blood pressure, and heart rate	• Improved mental engagement/attentiveness	• Positively impacted attitude and overall happiness
Non-Visual Connection with Nature	• Reduced systolic blood pressure and stress hormones	• Positively impacted cognitive performance	• Perceived improvements in mental health and tranquility
Non-Rhythmic Sensory Stimuli	• Positively impacted heart rate, systolic blood pressure, and sympathetic nervous system activity	• Observed and quantified behavioral measures of attention and exploration	
Thermal & Airflow Variability	• Positively impacted comfort well-being and productivity	• Positively impacted concentration	• Improved perception of temporal and spatial pleasure

Table 1 (Continued)			
Presence of Water	• Reduced stress, increased feelings of tranquility, lower heart rate and blood pressure	• Improved concentration and memory restoration	• Observed preferences and positive
Dynamic & Diffuse Light	• Positively impacted circadian system functioning		
Connection with Natural Systems			• Enhanced positive health response; shifted perception of environment

(Browning et al., 2014; edited by S.A. Amin, 2024).

Natural Analogues are the second group of biophilic patterns. These sets of patterns include indirect and non-living symbols of nature seen in objects, materials, colors, shapes, sequences, and patterns which can be integrated into art, furniture, and textiles. Shells, leaves, and furniture built in organic shapes and natural materials are examples of natural analogues as well. Nature analogues can be seen in (Figure 3a) and (Figure 3b) below.

Figure 3

a. Hotel Tassel in Brussels

b. Bank of America Tower in New York

(a) (b)

(Browning et.al., 2014)

Table 2

Biophilic Design and Biological Responses to Natural Analogues

14 Patterns	Stress Reduction	Cognitive Performance	Emotion, Mood, and Preference
Biomorphic Forms & Patterns			• Observed view preference
Non-Visual Connection with Nature		• Decreased diastolic blood pressure • Improved creative performance	• Improved comfort
Non-Rhythmic Sensory Stimuli	• Positively impacted perceptual and physiological stress responses		• Observed view preference

(Browning et al., 2014; edited by S.A. Amin, 2024)

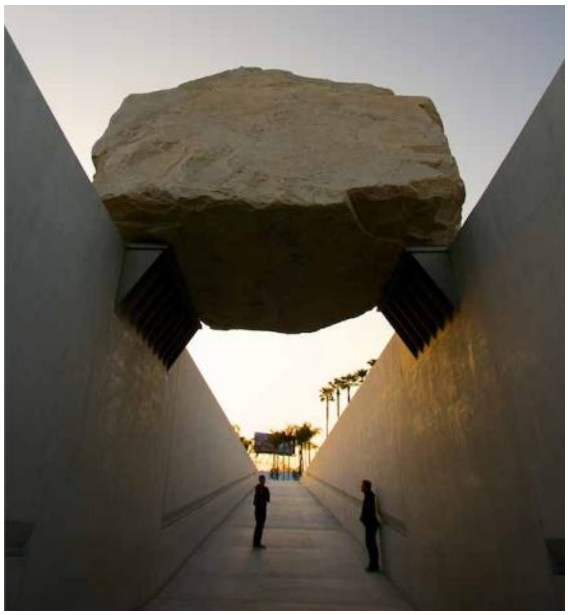
As shown above in (Table 2), the patterns under Natural Analogues describe how the emotional state of humans is most influenced. Biomorphic Forms and Patterns impact the observed view preference. Material Connection with Nature decreases blood pressure and improves creativity alongside comfort levels. Complexity and Order impact perceptions of stress response and the view preferences based on moods and emotions.

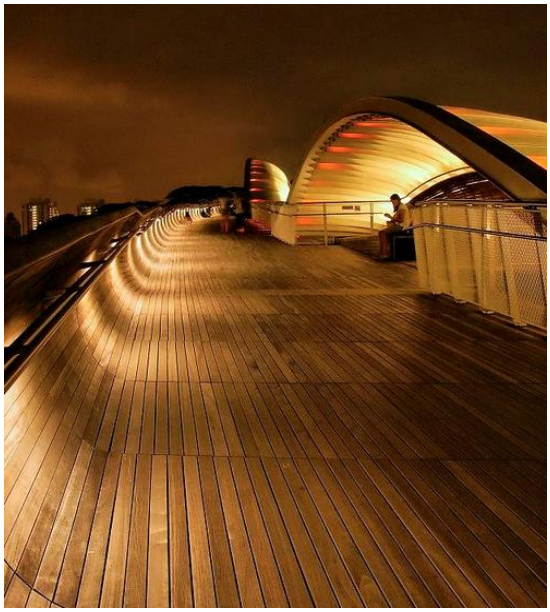
Nature of the Space patterns stimulates the psychological and subconscious aspects of nature. It deals with the fear of the unknown, and the feeling of danger and involves obstructions in interior spaces or a sense of mystery. Nature of the Space borrows spatial configurations with patterns found in Nature in the Space as well as Natural Analogues. Nature of the Space patterns are described in (Figure 4a) and (Figure 4b).

Figure 4

a. Los Angeles County Museum of Art

b. Henderson Bridge in Singapore





(a) (b)

(Browning et.al., 2014)

(Table 3) below are the patterns under Nature of the Space and how they influence human beings. The pattern of prospect reduces stress, boredom, or fatigue, but improves comfort and safety. Refuge impacts cognitive performances through improving concentration, attention, and perception of safety. Mystery as a pattern induces a strong pleasure response while Risk and Peril affect emotions such as pleasure responses and dopamine.

Table 3

Biophilic Design and Biological Responses to Nature of the Space

14 Patterns	Stress Reduction	Cognitive Performance	Emotion, Mood, and Preference
Prospect	• Reduced stress	• Reduced boredom, irritation, fatigue	• Improved comfort and perceived safety
Refuge		• Improved concentration, attention, and perception of safety	

Table 3 (Continued)	
Mystery	• Induced strong pleasure response
Risk/Peril	• Resulted in strong dopamine or pleasure responses

(Browning et al., 2014; edited by S.A. Amin, 2024)

Another key aspect to note about biophilic design is the three methods of how nature is experienced by a person. These three experiences are divided into ‘direct’, ‘indirect’, and the ‘experience of space and place’. Direct experiences of nature are a straightforward correlation between an individual and natural features in an environment. These include light, air, water, plants, animals, weather, natural landscapes, and fire. As for the indirect experience of nature, it entails the imagery of nature, natural materials, and colors, mimicking natural lighting and airflow, with shapes and forms taken from nature. Experience of space and place are related to the patterns of Nature of the Space, which include prospect and refuge, complexity within the environment, transitional spaces, wayfinding, and cultural or ecological attachment towards the space (Oduncu, 2020). Direct and indirect, or symbolic reflections of nature, were seen as organic, while on the other hand, aspects related to culture and ecology were ‘place-based’ or ‘vernacular’ frameworks. However, this built a vague understanding of what biophilia is and how it can be integrated into spaces, which is why representations of nature were then divided into Nature in the Space, Natural Analogues, and Nature of the Space (Zhong et.al., 2021).

Principles of Biophilic Design

Yale professor Stephen R. Kellert introduced the six principles of biophilic design as a base for architects and interior designers. These principles define creativity and well-being for spaces that implement more than the goal of providing shelter, and style of interiors. Moreover, biophilic design can be personalized based on the project brought by a customer and developed by what the designer needs. Since there has been a lack of true criteria for biophilic design within interiors, McGee and Marshall-Baker aimed to develop the Biophilic Interior Design Matrix (BID-M) in 2015. This included 52 biophilic attributes which were then further divided into 6 biophilic design principles. To study the matrix within interiors,

McGee and Marshall-Baker both tested the BID-M in hospital playrooms to assess how biophilic design elements aided in the health of children. The BID-M is known to be used within interior living spaces and specific areas such as recreational interiors within university campuses. The development of this matrix is significant in the environmental identity, the knowledge of the environment, and adult perceptions or behavior towards pro-environmental ideas. The COVID-19 pandemic only further established the vitality of safety and health of children especially since the experience of lockdown has impacted the well-being levels within homes and living spaces. The basic principles or elements of biophilic design include environmental features, natural shapes and forms, natural patterns and processes, light and space, place-based relationships, and evolved human-nature relationships (Mackie, 2024). These principles are further described in (Table 4) below.

Table 4

Biophilic Design Principles

Environmental features	The use of color, water features such as fountains, air, sunlight, gardens, green walls, natural materials, views, green facades, landscape, and fireplaces.
Natural shapes and forms	These include botanical and animal motifs, arches, vaults, and domes, as well as biomimicry. Japanese wood structures have carved patterns of plant and animal motifs within columns and beams. Islamic themes are present in geometrical carvings and mosaics.
Natural patterns and processes	The attributes of sensory variability, are the richness in information, passage of time, transitional spaces, balance, tension, and hierarchical aspects.
Light and space	The emphasis on light, shadows, and conditions, such as sharp edges and soft curves on molding. Light shining upon a plaster wall in comparison to a painted wall. The circadian rhythms involved

	with lighting, how it gives the feeling of spaciousness and harmony.
Place-based relationships	How landscape, culture, geography, ecology, and historic connection allow comfort and familiarity.
Evolved human-nature relationship	The purpose of the design, and who the design is for, including the user needs involving security, attachment, cognition, awe, and exploration.

(Mackie, 2024; edited by S.A. Amin, 2024)

Biophilic design aims to portray more than just the basic aspects such as including greenery in interiors. The place, history, culture, geographical condition, climate, and natural themes all tie together to create a rich environment that allows humans to connect with nature. Moreover, there are psychological influences of these principles, and they affect the subconscious mind, allowing humans to feel comfortable and enjoy their time within the space (Mackie, 2024).

Application of Biophilic Design in Interiors

Typically, the concept of biophilic design is considered a trend implemented in the interior and exterior greening of architecture, while there is a lack of knowledge on how to properly integrate it within interiors. This may be because of how flexible, broad, and complex biophilic design is, especially when considering the well-being of people, their health, the aesthetics, as well as the functionality required of the space. In addition to the innovative attributes of biophilic design, it is not a concept taught in design schools, nor is it included in curriculums. For this reason, in the practical field, there are certain protocols according to the scale and purpose of the space. Biophilic design is implemented in residential spaces, workplaces, healthcare, educational spaces, commercial and retail, hospitality sectors, and cultural or religious spaces (Verde Profilo, 2024).

As seen in (Figure 5), biophilic design in residential areas includes houses, apartments, and any kind of residential complex in which biophilic design can be implemented in interiors and exteriors. In this case, biophilia is used to create a more

welcoming atmosphere that is healthy in terms of human restoration and relaxation. This may include home offices as well (Verde Profilo, 2024).

Figure 5

Residential Biophilic Design

(Burca, 2023)

In workplaces, biophilic design is implemented to improve the levels of productivity, concentration, well-being, and employee satisfaction. Additionally, a biophilic workspace motivates employees to join the office, reducing the chances of absences (Verde Profilo, 2024). Biophilic design in workplaces can be seen below in (Figure 6).

Figure 6

Biophilic Design in the Workplace

(Gastoldi, 2023)

Within healthcare interiors, these areas include hospitals, clinics, and private and public healthcare facilities. The main purpose of biophilic design is to heal people and reduce the stress levels of patients, staff, and visitors (Verde Profilo, 2024). Biophilic design in healthcare can be seen in (Figure 7) below.

Figure 7

Biophilic Design in Healthcare

(ETHKO Hospital Engineering, 2021)

Educational spaces are schools, nurseries, universities, and institutions where education is promoted. They benefit from biophilic design through stimulating spaces and allowing students to concentrate and improve retention and learning (Verde Profilo, 2024). Biophilic design is implemented within interior spaces as seen in (Figure 8).

Figure 8

Biophilic Design in Education

(O'Keefe, 2022)

Commercial and retail areas consist of shops, malls, and similar areas, while biophilic design is integrated to invite and welcome more customers, improve their experience, and gain their loyalty. (Figure 9) describes a biophilic design example utilized within commercial or retail interiors.

Figure 9

Biophilic Design in Commercial and Retail Interiors

(Heath, 2016)

Hospitality areas include hotels, restaurants, and other similar venues. Typically, biophilic design is added to create better experiences for customers while making a space more welcoming and healthier for customers. (Figure 10) below is an example of biophilic design in hospitality interiors.

Figure 10

Biophilic Design in a Mexican Restaurant

(Loho, 2022)

As for cultural and religious spaces, museums and areas where religious activities are practiced can implement biophilic elements. Biophilic design is added to enhance the experience and emphasize a spiritual connection with nature. It is implemented to improve the experience of those interacting with the interior space. (Figure 11) below depicts an example of a biophilic interior within a religious space.

Figure 11

Biophilic design in the Honeycomb Mosque located in Indonesia

(Abdel, 2020)

In addition to biophilia in interiors, there are developments around furniture style and how they can be inspired by nature or by the environment. The concept of multipurpose furniture based on natural shapes, living creatures, plants, sea creatures, and planets describes biophilia within interiors. Other examples of biophilic design attributes in interior design are focused on realistic paintings, natural materials such as wood, and elements from nature incorporated with general design principles (Cvetanovic et.al., 2019). These attributes can be implemented through patterns in carved stained glass, printed features, or the texture of materials or textiles. Daylight is an important factor as well since it influences how the space is perceived through shadows and light. It impacts the way the eyes absorb colors and the use of materials such as glass or reflective surfaces. Through windows, airflow is also controlled, and as an additional factor, other senses are stimulated through sight, hearing the breeze as well as feeling the cool air, and the sense of smell from natural fragrances.

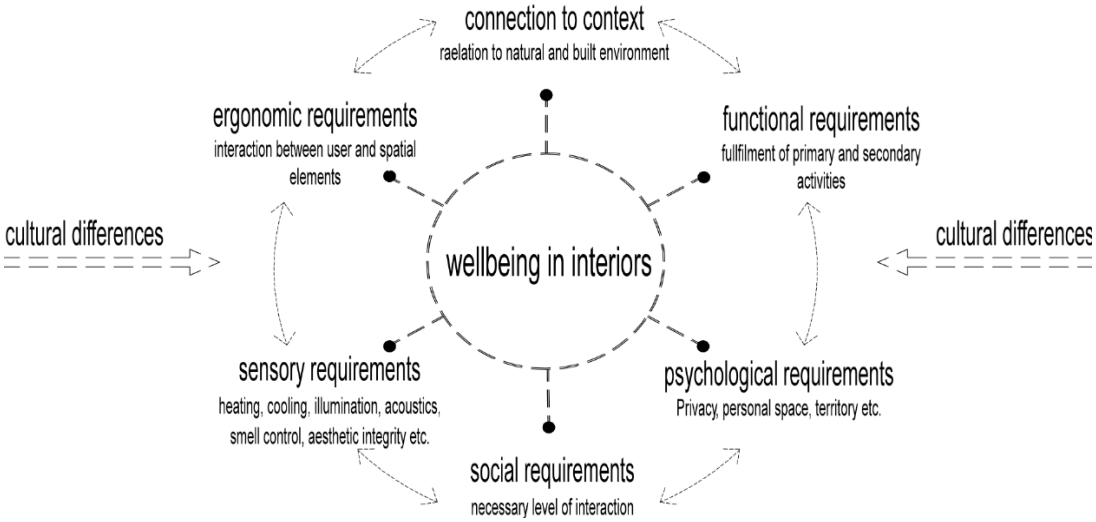
Similarly, water features and indoor vegetation contribute to the implementation of integrating outdoor attributes in interiors. As for fire elements, this can be depicted in interiors through controlled fireplaces, candles, or through color palettes that are brighter and fiery. Fire itself creates a warm atmosphere, and through light control, it can induce a feeling of comfort (Dalay, 2020).

Well-being and Biophilic Interiors

The well-being of a human is subjective and immeasurable because it is based on the human needs of a person and the quality of life. The term wellness can be defined as the physical and mental health of an individual which is intertwined with the social health of a human. This explains how well-being itself is rooted in social and personal satisfaction, the feeling of accomplishment, physical abilities, and mental capacities. The main points that contribute to well-being include happiness levels, life circumstances such as income, marital status, and religious beliefs, and lastly, positive cognitive, behavioral, and goal-based activities (Onay, 2019). Furthermore, culture is significant in the well-being of a person because the experiences of a person are various even though some features are universal and are relatable for many. Cultural factors relate to Subjective Well-being, otherwise known as SWB, and this comprises autonomy, meaning, and relationships, as well as the interaction between culture and the environment (Onay & Minucciani, 2018). For this reason, the well-being of humans in interiors has begun playing a significant role in the design process of living spaces. The experience of interacting with a designed environment built to enhance well-being is greatly based on design criteria which can be seen in (Figure 12). This involves ergonomics, connection to the natural and built environment, functional requirements within the interior, privacy and personal space, social necessities, and sensory approaches through aesthetics, acoustics, smell, and illumination, as well as thermal variability (Onay, 2019).

Figure 12

Well-being framework for interior design



(Onay & Minucciani, 2018)

Connection to context is a feature of well-being in interiors, and it is related to the natural and built environment, ignoring the components of human scale and senses. It is what differentiates spaces based on the context of location, orientation, surrounding spaces, infrastructure, and natural elements. This aspect of well-being can be seen to enhance recovery of illnesses for people who live close to open spaces. Their sense of place, quality of life, performance, and motivation grows, building evidence as to how natural connection is significant in well-being (Onay & Minucciani, 2018).

Functional requirements as an aspect of well-being regard basic needs in living environments based on the activities within the space. Interior elements including furniture and lighting reflect functional requirements and describe the user needs and activities they can perform. Multipurpose spaces require flexible design approaches, and for this, it is important to allow people to utilize the area in different ways, allowing them to fulfill the functional requirements necessary.

Ergonomics in well-being describes the connection between a human and the interior in the context of physical and cognitive aspects that allow an individual to complete a task. Ergonomics is the physical activity concerned with human anatomy, anthropometric, psychological, and cognitive ergonomics. İt is based on user capabilities, limitations, and how a human can utilize the utilities and furniture available to fulfill a task.

Psychological aspects of well-being are fulfilments of three psychological needs: ‘competence’ and the control of the outcome to master or achieve a goal, ‘relatedness’ and the desire to interact and connect with others to experience empathy, and ‘autonomy’, the desire to have the freedom to take control of one’s own life and behave according to oneself. Autonomy is related to privacy as well, and it allows a person to develop a link to the space. For this reason, an interior space should involve privacy and control for a person.

Social requirements in well-being interiors include the interaction between humans and groups of people. This includes how an individual describes their quality of life in terms of their relationships with other people, the neighborhood, and the community. There are five main aspects of social requirements: social integration with society, social contribution and value towards community, social coherence and perception of the world, social actualization, and social acceptance through the character and qualities of other people. Within interiors, social well-being is supported through activities and interactions between people in an environment based on spatial properties.

Sensory aspects describe ventilation, lighting, heating, cooling, and acoustics. Multi-sensory experiences are significant in contributing to the perception of the quality of space, matter, and scale. Spatial features such as light, color, sound, temperature, air, sense of smell, textures, and materials allow a physical definition of an area, stimulating an individual’s senses. These senses allow humans to appreciate and create emotional responses, ultimately influencing the experience of the space (Onay & Minucciani, 2018).

Additionally, recent studies have shown that 11.7 million working days in the UK during 2015-2016 were lost because of stress while it is predicted that by 2050, 66% of the world will be urbanized, which will impact the percentage of green spaces, ultimately creating a gap between humans and nature. This can create a decline in the health and well-being of people. Furthermore, human beings spend a large percentage of their lives within interiors, and for this reason, there is a demand for biophilic design to be implemented to improve well-being (Heath et.al., 2018).

Biophilic Design Theories in Relation to Well-being

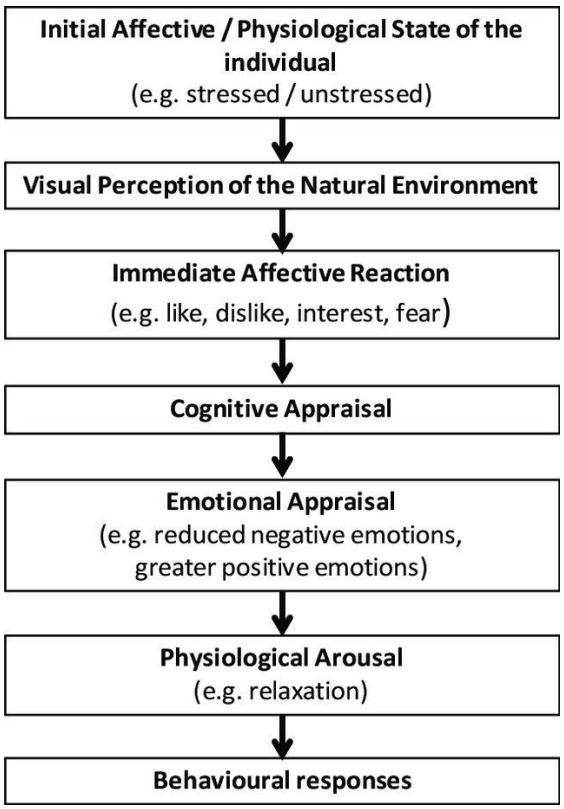
To further describe the unique connection between human well-being and nature, there are dominant theories introduced according to ecopsychology and

environmental psychology. These theories consisted of The Biophilia Hypothesis, Stress Reduction Theory (SRT), and Attention Restoration Theory (ART). Studies have shown how ART and SRT play a significant role in restorative environments, aiming to improve human emotions, attention and decrease stress (Gaekwad, 2023).

Stress Recovery Theory is a theory based on data collected by Ulrich in 1979, describing when humans experience the highest levels of stress, they benefit the most from visuals of nature. The term ‘stress’ itself is a human body response related to demand towards it and induces alarm, resistance, and exhaustion. These feelings are the response from the body in attempts of it trying to resist the stress caused by mental, social, environmental or physical factors. The term ‘fight or flight’ is a manifestation of stress and is a physiological response that affects the heart and lung function by raising the heartbeat and respiration rate (Gaekwad et.al., 2023). SRT mainly describes how an individual’s stress decreases according to the interaction between humans and the natural environment, and this is portrayed in (Figure 13). Visual perception of nature creates an emotional reaction, followed by cognitive appraisal and behavioral responses. A stressed individual who experiences natural settings will experience a positive reaction, creating a behavioral response of staying within the environment, while the cognitive appraisal will be positive, thus reducing negative emotions. These positive emotions invoke physiological arousal which allows a person to feel relaxed (Marselle, 2019).

Figure 13

Stress Recovery Theory in Response to The Natural Environment



(Marselle, 2019)

In terms of the biophilia hypothesis, there are cultural and social factors affecting the way biophilia affects an individual. Biophilia is seen as a complex phenomenon and for this reason, it can influence people in a variety of ways (Gaekwad et.al., 2022). Similarly, the concept of Attention Restoration Theory describes how extreme stress of cognitive tasks causes brain fatigue, while this exhaustion can be reduced by human-nature interaction. ART was first introduced in 1983 by Stephen Kaplan and is intertwined with SRT, working together to enhance 'attention recovery' by observing human psychology. Human-nature interaction can be achieved through restorative environments, creating a guideline for artificial areas that aim to induce restoration for individuals by implementing attention restoration theories beyond the concept of only using greenery within interiors. Natural environments in general prove to show the most significant results in restorative qualities and impacting attention recovery (Liu et.al., 2024).

Moreover, there are further theories that explain how biophilic design ties together with the enhancement of well-being and creates positive spaces. For

example, circadian Rhythms are the 24-hour cycle in which the physical and mental changes shift according to light and darkness in an environment. Exposure to sunlight aids in resetting circadian Rhythms since natural daylight allows the secretion of melatonin, a hormone that induces sleep and regulates this cycle. The Prospect-Refuge Theory and the Savanna Hypothesis both describe why humans desire to feel comfortable in interior spaces. This is derived from the biophilic pattern of Prospect and Refuge as well and explains the innate urge to observe our surroundings while being hidden from others. The Savanna Hypothesis relates to this theory in terms of creating open 'dangerous' spaces like a Savannah, as a dichotomy to sheltered areas which are seen as 'safe'. These two different areas invoke separate responses of excitement and exploration, thus allowing the restoration of mental and physical focus. Similarly, references to nature and the biophilic pattern of Natural Analogues in terms of the Ecological Valence Theory explain why certain colors allow comfort and reduce blood pressure. For example, blue is reminiscent of the sky and water, inducing calmness. Green colors remind humans of vegetation, and this impacts a person in the restorative context, while yellow colors mimic the sun, allowing positive and happy feelings. Red reminds humans of ripe fruits, causing people to be energized and excited. Another theory related to well-being and biophilia is the Blue Space Theory, which entails how humans are inclined toward environments that include water due to their restorative properties. Water in interiors reduces stress, and lowers heart rates and blood pressure, while additionally increasing positivity, concentration, and memory restoration (Heath et.al., 2018).

Restorative Environments

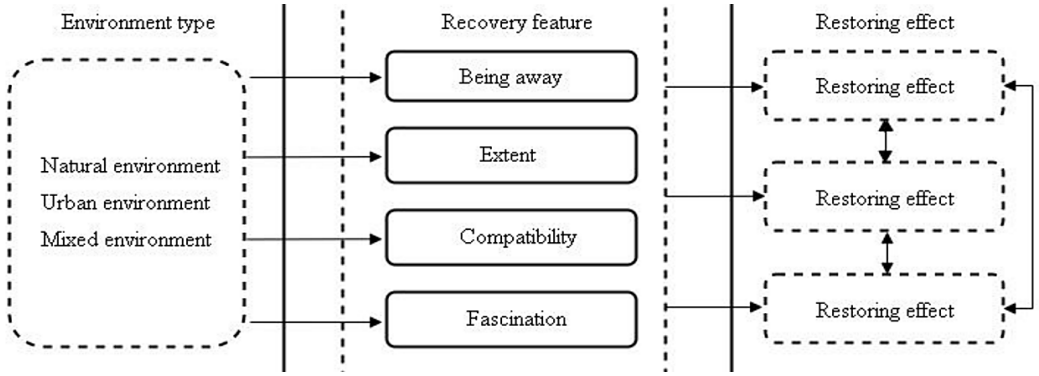
Due to the positive impact of human exposure to nature, several studies provide evidence for the relationship between biophilic design and psychological restoration in restorative environments. Restoration for humans includes physiological, affective, and cognitive states, which is related to the attention restoration theory (ART) and psychophysiological stress recovery theory (PSRT). As for restorative spaces, these include green areas, residential and non-residential streetscapes, blue spaces, areas of culture and history, and indoor built spaces such as shopping malls, coffee shops, and work environments. All these built spaces are categorized according to aesthetics, natural attributes such as vegetation, tree cover, and function. However, certain aspects such as visual and locomotive permeability

influence the effect of how well a space is restorative to a person. Factors such as walkability, landmarks in urban areas, wayfinding, street proximity, and density of crowds influence restorative environments. Furthermore, non-visual factors which cater to hearing and smell influence mood and recovery effects to allow a sensory experience (Martinez et.al., 2021).

To create a restorative environment, there are four aspects as seen in (Figure 14): 'being away', 'extent', 'fascination', and 'compatibility'. The concept of 'being away' portrays the idea of being able to escape from the daily routine of noise, crowding, and urban environments, while feeling the desire to rest in the physical and mental sense. Being away from the chaos of life provides renewal and allows retention and this is achieved through indoor gardens, nature views, water features, and areas that are not the typical kind of workstation. The aspect of 'extent' is intertwined with connection and explains the innate desire to be within nature. Extent is shown through open spaces, ceilings, different heights in interior spaces, as well as views of nature. 'Fascination' is related to the aspect of 'extent' since fascination is a short-term satisfaction experience for an individual and is a product of excitement or intrigue in an environment. It is fueled by curiosity and promotes the feeling of wanting to learn or explore more. This aspect is achieved by natural lighting, patterns, shapes, forms of greenery, and water features. 'Compatibility' describes the extent to which an environment is compatible with an individual. This works together with the 'fascination' to strengthen the connection between a human and the space (Ibrahim, 2021).

Figure 14

Restorative Environments Based on the Attention Restoration Theory



(Liu et.al., 2024).

An individual exposed to a restorative environment can be protected from fatigue and stress due to the daily routine. Restorative spaces allow humans to feel as if they are in a safe area where they can relax, while they can interact positively with enriching experiences with little to no interruptions. Studies and experiments throughout the years have supported this research in terms of natural environments within the context of residential and or therapeutic spaces. Additionally, there is great importance in social roles and circumstances that influence restorative experiences. Social interaction can aid in restorative environments through the concept of exploration and intrigue. The idea of discovering a space together with someone allows them to feel safe, resulting in positive experiences. It is also significant to note that despite nature being beneficial in the restoration process of a human being, nature alone is not the only factor, and restoration is transactionally dependent on what a person can bring to the environment through experiences and awareness of their surroundings (Lindern et.al., 2017).

Sustainability in Interiors

The concept of sustainability is a framework and guide that focuses on meeting the requirements of the present without compromising the needs of future generations, involving environmental, social, and economic factors. Conserving resources and reducing pollution through eco-friendly technology with the addition of renewable energy helps maintain sustainability for the environment. Social sustainability covers the idea of equity, human rights, the well-being of the community, and the availability of education and healthcare. Economic sustainability is the responsibility of managing local businesses, and economies in the long-term (S.N et.al., 2024).

In terms of sustainability in interior design, this includes environmentally sustainable interior design, sustainable interior design, and green interior design. In interior spaces, Sustainable Interior Design (SID) is focused on the emotions of people in the environment as well as their physical well-being. In other words, the SID is focused on comfort, safety, the performance of occupants, behavior, emotions, and physical and psychological well-being. However, the issue remains on the matter of how difficult it is to implement sustainability in interiors, despite designers being aware of the materials they are using, the building systems, and integrating technology that is energy efficient. Sustainable materials include those that promote

local economies and do not negatively impact the carbon footprint in transport. These materials are renewable, recyclable, and have a low environmental impact. Materials such as cork, rattan, bamboo, recycled metal, and glass are good examples of sustainable materials, as can be seen in (Figure 15a) and (Figure 15b). Energy-efficient technology includes LED or CFL lightbulbs, solar design, and natural lighting to reduce artificial lighting. Heating, ventilation, and air conditioning also reduce energy through energy-efficient systems. Water conservation can be achieved through low-flow fixtures, rainwater harvesting, and greywater reuse systems. Furthermore, healthy and sustainable environments are created by improving indoor quality, reducing waste, and implementing energy-efficient aspects alongside sustainable materials. By following trends and the latest technologies, designers need to remain knowledgeable about information and current trends (Kinebar et.al, 2023).

Figure 15

a. The Material Rattan Used in Interior Spaces

b. The Material Bamboo Used in Interior Spaces

(a) (b)

(Bolon, 2024)

Since sustainability in interiors is a complex concept, there are several approaches interior designers can implement. However, the core of sustainable

interior design remains focused on energy, water, material, and health, yet the use of materials and lighting is most significant for interior designers. Resources such as bamboo, stone, marble, cork, recycled plastic, aluminum, jute fibers, and reclaimed wood are the best to use. Bamboo is a versatile material, and it is an attractive choice to make interiors more visually appealing. Marble includes a variety of options, and most are expensive, which is a reason why designers opt to use granite, travertine, and sandstone. Cork as a material is resilient as well and is useful for insulation on walls, flooring, and for decoration. For textiles, the most sustainable are wool, linen, and hemp. Materials such as glass are biodegradable, and aluminum is practical even if it is not stylish. Recycled plastic is mainly used for rugs and carpets, while on the other hand, jute fibers add earth tones and are renewable while creating insulating carpets. Reclaimed wood is significant as well because of its flexibility and a variety of furniture can be made from wood (Radhika & Swetha, 2023).

Additionally, the issue with unsustainable materials and practices is that they include VOCs or Volatile Organic Compounds, which are essentially harmful to the environment. On the other hand, sustainable materials contribute to health benefits as well due to how they can reduce asthmatic episodes, aid in skin issues, and improve eyesight (Cooper, 2021). Research shows sustainable materials are related to ventilation systems since they create a healthy indoor environment by utilizing fresh air. Another way to improve indoor air quality is through plants and indoor gardens to cleanse the pollutants. This is evident in the style of vernacular design themes as well, since traditional methods were seen as more sustainable. They ensured energy conservation and utilized natural ventilation before fossil fuels were introduced, while the use of natural and local materials was common. Enhancing air quality can be done through operable windows and simultaneously, windows provide natural lighting, decreasing the need for artificial lighting. The addition of curtains, shades, screens, drapes, and window glazing is significant in providing comfort for people as well. In addition, lighting is related to space planning because the arrangement of a room is how humans perceive the space. Dimmers and timers are good methods of lowering energy consumption, and the idea of implementing reflective surfaces causes a room to be brighter. Moreover, dark flooring in interiors, such as tile, concrete, or stone, absorbs heat from natural lighting and this is distributed in the area to keep a space warm (Templeton, 2011).

Sustainable and Biophilic Interiors

Through research and investigations, studies have shown how biophilic design and sustainable design naturally overlap in the context of including plants, raw or natural materials, and implementing visual aesthetics through natural forms, materials, and colors. Several themes of biophilia and sustainability intertwine with clean air, ventilation, and air purification through the usage of plants. This is a vital aspect of creating healthy interiors due to how it reduces VOCs and toxins while plants aid in purifying the air from the production of oxygen, thus enhancing indoor air quality (Cooper, 2021).

Furthermore, SID is related to biophilic design because it overlaps in indoor plants, animals, daylight, natural materials, colors, the durability of natural materials, representations of nature in design, and vernacular elements (S.N. et.al., 2024). Another way of integrating sustainability and biophilia is through natural landscaping in interior spaces, which can be seen in (Figure 16) below. This includes vegetation, green walls, and potted plants, while these elements have a positive impact on physical health, productivity, and reduction of stress. Other examples of fauna can be aquariums and birdcages, influencing intrigue and mental stimulation (Konsyna & Bondarenko, 2023).

Figure 16

Indoor Landscaping in Interiors

(Ross, 2023)

The environment in interiors can be healthier through control of air, toxin levels, and ventilation as well. These aspects include air quality, heating, ventilation, lighting, and acoustics to create a fresh environment. The use of natural materials and recycled materials enhances environmental safety, and this includes interior finishing as well. Repurposing resources can be a creative way for designers to give life to materials once again, creating a circular production cycle that reduces waste in the environment. Natural colors and earth tones implement both biophilia and sustainability to create natural interiors. Subdued shades of brown, green, and blue are color schemes that promote this aesthetic while bright colors are seen to be used cautiously. The impact of light is significant in the well-being of a person, and for this reason, natural lighting and the right color of lighting reflect how the space is viewed. If there is darker furniture and walls with softer lighting, it creates an environment in which more artificial lighting is needed. Reflective surfaces help increase the brightness of a room and can be a more sustainable and biophilic method rather than adding more artificial lighting. Additionally, controlled lighting and technology are what make a space more energy efficient. As for the optimization of space, keeping the focus on humans while creating a sensory environment that connects with nature, allows comfort, health, and relaxation for people (Konsyna & Bondarenko, 2023).

Figure 17

Biomimicry

(Venturini, 2021)

Another aspect of both sustainable and biophilic interiors is the concept of biomimicry, a concept which can be seen in (Figure 17). Biometric designs are used to implement nature themes to provide sustainable features in design. Biomimicry is not only the integration of nature, but it includes biological processes and ecosystems. With the addition of how nature and its aesthetic appeal cater towards healing and mental restoration, aspects of nature in interiors provide relief from stress, illnesses, grief, and disorders. The concept of nature in interiors enhances sustainability, green spaces, and well-being, while the idea of ecotherapy is significant. This objective is centered around the therapeutic practices of bringing awareness of nature and its relationship with humans through interactions. To further describe this unique relationship, there is an emphasis on light therapy, aromatherapy, and the benefits of nature sounds. The smell of nature boosts serotonin and reduces anxiety alongside depression. Similarly, natural light impacts the moods of a person while spaces with large windows, skylights, and natural views prove to lead people to recovery. As for nature and auditory sounds, the stress of the constant sounds of car horns, technology, airplanes, and construction negatively affects a human. Nature sounds and indoor-outdoor interaction can boost biophilia attributes in sustainable environments (M. O'Reilly, 2018).

Interior Spaces

Interior design combines art, science, and technology to create an area in which space, form, texture, color, and light improve the quality of life, well-being, social lives, learning abilities, and appreciation of life. Designers aim to please users and implement the basic needs to allow better and healthier indoor experiences. However, interior design is perpetually changing due to new trends in society, the environment, culture, technology, and more so after advances in sustainability and wellness, which can be seen during COVID-19 (Kilmer & Kilmer, 2024).

Human factors such as sensory considerations are the reason why principles and elements of design are combined with aspects of acoustics, lighting, color theory, scene, tactile, and visual stimuli. These factors are what makes an experience within an interior special and unique since everyone interacts with the environment differently. Moreover, design theory involving human behavior perception, environmental design research, and design based on function is significant. As for designing with humans in mind, ergonomics and anthropometrics help guide

designers analyze the physical environment according to objects, spaces, and users. The interaction between a user and specific objects and tasks is based on the dimensions and needs of the task itself, allowing individuals to perform easily within the space (League, 2023).

Principles of Interior Design

To create an interior space, there are key points that provide designers with a framework, and these principles include balance, harmony, contrast, proportion and scale, rhythm, emphasis, and details.

Balance in interior design is the symmetry and geometry utilized in a space and is considered one of the most important factors. It refers to the symmetry which can be seen in nature, the asymmetry and radial balance of natural systems while there are three basic forms of balance. Symmetry is mirrored images and themes in an interior space, allowing the space to look symmetrical. It is mostly used in square rooms, and there are usually focal points that direct the eye toward a certain area that emphasizes symmetry. Asymmetry is more flexible and is not based on geometry, but it can be seen in similar shapes, sizes, or dimensions of objects. Radial balance is complex and includes a focal point to create harmony and allow aesthetics. There are typically circular, large, and eye-catching elements within the room to add radial balance to interiors.

Harmony is shown through the similarity and coordination of repetitive themes. This can be implemented by minimal elements, that are similar in colors, shape, and texture. Elements of interior design such as form, shape, texture, and color are used to achieve harmony. Repetition of major and minor elements is best to produce a harmonious interior, but excessive themes can cause dissonance, and this disrupts the unity of a space.

Contrast as a principle is the use of color, texture, pattern, shapes, and styles to portray the idea of opposites attracting, ultimately adding an intriguing touch to an interior. A popular style of contrast can be seen in the design of Scandinavian minimalistic interiors with themes of stripes and flowers, or matte and glossy patterns. For typography, colors that have opposite undertones can add either symmetry or asymmetry, whereas rough and smooth textures add contrast as well.

As for the principle of proportion and scale, there are mathematical themes that involve balance and harmony. The concept of scale is used within the context of

sizes of objects or elements that can either complement or contrast each other. Proportion is an inter-relationship of minor and major elements in a space in terms of sizes, and how it relates to the overall space.

Rhythm combines the principles of balance, harmony, contrast, proportion, and scale to create an arrangement. This is a significant principle because it is vital in the layout of a space according to what colors, textures, geometry, and shapes are utilized. Solidarity and coordination are achieved through this principle by implementing these elements, and it influences the overall perception.

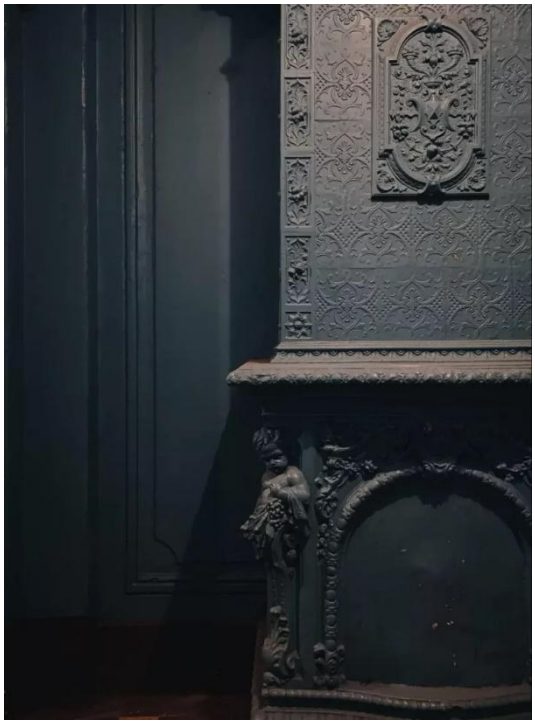
In terms of emphasis, this principle is most used in interiors where there are strong and apparent themes, typically shown through a focal object or design element as seen in (Figure 18a) and (Figure 18b) below. All sub-elements within the interior are synchronized, and there is a statement piece to accentuate a unique area and catch the attention of a viewer. In contrast, there are sub-elements used to add a monotone effect.

Figure 18

a. The Interior Design Principle Emphasis

b. The Interior Design Principle Details

(a)



(b)

(Fayaz, 2022)

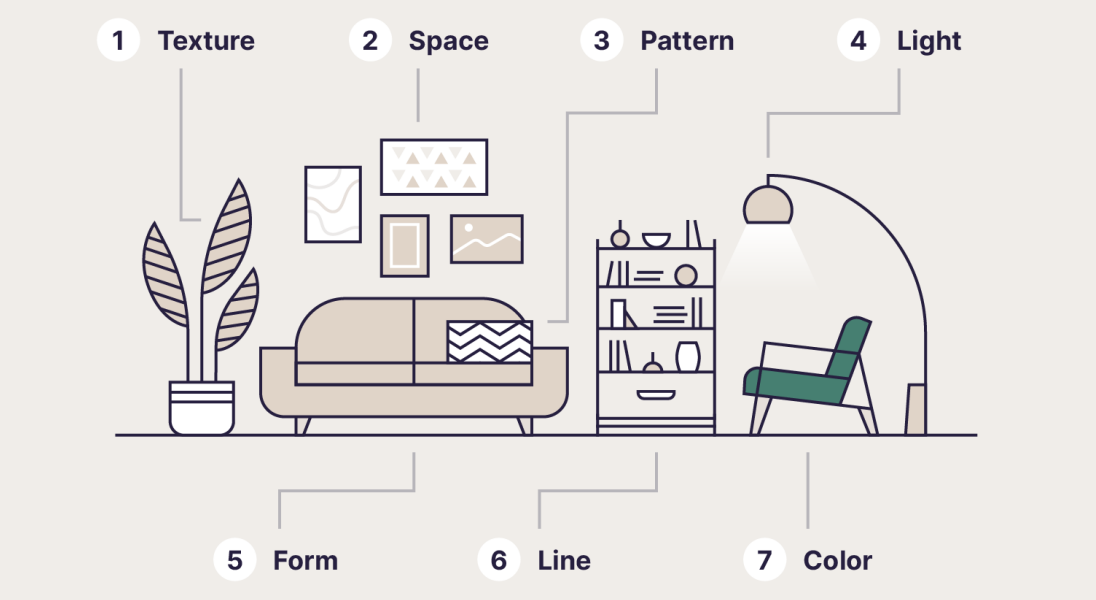
Details as a principle of interior design are the most defined quality in creating a unique environment because they add the final touches and complete or personalize the interior. Details are achieved through the elements of interior design to add a cohesive and strong aesthetic design while showcasing the creativity and artistic characteristics of a designer. These elements of interior design are line, space, light, forms, color, textures, and patterns. Additional aspects of design include alignment, repetition, movement, and white space (Fayaz, 2022).

Elements of Interior Design

Elements of an interior space are fundamental concepts to design a space by not only appealing visually to a person but also adding harmony and functionality. The key elements of interior design are space, color, light, texture, form, line, and pattern. These elements are seen in (Figure 19), describing how it is used in interior spaces.

Figure 19

Elements of Interior Design



(Pacaso, 2024)

Space involves the dimensions, layout, flow of the room, spatial arrangement, and space planning. In terms of dimensions, the size and proportions play a role in how furniture, decor, and other design elements influence how spacious the interior

is. For example, a smaller room would involve a minimalistic style with furniture that does not create a claustrophobic atmosphere. Proportions are tied to size as well since a balance of dimensions solidifies harmony and unity. As for the layout, there are functional zones needed for specific areas in living rooms compared to bedrooms. The elements within the interior are dependent on the function and how users interact with it, while traffic flow and easy navigation guide individuals on how to complete their tasks and avoid any obstacles. The flow of an interior can be achieved through cohesive color schemes and styles, allowing a connection to elements and features that complement each other. Multi-functional design is another factor for aiding the space-saving aspect in smaller areas. Furniture with multiple purposes such as a sofa bed or coffee table with extra storage adds a thoughtful touch to space planning.

Restaurant Interiors

The term ‘restaurant’ first originated in Paris, referring to the commercial dining establishments during the period in France before the French Revolution. However, there are older restaurants reported that were founded in China around nine centuries ago and are regarding similar aspects to what a restaurant entails (Symons, 2013). The idea of restaurants was unique at the time, but due to the French Revolution, many chefs traveled to other areas, and because of this, the idea of restaurants spread across the world (Mannapova, 2020). The meaning of the word ‘restaurant’ is ‘restorer’ and is like the word ‘restauratif’, which means ‘restorative’. These translations suggest a ‘medical term’ and a ‘remedy to give strength’ (Symons, 2013). This is related to the idea of how nutrition is essential to human life while an area where people can spend leisure time, engage in the entertainment of music and performances, socialize with friends or family, and eat food, is a part of what defines human culture (Mannapova, 2020).

In the current day, restaurants include modern-day necessities within their design to create a cozy environment that is comfortable and aesthetic. This involves a design criterion that restaurants follow, and a vital aspect of this design criteria is space planning. Separate zones and sectors in restaurants aid in dividing the space while allowing people to be comfortable in their own private spaces. Partitions, cozy niches, sliding doors, freestanding panels or screens, walls with decorations or paintings, sculptures, and plants help create these small spaces of refuge in restaurants. Space planning is connected to furniture, and it plays a significant part in

creating harmony through matching the theme and aesthetic elements of the interior, which is portrayed in (Figure 20). The requirements of furniture include form, function, color, arrangement, and how comfortable they are based on anthropometry since it affects the mood of the person using the furniture. Comfort regards ventilation as well, and with a good heating and cooling system, it maintains the indoor environment. Furthermore, ventilation grills should consist of a decoration to combine the technical function with the design while the ventilation units must be silent to not cause additional noise pollution. Providing auditory comfort can be achieved through sound-absorbing materials which decrease noise pollution (Mannapova, 2020).

Figure 20

Aquavit Restaurant in London

(Myers, 2018)

As for lighting, natural lighting is utilized the most to connect the interior with the surrounding landscapes. Large window displays help advertise the restaurant as well. However, light is rather complicated during the nighttime since the darkness causes the light to reflect inwards, causing the views of the landscapes to no longer be visible. To counter this issue, it is recommended to lower the brightness levels.

Lighting and luminaires consist of fixtures such as pendants, chandeliers, tube lamps, sconces, wall lights, tabletop lamps, floor lamps, ceiling lights, and built-in lighting (Mannapova, 2020).

Restaurants typically require false ceilings with soundproofing materials to hide electrical wiring, ventilation ducts, and electrical fittings for light. For the floors, a non-slip surface which is also moisture resistant as well as abrasion resistance is important for durability (Mannapova, 2020). Additionally, this durability should be a standard maintained in restaurant furniture. Textures and patterns within curtains, tables, and floors allow functionality while also providing design aesthetics of the restaurant, affecting how a human interacts and connects with the space. Similarly, color schemes influence moods, feelings, and emotional associations. This ties in with temperature, noise, scent, and music. Thermal comfort allows people to feel at ease while scents impact how people consume food and the duration of their stay. An unpleasant ambiance affects the emotions of a person, and this is the case with sounds and music. Loud and fast music disrupts people and forces them to leave quicker, while on the other hand, soft music helps slower eating, causing people to extend the duration of their stay, ultimately encouraging them to order more food and drinks (Tuzunkan & Albayrak, 2016).

Cultural Aspects in Restaurants

With the rapid and dynamic shifts in demand, supply, and marketing, businesses try to maintain food, beverages, service quality, and prices. Businesses and trends change perpetually, and this is why the competition to bring something fresh to the table is a constant battle. Individuality is vital to create an identity within the interior, and because the services provided in a restaurant are similar, the interior design and concept restaurants have become a way to differentiate themes according to the design and the food and beverages. Restaurants are categorized according to what crowd they wish to serve. The types of restaurants include upscale restaurants for fine dining and luxury experiences, ordinary restaurants with normal standards, fast-service restaurants with quick service and unstandardized food, ethnic restaurants that reflect a specific country, specialized restaurants that focus on certain food such as kebabs and pizza, and lastly, family restaurants where they do not serve alcohol (Şenel & Yılmaz, 2020).

Figure 21

Little Miss India Restaurant in Dubai

(Mehta, 2022)

As seen in (Figure 21), national and ethnic-themed concepts emphasize their design and services according to what country or nation they are representing. Restaurants with national themes include Turkish, French, Italian, Chinese, and many more according to countries (Şenel & Yılmaz, 2020). These restaurants provide unique experiences in contrast to the original country, reflecting the homeland's culture. Perhaps the most significant factor in ethnic-themed restaurants is how they are seen as 'tourism at home' experiences (Aybek & Özdemir, 2022).

Biophilic Restaurants and Their Significance

Biophilic elements utilized in restaurants consist of the use of natural materials, greenery and plants, natural light, water features, natural colors or textures, art and murals, outdoor seating and views, and local elements. Natural materials in the interior include wood, stone, and clay, and using these materials allows a visual connection with nature as well as a tactile connection. The use of indoor plants, vertical gardens, and such improves air quality while creating a refreshing environment. This can be further accomplished through the integration of water

features such as water fountains, waterfalls, or other aspects that allow people to hear the calming sound of water through auditory purposes. Adding natural colors and textures helps create earthy tones as well, while textures or natural materials enhance the harmony within the space. As for art and murals, incorporating artwork or graphics that are inspired by nature grants a visual connection to nature that allows the entire area to follow a certain theme. In restaurants, biophilia can be accomplished through providing outdoor seating for people with the addition of natural views of the landscape. It is important to implement local identity within restaurant interiors, and this can be achieved through design themes that take inspiration from the local environment, culture, or region to create a unique experience (Kansal & Rana, 2024).

Figure 22

Biophilic Restaurant Fandi Mata Located in New York

(Boever, 2022)

There has been an incline in biophilic design in the hospitality industry, and in the case of restaurants, it is used to enhance the dining experience while providing restorative benefits for people as seen in (Figure 22). The incorporation of biophilic design can increase sales and business potential to attract loyal customers. Additional

benefits of biophilic restaurants are seen in the influence of how customers perceive the interior, thus impacting their behavior. The most significant impact is the well-being, and how themes of nature allow a restaurant to feel more welcoming. Moreover, biophilic restaurants boost positive emotional responses because they ensure customer satisfaction while gaining loyalty. Biophilic attributes allow people to spend a longer duration within restaurants as well because of the calming atmosphere. Furthermore, the use of indoor plants builds an ambiance of positivity, affecting the decisions of the customers based on their moods. For this reason, mood, productivity, and creativity increase alongside the air quality, enhancing the health of the indoor climate. Additionally, there is an aesthetic impact by adding visual appeal and a well-maintained environment which intrigues customers and inspires them to explore the area. With aesthetic harmony, there is a design balance within the interior, and it is depicted in the way the furniture, furnishings, décor, and other elements of design all connect to improve the aesthetics. By emphasizing natural light and ventilation in restaurants, indoor air pollution is removed while it enhances the health of respiratory functions. Not only is it beneficial for humans, but it is efficient in energy usage while it creates an inviting interior through comforting visuals of natural elements (Kansal & Rana, 2024).

The visual and tactile aspects of restaurants are seen in the materials integrated into the interior. These natural materials include wood, stone, clay, natural fabrics, concrete, porcelain tiles, brass, and walnut wood. The use of wood creates a coziness to the environment and a sense of warmth. Stone is typically seen in accents within walls, countertops, and decorative aspects, allowing the space to achieve visual depth, richness, and a rugged look. Clay causes a space to appear rustic with the appeal of a handcrafted theme. As for natural fabrics, they range from the softness of cotton to woven fibers which create a comfortable tactile sensation while also making the user feel invited. Concrete materials create a naturalistic and modern atmosphere with a touch of minimalism, while the use of porcelain tiles offers durability. Tiles are mainly used to mimic the natural textures and are easily maintained. Fixtures, lighting, and other decorative features can add depth, richness, and warmth using brass. It is a dense material that allows an interior to feel elegant and sophisticated (Kansal & Rana, 2024).

Amongst the benefits and concepts of biophilic design in restaurants, there is a unique relationship between the dining experience and the environmental and

emotional factors. Lighting, for example, influences comfort, and the perception of the meals being served, while creating a refreshing and healthy indoor environment. Mobility and privacy influence the comfort of the dining experience, and biophilic patterns of prospect and refuge allow people to feel as if they are in a safe space. Similarly, the sense of smell and auditory perception aid in covering additional noises or sounds, allowing a person to feel relaxed through fresh scents of flowers, herbs, and wood. Because biophilic design is vital in psychological recovery, studies have proven how natural elements enhance the dining experience. Dining in biophilic spaces where social interaction is encouraged amongst a group of people allows them to feel attached to the restaurant interior due to how it invokes a sense of belonging with the community (Ibrahim et.al., 2024).

Related Research

There are several methods of understanding the parameters of biophilic interior design, sustainability aspects in interiors, indicators of well-being within interiors, and the importance of their relationships. For this reason, a total of five related studies were chosen and evaluated in chronological order. Each study will include the author, the title, the publication year, the research location, the methodology, and how the interior is evaluated.

The related research methods include quantitative analysis through questionnaires and qualitative analysis with interviews and observational evaluation. Moreover, one qualitative research study was chosen because it focused on well-being and biophilia in restaurants, a limited topic within previous research within the gastronomy sector. Still, it highlights the importance of biophilic design and well-being in restaurant interiors. For this reason, the case areas are chosen based on the qualitative approaches to analysing restaurant interiors and the most recent relevant research based on biophilic design, sustainability, and well-being, which limits the number of options for similar examples. Related studies are listed below in chronological order.

Alkilany, A. (2021), Sense of Place in Biophilic Restaurants Interior Spaces: A Case Study of Jordan

Alkilany, A. (2021), in his research, titled “Sense of Place in Biophilic Interior Spaces: A Case Study of Jordan”, described the relationship between the

sense of place and biophilic design. The study highlights how urbanization has disconnected people from nature and its benefits while emphasizing the importance of biophilic spaces to improve the experience of those interacting in the interiors. This study aimed to explore biophilic interior spaces as a design tool and analyze how biophilia impacts human beings within the environment, mainly focusing on the sense of place. A concept related to interior and architecture describing the subjective relationship between humans and the space is the characteristics of a sense of place.

For the methodology section of the study, a qualitative analysis was used to evaluate public spaces within Jordan. The specific area of study consists of restaurants, and they were reviewed based on how they incorporated a sense of place. Since the sense of place consists of the physical and social environment, including geographic location, type of landscape, the people, and history, the core of the concept remains within the elements of biophysical settings, psychological elements, sociocultural context, and political or economic aspects. To connect sense of place with biophilic attributes, the evaluation of each restaurant focused on these aspects based on the experience of space and place:

1.) Prospect and Refuge: The perception of opportunities and danger, safety, and security.

2.) Organized Complexity: The variability and diversity in an environment.

3.) Integration of Parts to Wholes: Clear boundaries in the interior that emphasize a central point which may be functional, aesthetic, or both.

4.) Transitional Spaces: Links areas together and creates easy navigation.

5.) Mobility and Wayfinding: Enhances feelings of prospect and refuge

6.) Cultural and Ecological Attachment to Place: Emotional attachment based on cultural and ecological aspects.

One of the restaurants chosen is named Ward Restaurant, located in the capital of Jordan. The name of the restaurant is *Ward*, the Arabic word which translates to ‘rose’. The reason behind this name was to associate the design of the area with mimicking a rose garden while the restaurant provided sections of the space according to summer, spring, and winter seasons. The second restaurant is Lucca Steak House, and the inspiration for the design is taken from a farm setting with wooden features along with fauna, and a central theme of steak as a cuisine, which is integrated within the design. As for the third restaurant Romero restaurant,

the design and theme portray an Italian style to allow visitors a taste of Italian cuisine and experience. The fourth case area is a modern coffee house named Bun-Bun, a small and cozy place for people in search of a café.

The findings of this study describe how the sense of place is linked with the psychological and perceptual aspects of the interior, including personality, experience, and culture. As shown in (Figure 23), Ward Restaurant showed multiple aspects of biophilic design requirements in terms of the interior and exterior with elements that are taken from the local ecology and culture, allowing individuals to feel connected with the environment. With transitional spaces and mobility, it achieves space and place through the pathways inside the restaurant.

Figure 23

Ward Restaurant in Jordan

(Alkilany, 2021)

Lucca Steak House, as seen in (Figure 24), showed a particular theme, especially with how it is inspired by a farm and is located within an urban setting. With retractable roofs and glass walls, it provides prospect and refuge, however, it does not provide other biophilic and sense of place aspects in terms of mobility since it has inadequate seating arrangements while there is no cultural or ecological attachment.

Figure 24

Lucca Steak House in Jordan

(Alkilany, 2021)

For the case area of Romero Restaurant, shown in (Figure 25), the theme and style are based on the Italian countryside villa escapade, including the emotions of refuge and prospect because of it. With the addition of views of gardens and a courtyard, it connects to Italian ecology and culture, successfully achieving a sense of place and biophilia.

Figure 25

Romero Restaurant in Jordan

(Alkilany, 2021)

Lastly, as shown in (Figure 26), the coffee house Bun-Bun has implemented biophilic and sense of place attributes through glass facades to provide prospect and refuge, as well as mobility, wayfinding transitional spaces, and integration of parts to the whole. In terms of cultural and ecological attachments, findings showed the design is contemporary while artificial plants do not represent the natural and local vegetation of Jordan.

Figure 26

Bun-Bun Coffee House in Jordan

(Alkilany, 2021)

In conclusion, the research showed how although there are features of a sense of place within the context of biophilic design, the concept is far more complex since it is dependent on modernity, globalization, and personal perception of the interior. The idea of it is subjective, however, there may be objective ways to describe how a sense of place and biophilic design are interconnected. However, with the implementation of a sense of place with biophilic design principles, the challenge remains as to how a sense of place can be measured within the interior.

Marquez G. et al. (2022), An Investigation into Factors that Affect the Well-being of Overseas Workers Within Filipino Restaurants in Bangkok

Marquez G. et al. (2022) in their research titled “An Investigation into Factors that Affect the Wellbeing of Overseas Filipino Workers Within Filipino Restaurants in Bangkok” portrayed the impact of the restaurant environment on the well-being of

people. The study aimed to investigate the factors that most influence the well-being of overseas Filipino workers and customers in restaurants within Thailand. In addition, they aim to identify the well-being of Filipino workers, analyze interior branding, increase resilience and profit, and help create a design that enhances brand identity and appeals to consumers.

The research plan and methodology consisted of both qualitative and quantitative analysis based on a literature review of previous studies and a survey based on the well-being of Filipino restaurants. A focus group was also conducted, including people who fit the criteria of an overseas Filipino worker, living in Thailand, and enjoying dining at restaurants, while the survey was open-ended. The customers or consumer group of the survey integrated a Likert scale to assess the levels of agreement, and consisted of questions related to:

1.) Survey agreement form
2.) Contact information
3.) Personal information
4.) Frequency of visits to restaurants (pre-COVID-19)
5.) Frequency of visits to restaurants (during COVID-19)
6.) Perception of well-being in restaurants
7.) Nature-infused elements in restaurants
8.) Non-Visual Connection with Nature
9.) Dynamic and Diffuse Light
10.) Natural, organic, and elements of nature
11.) Nature of The Space
12.) Empathy, service, and perception of well-being

On the other hand, the workers section of the group was split according to the sections of survey questions, which were based on the Likert scale as well:

1.) Survey agreement form
2.) Contact information
3.) Personal information
4.) General well-being in the workplace
5.) Mental well-being in the workplace
6.) Physical well-being in the workplace
7.) Empathy and management

8.) Service in restaurants

As for the focus groups, questions were asked to customers according to their definition of well-being, how dining influences well-being, how can Filipino restaurants increase a customer's well-being, customer perception of restaurants that focus on nature, and what their perceptions of restaurants that create their brand identity based on empathy and family values.

In terms of the perception of consumers on biophilic design factors influencing their well-being, they showed a strong agreement as to how restaurants with nature themes are restorative and positively influence their well-being. They agreed on the matter of how biophilia is unique and creates a special environment in restaurants. Furthermore, out of the 14 patterns of biophilic design, the patterns of Thermal and Airflow Variability, Visual Connection with Nature, and Dynamic and Diffuse Lighting proved to be most significant in consumer perceptions.

Other factors that influence well-being relate to cleanliness and hygiene levels, and the concept of nature in restaurants such as providing outdoor views to ease anxiety and negative emotions. Themes of lighting show they create inviting atmospheres while improving health instead of contributing to headaches from inadequate lighting. Additionally, the feeling of empathy is significant since the factor of welcoming and eager staff and employees helps customers feel comfortable. Similarly, worker well-being factors depended on empathy within the workplace and how often the staff kept in contact, communicated with customers, and shared a feeling of community while catering to customer needs. Overall, the research provided insight as to how empathy and nature are vital in restaurants to both the well-being of the customers and workers.

Kansal S.; Rana P. (2024), Bringing Nature Indoors: Exploring the Impact of Biophilic Interior Design in Restaurants

Kansal S. and Rana P. (2024) in their research titled "Bringing Nature Indoors: Exploring the Impact of Biophilic Interior Design in Restaurants" investigated the enhancement of the dining experience by improving the well-being of both customers and staff members in the hospitality industry. They analyzed how biophilic interior design in restaurants is not only for aesthetic purposes but also influences the health and well-being of those interacting with the space, reducing stress and improving cognitive functions. Their research aims to investigate how

biophilic interior design is impacting the dining experience, the behavior of customers, and sustainability aspects.

The methodological approach for this research consists of a quantitative approach through surveys which were distributed to the restaurant owners while qualitative measures were acquired through in-depth interviews and observations. For the semi-structured interviews, the questions were focused on the subjective experiences, the emotional impact, and personal preferences of biophilic design aspects. Additionally, Tsuki Restaurant located in Pune, India is the main case area of the research. The main parameters focused on this research entail:

1.) Use of natural materials
2.) Greenery and plants
3.) Natural lighting
4.) Water features
5.) Natural colors and textures
6.) Biophilic art and murals
7.) Outdoor seating and views
8.) Local identity elements

Furthermore, the features analyzed further were the impact of indoor plants in restaurants according to enhancing ambiance, customer decisions, enhancing moods, healthier climates, and contemporary design elements. The psychological and aesthetic impact is taken into consideration, and the same parameters were evaluated for the benefits of integrating natural lighting, ventilation, and tactile and visual aspects of materials within restaurants.

In terms of biophilic features, the interiors of the restaurant, as seen in (Figure 27), are ordained with muted tones to highlight the greenery and indoor plants. In addition to the muted tones, the textiles are pale and neutral to ensure there is harmony within the base colors while the furniture is arranged to blend within the space. For sustainability aspects, the restaurant is solar powered while the materials used in the furniture are Teak and Sheesham wood. Water hyacinth reed lamps are used to provide a natural environment and because the name of the restaurant is *Tsuki*, which translates from Japanese to the word ‘moon’, the interior receives plenty of moonlight and sunshine due to its location, and there is a skylight as well.

Figure 27

Tsuki Restaurant in Pune

(Kansal & Rana, 2024)

Findings provided information on the patterns and trends, including the rising interest in biophilic design in the hospitality industry, the customer experience, the duration of stay, restorative effects on well-being, and design patterns. The practical features for the owners of restaurants and the designers show there is an increased sales potential, reduction of stress, and positive health benefits. Furthermore, biophilic design in restaurants influences the sense of place, the sustainable aspects, and the enhancement of well-being. However, there remain a few gaps in the literature segment on biophilic design in interiors based on the limitations. A variety of biophilic design elements impact well-being while diverse environments need specific applications based on the function. Moreover, there are gaps in the quantitative measure of biophilic design and there may be more to explore as to how biophilic design can contribute to the sustainability of interiors. Recommendations for biophilic design in restaurants consist of the following:

1.) Natural materials such as wood, stone, and bamboo
2.) Biophilic focal points such as indoor gardens, water features, and green walls

3.) Hanging plants to incorporate vertical indoor landscaping
4.) Rustic and organic features by adding natural and raw furniture design elements
5.) Large windows, skylights, open-air seating, and natural views
6.) The 14 patterns of biophilic design

Areas for future research include field studies, context-specific evaluations based on geographical, cultural, and economic aspects, a standardized metric to evaluate biophilic design, long-term impact on customers, and costs of establishing a biophilic restaurant. Concluding considerations of this research provide evidence as to how biophilic design promotes sustainability by integrating eco-friendly features that positively influence humans in the context of experience, health, education, user comfort, and creativity, and shedding light on the significance of natural environments.

Soerjono E.A.; Primadani T.I.W. (2024), Sustainable Interior Design in Restaurants by Applying Lumajang Locality Elements

Soerjono E.A. and Primadani T.I.W. (2024) in their research titled "Sustainable Interior Design in Restaurants by Applying Lumajang Locality Elements" analyzed a restaurant within the Lumajang Regency and designed a restaurant that utilizes natural materials and elements, taking inspiration from local themes while implementing sustainability to aid in the environmental issues as well as the comfort of customers. Interior designers play a significant role in reducing the negative impact on the environment, the health, and comfort of those within an interior environment. Since the area is relevant in business, their objectives are to integrate natural and cultural aspects of the regency to enhance hospitality establishments.

For the methodology section of their research, they used field surveys, observations, and interviews while reviewing previous literature. During their observation, they aimed to analyze design criteria and investigate the issues within the interior. Interviews with the owner guided them about what the restaurant needs and employee interviews helped them understand the comfort levels, their needs, ease of activities, and multi-purpose areas. As for the visitors, their interviews consisted of their comfort and needs, as well as the areas they perceived to need improvement.

Results displayed the reoccurring theme of the longing for nature and how customers desire natural connection in the age of technology. For this reason, the main concept in their design was to implement a minimalistic rustic design to bring awareness towards natural materials that are sustainable, including wood, bamboo, and stone, while creating a clean and firm environment. They focused on implementing certain themes of sustainable design:

1.) Natural landscaping through greenery and views of natural outdoor views

2.) Energy efficiency with smart LED lighting, spotlights, and LED strips while the lampshades are made of bamboo. There is natural ventilation for the semi-outdoor areas with AC in the interior.

3.) Materials on the wall are bamboo with exposed brick, concrete, and wood. The ceiling is made of exposed roof tiles and plywood, gypsum, woven bamboo, and wood finishing.

4.) Furniture is built-in, multi-purpose, and upcycled, made from wood, plywood, foam, cloth, bamboo, and synthetic rattan

5.) Indoor health and comfort are achieved with indoor greenery

6.) Economic and social well-being through bamboo elements which are local materials. Aesthetic elements and motifs with cultural elements are used

Figure 28

Proposed Design for a Restaurant in Lumajang District

(Soerjono & Primadani, 2024)

As seen above in (Figure 28), sustainable design within the interior of the restaurant is achieved with these 6 aspects. These elements are dependent on the location since how sunlight reaches the interior is significant in impacting indoor ventilation and thermal comfort, as well as energy efficiency. Using local materials allowed for sustainability as well as supporting residents. Adding natural themes and

colors such as yellow, brown, and green allows people to connect with nature while it connects with the richness of the regency and the history of the location. These features allow sustainability within interiors and by drawing attention to community needs and environmental concerns, the application of sustainability can be further achieved.

Singhal P. (2024), A Study on the Implementation of Eco-friendly Design Techniques in Hospitality Space (Restaurant)

The research carried out by Singhal P. (2024) titled "A Study on the Implementation of Eco-Friendly Design Techniques in Hospitality Space (Restaurant)" the importance of eco-friendly design in restaurants to improve brand design and loyalty by appealing to consumers who are environmentally conscious while being unique within the competitive industry of hospitality is emphasized. The concept of sustainable and eco-friendly restaurants involves factors such as energy, waste production, and how they require ingredients for their cuisine. The design aspects specifically relate to energy-saving appliances, sustainable materials in the interior, conserving water, and reducing waste.

The main indicators of eco-friendly design in hospitality spaces include environmental sustainability such as energy consumption, water usage, and waste generation. Materials are significant as well since they can be sustainable in terms of being recyclable and biodegradable. Another aspect of sustainability is operational efficiency through energy-saving techniques with low-flow fixtures. Lastly, aesthetic appeal with natural elements, natural lighting, and sustainable materials are seen to be sustainable while creating an inviting dining experience.

For the methodology, Singhal conducted a comparative analysis of eco-friendly restaurants by assessing the various approaches to sustainable interior practices. Their first case study is Mitti Ke Rang Restaurant, shown in (Figure 29), which is a restaurant in the state of Gujarat in India, which promotes Indian culture and heritage. The name of the restaurant translates to 'Colors of Earth' while they use natural materials to integrate traditional Indian design, utilizing golden tones and eco-friendly plaster to add warmth to the interior. By using earthy tones, colors, and textures such as mud plaster, bamboo, recycled wood, jute, and hemp, the restaurant applies sustainable and aesthetic aspects.

Figure 29

Mitti Ke Rang Restaurant in Gujarat

(Singhal, 2024)

Terracotta Restaurant, shown in (Figure 30), which is in the same state of India, is the second restaurant assessed. The interior is reminiscent of its name by integrating terracotta, which is a sustainable material with adaptable aspects and can be used in floors walls, and decorative features. For this reason, the interior implements design cohesiveness by highlighting natural warmth as well as texture. Other materials used include recycled wood in the ceiling, wall panels, and tables; recycled metal in *jaalis* and table frames; recycled glass in tiles to add decorative effect; terracotta tiles in walls and floors, and terracotta lighting fixtures. Chairs are made of recycled mild steel while pots and wall décor are made of recycled artefacts.

Figure 30

Terracotta Restaurant in Gujarat

(Singhal, 2024)

The third restaurant is shown in (Figure 31) and is named Como Agua which translates to ‘Like Water’, reflecting an atmosphere of calm and sustainable features, while the main inspiration comes from the natural aspects of the landscape. With materials such as bamboo, teak, and stone, it allows the interior to feel welcoming and cozy. The restaurant has large windows and open-air dining areas which provide natural lighting, and the natural colors connect with the natural environment. Additionally, the shape and structure of the restaurant is in the shape of a bird’s nest, showing an example of biomimicry. Furthermore, energy efficiency can be seen within the area through LED lighting, while materials and ingredients are locally sourced. They partner with local communities and businesses to remain loyal to the community.

Figure 31

Como Gua in Gujarat

(Moss and Fog, 2024)

For the comparison, the case studies incorporate local and natural materials, energy efficiency, and water-saving aspects. All three reflect cultural and environmental features, however, the differences show that all three restaurants include materials that are various according to geography and culture. Findings describe eco-friendly design aspects that allow a decrease in energy consumption, are cost-saving, and enhance the brand of the restaurant. Implementing cultural and environmental elements improves the uniqueness of the restaurant and attracts customers due to the various ambiance and aesthetics in the interior.

CHAPTER III

Methodology

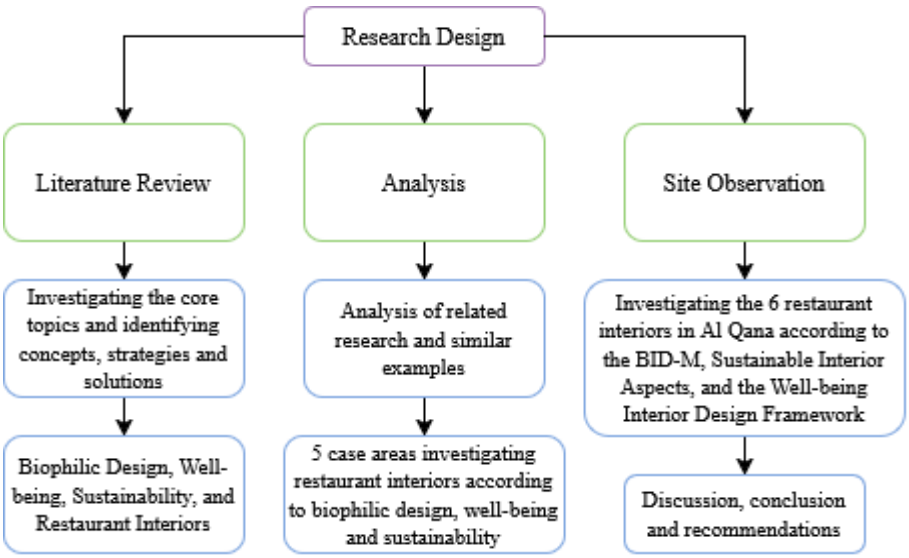
This chapter outlines the information about the research design, the population and sample, data collection, data analysis procedures, and the data analysis plan. Biophilic interior design consists of a framework known as the BID-M, and it will be used to evaluate biophilic features in Al Qana Restaurants. The evaluation will be conducted through a data card describing the BID-M within each restaurant, and then these attributes of biophilic design will be evaluated in terms of sustainability and well-being. The study design, data collection method, and research plan all entail detailed information including the BID-M, the features analyzed in sustainable interiors, and the well-being.

Research Design

For the methodology, a theoretical and practical approach through observation was followed. To wholly understand the topics of biophilic design, sustainability, and well-being, these topics were discussed in the theoretical section, thus creating the theoretical framework of this research. During the practical analysis stage of the methodology, the evaluation of restaurants in Abu Dhabi, United Arab Emirates was made through on-site inspections.

Figure 32

Research Design



(S.A. Amin, 2024, 2024)

For the investigation, a total of six restaurants were chosen, and each is analyzed through the lens of the Biophilic Interior Design Matrix (BID-M) while highlighting these attributes in the context of how they contribute to sustainability and enhance the well-being of the people. This matrix was developed by McGee and Marshall-Baker in 2015 and included the presence of 52 biophilic attributes categorized under the six biophilic design elements (McGee and Marshall-Baker, 2015). The BID-M focuses on the presence of environmental features, natural shapes and forms, natural patterns and processes, light and space, place-based relationships, and human-based relationships in interiors. Then, to further investigate how biophilic design contributes to the sustainability and well-being of people, the restaurants were evaluated according to sustainable interior aspects and the interior design framework for well-being. Sustainable interiors are evaluated for energy efficiency, materials, space planning, and indoor health. As for the well-being interior design framework, the connection to context, functional requirements, psychological, social, sensory, and ergonomic factors were evaluated. These features were collected through inspection and were analyzed in the context of their connection to the BID-M. Additionally, (Figure 32) above describes the research design of this thesis.

Population and Sample

In this research, Abu Dhabi, the capital of the country United Arab Emirates was chosen as the sample. In the city, there is a tourist spot, Al Qana, where there are a various number of restaurants, cafés, and entertainment activities available for people to choose from. Within Al Qana, six different types of restaurants were chosen to determine how biophilic design can be integrated. These six restaurants were Japanese, Thai, American, Latin American, Mediterranean, and Lebanese restaurants within Al Qana. Analysis of each restaurant was then made from theoretical and observation methods, evaluating BID-M, sustainability in interiors, and parameters of well-being within each restaurant.

Data Collection Tools/Materials

The primary focus and method of documentation is qualitative analysis in terms of on-site inspections of the restaurant interiors, and mainly how interior features contribute to the BID-M. Observation of the selected restaurants within Al Qana and evaluation criteria within the scope of the research are the main data

collection tools. The approach of this research is based on the Biophilic Interior Design Matrix and how these attributes are seen in restaurants to provide sustainable healthy interiors that enhance the well-being of the people. The BID-M is developed through the literature review and is taken from the elements of biophilic design, which is utilized in interior spaces. Similarly, the sustainable interior aspects and the well-being interior design framework were obtained from the literature review as well as the related research. Furthermore, maps taken from the official websites of Al Qana were used to visually describe the specific region of the study. Other images and pictures were taken during the observation to aid in the evaluation of the interior and provide evidence for the biophilic attributes found within the restaurants, alongside the sustainable interior aspects and well-being interior design framework. Additionally, to protect the privacy of the staff and other members of the restaurant, their faces were blurred using Photoshop.

Data Analysis Procedures

The features observed and the data collected were analyzed in relation to the established attributes of biophilic design in interiors. The analysis of the findings is presented in a table, detailing the restaurant features and the pictures of the interior as a visual aid for the biophilic attributes that integrate with sustainability and well-being. Detailed explanations of each attribute are highlighted according to each restaurant and evaluated based on how these features contribute to sustainable interior environments as well as creating healthier interior spaces for individuals. It is important to evaluate the interior according to the BID-M as seen in (Table 5) since it is focused on the interior aspects. Similarly, the analysis of sustainable and well-being (Table 6) aspects are under the parameters of interior features, which is based on the literature review and related research.

Table 5

Information card for the analysis of Restaurants within the Biophilic Interior Design Matrix

Evaluation of Restaurants According to the Biophilic Interior Design Matrix (BID-M)		
Restaurant: **Type of Restaurant:**		
BID-M	**Evaluation of BID-M**	**Images**
Environmental Features	• Natural colors • Water, air and natural ventilation, plants, animals, fire through color warmth and movement • Natural materials (wood, stone, metal) • Natural views	
Natural Shapes and Forms	• Botanical and animal motifs • Trees and columns • Shells or spirals • Eggs/oval/tubular forms • Arches, vaults, domes • Non-linear lines • Simulation of nature, biomimicry	
Natural Patterns and Processes	• Sensory variability • Age or passage of time • Focal points • Transitional spaces • Parts of a whole • Complementary contrasts • Dynamic balance and tension • Hierarchy, scales, ratios	
Light and Space	• Natural light, diffused light • Shadows • Reflected light • Lights creating shape or form • Spaciousness, spatial variability	
Place-based Relationships	• Geographic and historic connection • Ecological connection • Cultural connection • Local materials • Landscape features	
Human-nature Relationship	• Prospect and refuge • Order and complexity	

(S.A. Amin, 2024)

Table 6

Information card for the analysis of Restaurants through Sustainability and Well-being within the context of BID-M

Evaluation of Restaurants through Sustainability and Well-being within the BID-M		
Restaurant: **Type of Restaurant:**		
Sustainable Interior Aspects	**Evaluation of Sustainability Aspects**	**Connection with BID-M**
Energy Efficiency	• LED lights • Compact Fluorescent lightbulbs • Timers or motion sensors • Natural lighting • Air Conditioning	
Materials	• Sustainable and durable materials, textiles, and finishes within furniture, walls, and floors • Lighter colors • Reflective surfaces	
Space Planning	• Open kitchens • Visual connection • Flexible space planning and furniture • Zoning • Minimalism	
Indoor Health	• Curtains, frosted glass • Operable windows • Ventilation • Thermal comfort • Sensory comfort • Visuals of nature	
Well-Being ID Framework	**Evaluation of Well-being in Interiors**	**Connection with BID-M**
Connection to Context	• Relation to the natural and built environment	
Functional Requirements	• Fulfilment of primary and secondary activities	
Psychological	• Privacy, personal space, territory	
Social	• Levels of social interaction	
Sensory	• Heating, cooling, illumination, acoustics, smell control, aesthetics	
Ergonomics	• Interaction between user and spatial elements	

(S.A. Amin, 2024)

Data Analysis Plan

The data analysis plan was created through the theoretical framework discussed. The on-site investigations were conducted in November 2024, and during this period, photographs were taken of the interior in terms of the Biophilic Interior Design Matrix. Additionally, the framework for sustainable interiors and well-being indicators within interior spaces are investigated as well. To conclude the data analysis, it is important to further describe and explain how sustainable and well-being indicators are related to biophilic design features. This builds a better understanding of how all three factors play a role in creating restaurant environments that are biophilic, sustainable, and enhance well-being, showcasing evidence for the conclusions and recommendations of the research.

CHAPTER IV

Biophilic Design Criteria in the Context of the Well-being and Sustainability

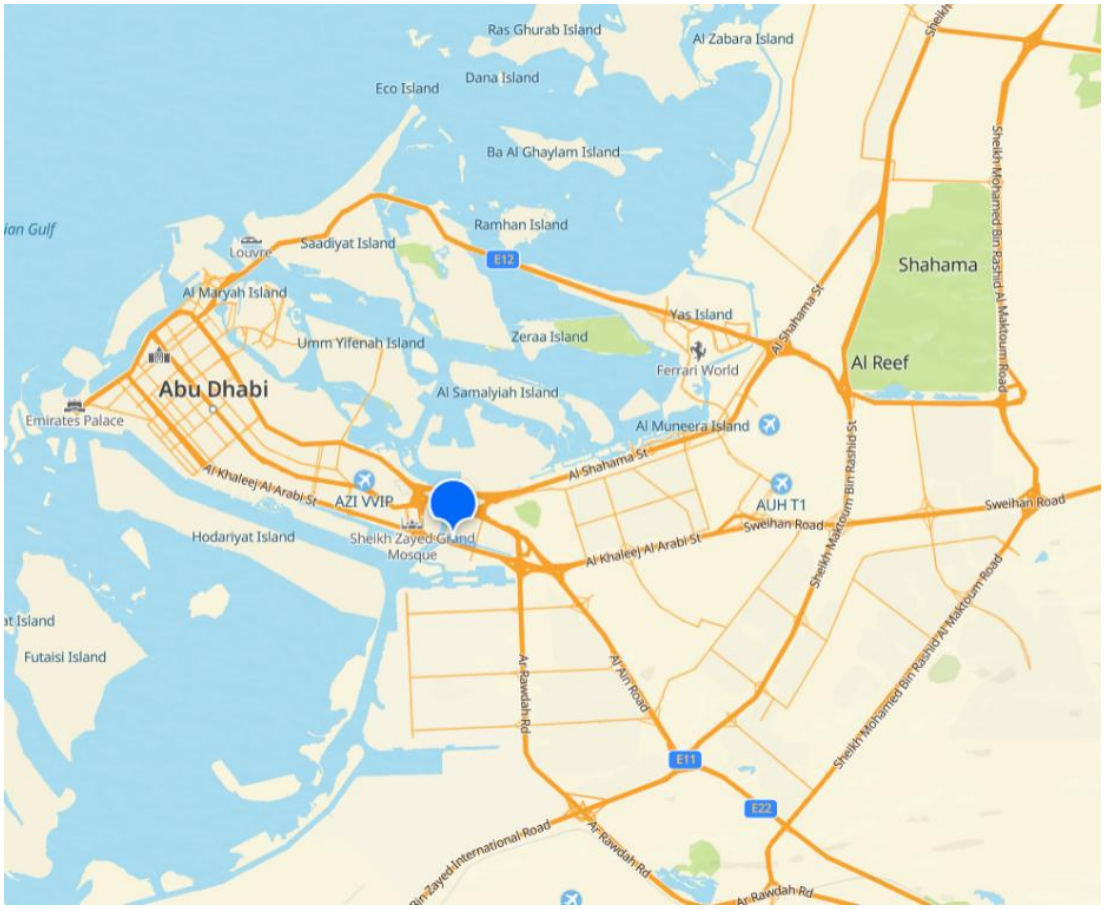
This chapter displays the data according to the case area of Al Qana, the results of the biophilic design criteria in the context of the well-being and sustainability, the analysis of data collected, and the evaluation of the connection between biophilic interior design, sustainability and well-being. The case area of the research has been investigated to understand the intentions of the tourist spot in terms of design and functions or activities available. Following the brief explanation of the case area, the findings are highlighted with detailed tables of each restaurant, consisting of the BID-M, sustainability aspects in interiors and their connection with the BID-M, and then the well-being interior design framework and its connection with the BID-M.

Al Qana, Abu Dhabi

Within the heart of the capital city of Abu Dhabi in the United Arab Emirates, a tourist spot in Khor Al Maqta named Al Qana can be found. (Figure 33) below displays a map of the city while depicting where Al Qana can be found in the middle. Al Qana is known for its national aquarium, a wide range of recreational activities, restaurants, cafés, and other gastronomy establishments. Al Qana first opened in 2018, and the architecture of the buildings incorporates geometrical shapes and themes from the local landscapes to reflect the country's image. The area provides views of the city skyline and a waterfront where people typically indulge in boat rides. There are a total of eleven low-rise buildings, all linked by a 2.4-kilometer waterfront promenade, with the addition of four pedestrian bridges. This promenade allows jogging tracks and bike lanes, as well as seating areas and water features. For the main goal of the project, they wanted to invite as many tourists as possible, and to support this, the materials used are durable for high foot traffic (Al Qana, 2023).

Figure 33

A Map of where Al Qana is Located on the Map of Abu Dhabi

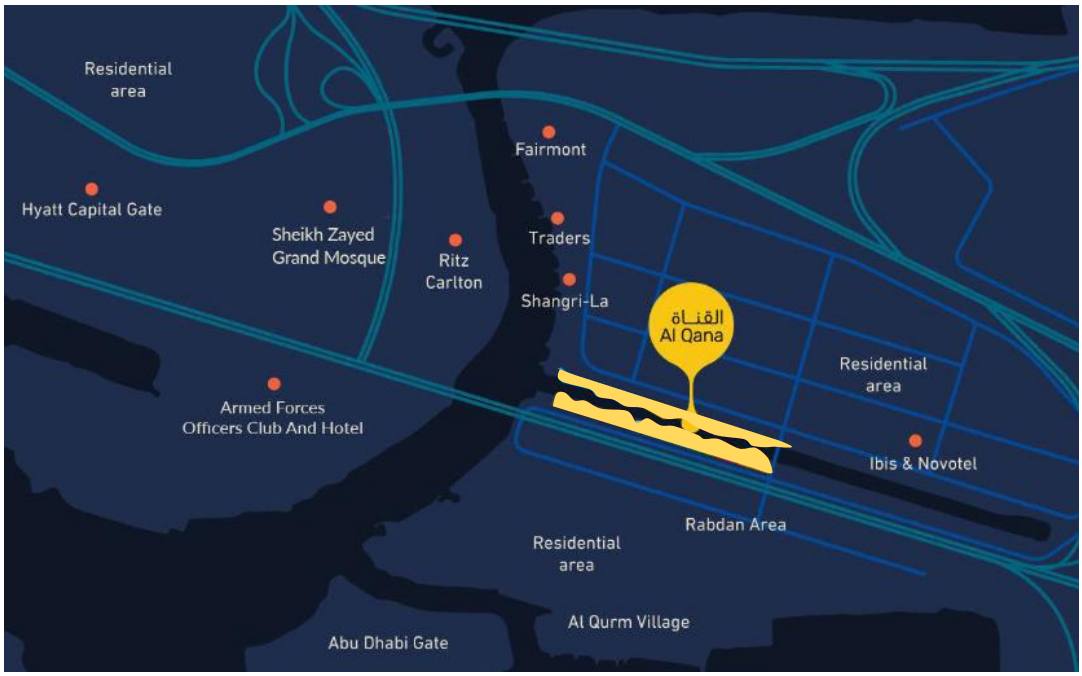


(Abu Dhabi, 2024; edited by S.A. Amin, 2024)

Furthermore, the aim of Al Qana as a project is to develop sustainable living environments for the residents of the city as well as tourists to follow the Abu Dhabi 2030 vision. As seen in (Figure 33) and (Figure 34), its location is unique due to its accessibility and it is adjacent to seven five-star hotels while the area is open and has no high-rise buildings near it. With the view of Sheikh Zayed Grand Mosque and Memorial Park in addition to the waterfront, the area is known for its landscape views. The experience is further made unique through the many seafood restaurants, lounges, cafés, and seasonal cuisine with floor-to-ceiling operable windows and outdoor seating to unwind next to the waterfront (The Heartbeat of Abu Dhabi, 2024).

Figure 34

Study Area Located in the Heart of Abu Dhabi



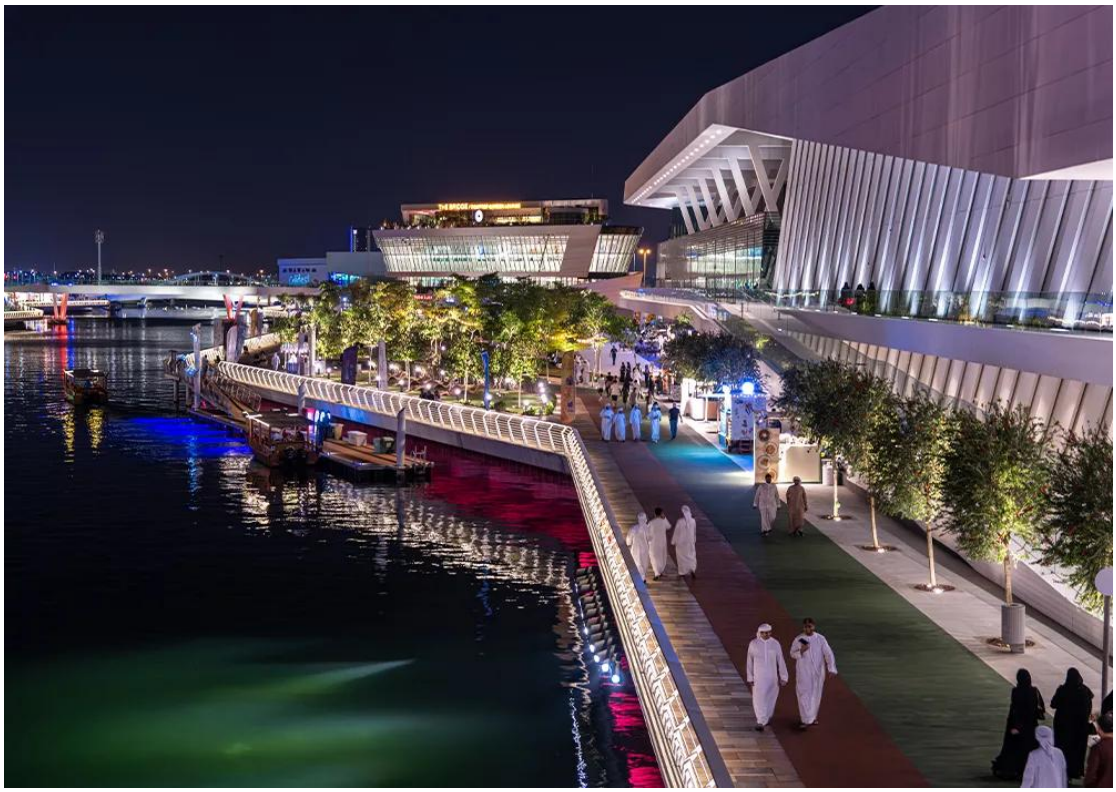
(The Heartbeat of Abu Dhabi, 2024; edited by S.A. Amin, 2024)

The gastronomy of Al Qana consists of local products as well as recipes that have been shared throughout generations. They aim to allow experiences wherein sustainable and environmentally health-conscious consumers can enjoy themselves through culinary trends. Through this, they aim to increase opportunities for using gastronomy to enhance tourism demands. With a variety of Mediterranean to Middle Eastern flavors, cuisine in Al Qana restaurants includes hummus, lamb, and yogurt, allowing people to step away from the popular Asian, Mexican, and Italian cuisine, especially when food such as zaatar, pomegranate, cardamom, and turmeric are expected to keep increasing in popularity in global restaurants. Al Qana restaurants provide breakfasts, all-day brunch, as well as food bowls, a popular trend containing fresh fruits, vegetables, and whole grains alongside rice and seasoning for a healthy meal. Street food is sold in stalls to offer options of cuisine with unique twists to an otherwise traditional idea, while these additions allow fresh experiences for people that differ from the regular gastronomy trends. To address sustainability, their seafood menus include harvested species with farm-grown seafood to support the local fishing economy. (The Gastronomy of Tomorrow, 2019). Moreover, they are socially conscious in terms of business and global issues, and their mission is to be

socially inclusive and create healthier lives for all ethnicities, age groups, disabilities, and genders. They have implemented sustainable development solutions while protecting their agencies and non-governmental organizations by aiding them in finances as well (CSR, 2024).

Figure 35

Al Qana At Night



(ICON, 2024)

The architect Tony Abi Gebramel and designer Jacqueline Saad Abi Gebramel collaborated on the project of Al Qana, achieving the Porcelanosa International Project Award in 2022 for their contribution to the luxurious Arabian port complex. They aimed to design a resilient, durable, and elegant structure with a minimalist style for functionality and to reflect the sports and wellness activities available. With the use of neutral colors and elegance, the public space has become an iconic aspect of the city (Porcelanosa, 2022). With the addition of cantilevered design and geometrics, the structures appear dynamic as well as exhilarating by allowing shaded seating areas for restaurants. Furthermore, the pedestrian promenade is built to extend six meters across the waterfront, adding more shaded spaces.

Similarly, the areas between each building are open for social gathering and interaction, creating a variety of open squares for people whilst designing a multi-layered public space (Commercial Interior Design, 2019).

Results of Biophilic Design Criteria in The Context of The Well-Being and Sustainability in Al Qana Restaurants in Abu Dhabi

Restaurants within Al Qana, Abu Dhabi have been shown to implement biophilic themes in the interior design while taking account of sustainable aspects and well-being elements. The following tables are divided by restaurant, and each restaurant is assessed first by the Biophilic Interior Design Matrix (BID-M), then by sustainability interior aspects and their connection with the BID-M, and lastly evaluated by the well-being interior design framework and its connection with the BID-M. The investigation of sustainability and well-being in relation to BID-M is assessed by how each aspect is seen within biophilic elements to provide evidence as to how biophilic design can advocate for both sustainability and well-being. Additionally, data is collected through observations while the research was conducted in each restaurant in Al Qana for three days. This data is available in the following tables below while a total of 6 restaurants were chosen to be evaluated. Furthermore, each table will be provided with additional information and an explanation to explain the data more clearly. The pictures are taken by the author, and to keep the privacy of customers, faces are blurred while all pictures were taken during times in which the restaurants were empty.

The data for biophilic interior design aspects are found through indicators detailed in the literature review and methodology. These biophilic design criteria were then outlined through careful examination of the interior space. Then, each restaurant is evaluated according to the sustainability of interior elements and the well-being of interior design aspects. This evaluation is further assessed in connection with the BID-M based on how sustainability and well-being features relate to biophilia to show how BID-M is an indicator of healthy interior spaces that maintain both sustainability and well-being.

BID-M for Restaurant 1

Restaurant 1 is evaluated according to the BID-M. The Lebanese restaurant is vibrant with its interior design, and the first feature to note is the hanging flowers

from the ceiling which instantly capture any customer's attention. Its first BID-M aspect Environmental Features can be seen within colors such as green, orange, yellow, brown, blue, and pink. Although there are no water elements, blue colors and shades do allow people to subconsciously connect it with water. Additionally, warm lighting causes there to be a correlation between it and the element of fire. With the use of natural materials wood and marble and natural views through the window, there are various ways in which Environmental Features are present. Similarly, Natural Shapes and Forms and botanical motifs are seen in the fabrics of the chairs as well as the interior structures such as the hanging tree-like lighting fixtures on the ceiling covered in greenery. The flooring design includes floral patterns and vines with colors that match the interior colors of the furniture and décor. Moreover, it matches the ceiling design consisting of the wavy and dynamic structure covering the exposed ceiling. Natural features can be seen in wallpaper and murals with bursts of color and shapes alongside non-linear lines and biomimicry. The BID-M Natural Patterns and Processes mimic natural systems such as lighting shifts throughout the day, and this is achieved through the timing of the day since it influences the lighting within. They use light dimmers during the evenings, which aid in how lighting changes. The use of transitional spaces within the interior can also be seen in how the space is divided between the family area and non-family area, also known as the smoking room. The contrasting colors of orange and green are vibrantly different, just like blue and yellow. However, the use of contrasting colors creates dynamic balance and tension, which is only further achieved by the wavy ceiling structure.

As for Light and Space, natural lighting is common in all the restaurants in Al Qana. However, none of the restaurants receive direct sunlight due to the exterior shading while lighting is dependent on the time of day or artificial lighting. This influences how the space is viewed since lighting allows an area to appear larger, and because the restaurant is one of the largest in Al Qana, there seems to be plenty of space and mobility. Place-based Relationships relate to how the restaurant reflects the geography, ecological, and cultural connection towards the country it represents. In this case, it is a Lebanese restaurant, and some instances of its relation are through Arabic music playing on the speakers, and Arabic lamps used as decoration. Other interior elements such as detailed patterns and luxurious textiles are common in Arab traditions, while the use of wood and woodwork is also significant. Human-nature Relationship refers to prospect, refuge, and aspects of complexity, and this is

integrated with floor-to-ceiling windows, exposed ceilings, and how the space is divided. This creates a sense of refuge amongst secluded or more crowded spaces through seating arrangements. Since the family section and smoking area are separated through glass doors, this creates autonomy within the space. The use of murals and the ceiling design portray order and complexity as well because they add a sense of urgency within the space, adding dimension. Moreover, the findings of Restaurant 1 are portrayed below in (Table 7), which describes the BID-M aspects and the evaluations of each attribute alongside the images.

Table 7

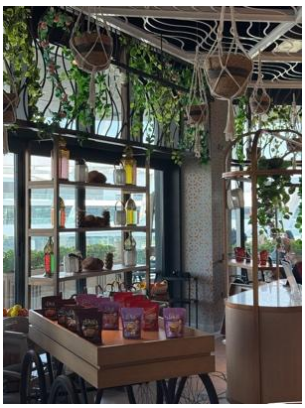
Information card for the analysis of Restaurants within the Biophilic Interior Design Matrix (BID-M)

Evaluation of Restaurants According to the BID-M		
Restaurant 1 **Type of Restaurant: Lebanese**		
BID-M	**Evaluation of BID-M**	**Images**
Environmental Features	• Natural colors such as green, orange, yellow, brown, blue, pink • No specific water elements besides outdoor views of the water • Blue colors mimic water • Central AC • Plants and flowers hanging from the ceiling • Orange colors mimic fire alongside warm lighting • Wood, marble materials	
Natural Shapes and Forms	• Botanical motifs in the texture and fabrics • Lighting fixtures appear like trees and hanging plants • The floor has floral patterns, and the ceiling has a wavy pattern • Wallpaper and murals consist of natural motifs	

Table 7 (Continued)

BID-M	Evaluation of BID-M	Images
Natural Shapes and Forms	• Columns as tubular form and pots as oval forms • Arches used in lighting structures • Non-linear lines and biomimicry within the dynamic ceiling design, vine design on the floor, and hanging plants	 
Natural Patterns and Processes	• Lighting shifts throughout the day • Focal point in the hanging garden above and the singular column • Transitional spaces within the interior which separate the smoking section with a door • A theme of colors, nature elements, and features • Contrasting colors of orange and green, blue and yellow • Dynamic balance and tension within the ceiling structure	 
Light and Space	• Natural light • Hanging light pendants • Some areas with less sunlight create shadows of furniture • Spacious with plenty of mobility and allows privacy	

Table 7 (Continued)

BID-M	Evaluation of BID-M	Images
Place-based Relationships	• Geographic and ecological connection towards nature in Lebanon • Arabic music playing on the speaker • Arabic lamps • Patterned and luxurious textiles • Natural materials of wood and woodwork • Landscape features	
Human-nature Relationship	• Prospect with tall windows and exposed ceilings • Ceiling design creates an illusion of less space • Refuge with secluded areas and seating arrangements, especially with the addition of a smoking zone • Order and complexity through the mural and the ceiling design	

(S.A. Amin, 2024)

Sustainable Interior Aspects in Relation to BID-M for Restaurant 1

Restaurant 1 is further evaluated according to sustainability and well-being factors within the context of the BID-M in (Table 8) above. In terms of energy efficiency, there is no aspect of water features and water-saving elements within the bathrooms such as sensors. Additionally, without knowledge of how the HVAC system is integrated, there is no way to know if the AC is sustainable, even though central AC is considered less sustainable. As for the connection between Energy Efficiency and BID-M, the element of natural lighting connects with Environmental Features alongside the use of warm LED lights to mimic the presence of fire. Natural Shapes and Forms alongside Light and Space, and Natural Patterns and Processes can relate to lighting as well since the use of all lighting can create shadows of nature. For example, the bulbs used on the hanging tree-like branches can create

shadows while the natural lighting throughout the day impacts the interior, referring to circadian rhythms.

The direct materials and the ones most significantly used within the interior are wood, marble, vinyl, and wallpaper. Wood and marble are known to be sustainable natural materials due to how they are durable, renewable, biodegradable, and recyclable while being environmentally friendly. The vinyl used in some seating can be sustainable as well, and the use of wallpaper is sustainable depending on the material used. These features relate to Environmental Features since they are directly related to natural elements while Natural Shapes and Forms as well as Natural Patterns and Processes through how the materials are integrated within the interior. The lighting fixtures which resemble hanging tree branches are made of wood, and the wallpaper consists of botanical motifs. Moreover, the use of natural colors within the materials allows a connection with nature by reminding people of natural systems. Place-based Relationships can be seen in materials as well because the textiles are more luscious in comparison to other restaurants within the area. It is reminiscent of the Lebanese and Arab cultures alongside the woodwork and carvings in the design.

Space Planning as a sustainable interior aspect is shown in the flexible furniture and how there is plenty of room for tables to be pushed together and chairs to be moved toward certain areas. Since there are zones in the interior for families and a smoking area for non-family members, it divides the space. These features relate to the BID-M through Natural Shapes and Forms through round tables, square tables, and different types of seating to accommodate the space. There is a column used as a built-in seating as well, and this relates to natural shapes and Space Planning. Transitional spaces and zoning of different seating areas connect with Natural Patterns and Processes. Light and Space as a BID-M relates to Space Planning with natural lighting and since the ceilings are high with floor-to-ceiling windows, it causes the area to appear larger as well, adding to how spacious the interior is. This is related to the BID-M Human-nature Relationship as well with the addition of outdoor natural views.

Indoor Health can be achieved with operable windows, natural lighting, the use of AC, sound absorption, Arabic music, and visuals of nature. Natural ventilation, especially during wintertime allows Environmental Features and Human-nature Relationships while directly connecting with the landscape and visuals of the

waterfront. Natural Shapes and Forms are seen with natural motifs within textures and interior décor which resemble natural systems such as the hanging flower garden and tree branches, floral vines on the floor, shapes with arches, tubular and oval forms in décor. Natural Patterns and Processes are portrayed in focal points of the hanging garden while natural lighting shifting throughout the day can aid in circadian rhythms alongside the BID-M Light and Space. Indoor Health is considered in psychological aspects as well, and the use of Arab themes such as music, lanterns, and woodwork, allows a Place-based Relationship.

Well-being Interior Aspects in Relation to BID-M for Restaurant 1

The well-being interior design features include Connection to Context, Functional Requirements, Psychological, Social, Sensory, and Ergonomics. For the well-being aspect of Connection to Context, is achieved in relation to the natural and built environment in terms of Al Qana and the waterfront, which can be seen through glass floor-to-ceiling windows. The restaurant is situated on the first floor of Al Qana and is on the corner, which receives more wind and sun as well. The use of natural and natural materials such as wood relates to Environmental Features as well as Place-based Relationship due to its connection with the restaurant culture. Light and Space and Connection to Context relate through natural lighting.

Functional Requirements are the ease with which the furniture allows eating, drinking, and socializing within the restaurant. This can be achieved through a variety of seating arrangements which are based on circular tables, square tables, and built-in seating. The choices are dependent on the type of activity the customer prefers according to comfort and preferred views. The lighting and thermal comfort also vary and influence the functions of the users. Functional Requirements mainly relate to Light and Space and the Human-nature Relationship based on seating arrangements, spatial variability, and accessibility of outdoor views. Furthermore, with sensory variability utilized within the natural views, materials, décor, and botanical motifs, these all connect to relate with the BID-M aspects of Environmental Features, Natural Shapes and Forms, and Natural Patterns and Processes. The visuals and tactile comfort of these aspects factor in on the Functional Requirements of every person.

Psychological features of well-being are integrated into the sense of autonomy present within which zone they prefer based on family areas and the

closed smoking area. This autonomy is present in how people can choose whether to sit outside or anywhere inside based on their comfort. The presence of partially secluded seating, built-in seating, and separate tables spread within the space create a feeling of refuge as well, connecting with Natural Patterns and Processes, Light and Space, and Human-nature Relationship. This is achieved with transitional spaces, spatial variability, and zoning.

Levels of Social aspects are dependent on seating arrangements and the number of people sitting together as a group. For example, if it is a larger group of people, they will utilize larger tables or group tables together for easier interaction. Meanwhile, built-in seating, for example, can allow people to connect with others through proximity. Furthermore, there are counter seats available for individuals while there are grouped tables of a maximum of 6 people set up and a minimum of 2. These features relate to Light and Space, and Human-nature Relationship due to zoning and seating arrangements, as well as how lighting influences spatial variability.

Sensory as a well-being parameter influences all BID-M components due to how each feature relates to sensory aspects. The visuals, auditory, olfactory, and tactile are depending on the interior elements utilized as BID-M features. The interior elements most significant in sensory aspects are how the doors are closed because of the heat, while indoor cooling is comfortable. However, the AC is loud, and they are playing Arabic music. There is the smell of food as well while natural aesthetics and motifs are implemented within the interior. The use of different materials allows different textures with smooth, rough, and soft textiles or materials, offering different sensory experiences.

As for Ergonomics, there is built-in furniture as well as unfixed furniture which is flexible to be moved easily for mobility and spacing reasons. Seats are padded with extra cushions and the heights are comfortable for dining. However, some tables appear small to accommodate the number of seats available. This connects with Place-based and Human-nature Relationships since the materials impact the comfort level while also relating to the cultural aspect of the Lebanese theme.

The findings of Restaurant 1 are as seen below in (Table 8), which describes the sustainable interior aspects and well-being interior design framework of the restaurant. Additionally, the connection with the BID-M is highlighted.

Table 8

Information card for the analysis of Restaurants through Sustainability and Well-being within the context of BID-M

Evaluation of Restaurants through Sustainability and Well-being within the BID-M		
Restaurant 1 **Type of Restaurant: Lebanese**		
Sustainable Interior Aspects	**Evaluation of Sustainability Aspects**	**Connection with BID-M**
Energy Efficiency	• LED lights used in all lighting • Natural lighting • Central AC • Power bank station available for use	• There is a connection with Environmental Features of natural lighting and views alongside the warm lighting • Natural Shapes and Forms created through lighting • Natural Patterns and Processes according to lighting throughout the day • Light and Space elements due to natural and artificial lighting
Materials	• Wood is durable and recyclable • Marble is environmentally friendly • Vinyl on some seatings • Wallpaper may be sustainable in terms of material • Ceramic or porcelain tiles	• Environmental Features • Natural Shapes and Form and Natural Processes within materials and textures • Place-based Relationship through a variety of textiles
Space Planning	• Open kitchens • Visual connection to all areas including the smoking zone due to glass doors • Visual connection to outdoor views • Flexible space planning and furniture • Zoning with separate areas for family and non-family (smoking area) • Furniture does not feel cluttered and is scattered or distributed evenly	• Environmental Features with outdoor views of nature alongside furniture with natural materials • Natural Shapes and Forms within the interior furniture and visual connection to natural elements • Natural Patterns and Processes with transitional spaces to create zones • Human-nature Relationship with tall windows which connect with outdoor views, and the scale of the space

Table 8 (Continued)

Sustainable Interior Aspects	Evaluation of Sustainability Aspects	Connection with BID-M
Indoor Health	• Operable windows • Natural Lighting • Doors stay open during winters • Cool indoors • Arabic music • Visuals of nature • Marble and wood are sound absorbing • Porcelain, ceramic, and wallpaper aren't	• Environmental Features with natural ventilation and visuals • Natural Shapes and Forms, and Natural Patterns and Processes with natural motifs, colors • Natural lighting connects with Light and Space • Place-based Relationship with Arabic music and themes • Windows create Human-nature relationship
Well-Being ID Framework	**Evaluation of Well-being in Interiors**	**Connection with BID-M**
Connection to Context	• Relation to natural and built environment in terms of the context of the area Al Qana, and glass floor-to-ceiling windows which allow views of the landscape • The restaurant is placed on the corner of the first floor which receives more wind and sun • Use of natural materials	• Natural materials with Place-based Relationship • Human-nature Relationship, Environmental Features within Natural Shapes and Forms • Connected with Light and Space for lighting and spatial variability
Functional Requirements	• Fulfillment of activities such as eating, drinking, socializing • With a variety of seating, it allows people to choose where they want to sit and what type of seating they prefer based on comfort and preferred views • The lighting and thermal comfort varies in the interior as well, influencing functions	• Mainly connected towards Light and Space and Human-nature Relationship through seating arrangements, spatial variability and visual accessibility of outdoor views • Environmental Features, Natural Shapes and Forms, and Natural Patterns and Processes connected with sensory variability and how it affects functions

Table 8 (Continued)

Well-Being ID Framework	Evaluation of Well-being in Interiors	Connection with BID-M
Psychological	• There is a degree of autonomy present if a person wants to sit in the family zone or non-family zone (smoking section) • Some areas are more secluded than others based on separate tables and arrangements in contrast to built-in seating along one entire wall which places tables together	• Natural Patterns and Processes, Light and Space, and Human-nature Relationship due to transitional spaces, spatial variability, and zoning
Social	• Levels of social interaction based on seating arrangements and the number of people. This creates privacy for groups of people with the space between tables • Built-in seating allows a connection with other groups of people • There are counter seats for individuals, grouped tables of maximum 6 and minimum of 2	• Light and Space, and Human-nature Relationship due to spatial variability and zoning between different sets of seating arrangements
Sensory	• Doors are closed but there is indoor cooling • Darker interiors based on where natural lighting enters the space • Arabic music playing • Slight smell of food • Natural aesthetics and themes • Variety of materials that are smooth, rough and soft to touch	• All BID-M components connect with sensory aspects since they influence the visual, auditory, olfactory, and tactile
Ergonomics	• Built-in furniture as well as movable furniture with easy mobility and spacing • Seats have comfortable padding and heights to ensure dining experience • Some tables are too small for the number of seats available	• Place-based Relationships with Human-nature Relationship based on materials and function

(S.A. Amin, 2024)

BID-M for Restaurant 2

The first BID-M aspect is Environmental Features, and the features that relate to it include the natural and neutral shades used within the interior, the numerous plants, the addition of stones, marble, and wood, recessed orange lighting to create a warm atmosphere and connect with fire motifs, and natural views of the landscape. The landscape involves the outdoor greenery and the waterfront of Al Qana. Natural Shapes and Forms are seen in botanical motifs of natural colors, patterns, and materials. Additionally, indoor trees and plants, and motifs of the shell-like lighting mimic nature. This is shown through oval and tubular forms within the decorative pots on the floor, adding hierarchy and ratios, and the non-linear lines on the wall around the mirror feature, which adds a natural and dynamic aspect. Natural Patterns and Processes are the sunlight, and the mimicking of circadian rhythms through light shifts within the day. A focal point of the restaurant counter alongside a partially hidden tree feature adds intrigue and mystery of natural aspects. The use of complementary colors such as beige, grey, and brown shades all contrast and blend well together for a cohesive theme.

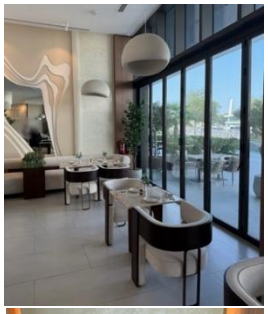
Light and Space are natural and artificial lighting. With the same windows used within Al Qana, this feature will remain the same throughout all restaurants. The use of recessed lighting in the walls adds coziness as well, and the light reflecting on the mirrored design feature on the wall allows the space to appear bigger. The spacing is evened as well, and despite the seating being bulky, it is flexible and movable. Place-based Relationship is based on the ecological, geographic, and cultural aspects. This is integrated with tropical greenery, and the use of shells, pebbles, and tiles, which are all commonly used in Latin American interiors. With the addition of warm wooden highlights and almost a red-like shade to the wood, it connects with the cultural themes. Human-nature Relationship are shown in the prospect, refuge, and order and complexity. The large open space with tall windows allows indoor and outdoor connection with nature. There is a sense of mystery with the hidden tree focal point as well, while the décor and shelves are scattered to add dynamic aspects. (Table 9) below are the findings of the BID-M for Restaurant 2 to describe the information in table form. Each aspect is evaluated according to the attributes and provides images for visual aid.

Table 9

Information card for the analysis of Restaurants within the Biophilic Interior Design Matrix

Evaluation of Restaurants According to the BID-M		
Restaurant 2 **Type of Restaurant: Latin American**		
BID-M	**Evaluation of BID-M**	**Images**
Environmental Features	• Natural colors with neutral shades • Numerous plants create a natural theme with the natural material of stone • Natural materials of stone, marble, wood • Recessed orange lighting creates warmth • Natural views of the outdoor landscape and interior greenery	
Natural Shapes and Forms	• Botanical motifs with natural colors, patterns, and materials • Indoor trees and plants • Shells used as lighting • Indoor trees and plants • Oval and tubular forms within pots used as decoration • Arches within the décor of the interior • Non-linear lines on the wall around the mirror and other walls as biomimicry.	
Natural Patterns and Processes	• The sunlight within the space changes according to timing • Focal point of the main restaurant counter which includes a partially hidden tree • Complementary contrasts of beige, gray, and brown shades • Hierarchy and ratios of pots on the ground	

Table 9 (Continued)

BID-M	Evaluation of BID-M	Images
Light and Space	• Natural light • Recessed lighting in the walls • Light reflecting on the mirrored design on the wall • Spaciousness and easy mobility • Spatial variability of furniture	 
Place-based Relationships	• Rugged and textured walls of stone • Deep brown almost red colors • Ecological and geographic connection towards the tropical greenery, and themes of shells, pebbles, and tile which are common materials	 
Human-nature Relationship	• Prospect of large open spaces and tall windows • Sense of mystery with the partially hidden tree focal point • Order and complexity within the décor and shelves	 

(S.A. Amin, 2024)

Sustainable Interior Aspects in Relation to BID-M for Restaurant 2

For interior aspects of Sustainability, these include Energy Efficiency, Materials, Space Planning, and Indoor Health. Sustainability can be achieved by using LED lights, the restaurant also does not use any light dimmers. The interior is darker as well due to the wood, and this adds to the thermal comfort while the warm lighting allows fire motifs, which relate to Environmental Features in the BID-M. Furthermore, the patterns from lighting and circadian rhythms impact the Natural Patterns and Processes created through lighting, which is directed at the wall and mimics fire by placing them on the ground next to the wall. For this reason, Light and Space are influenced as well through the darker furniture in contrast to the lighter shades in the interior.

As for Materials, the ones used in the interior are wood, marble, stone, and Venetian plaster. These materials are durable, renewable, natural, and environmentally friendly. How it connects to the BID-M is based on the used natural materials and their direct relation to Environmental Features, and how it is used in Natural Shapes and Forms, such as botanical motifs, shell shapes in lighting, non-linear lines in the wooden furniture, and circular marble tables. Furthermore, this connects with Place-based Relationship too by using culturally local and natural materials which are reminiscent of Latin American styles.

Space Planning is seen with an open coffee bar and the visual connection to all interior spaces. This adds to Environmental Features, especially when nature and the landscape can be seen from all areas in the interior. Additionally, the furniture is divided equally and allows enough space for mobility. However, the sizing of the chairs appears larger than the tables, which may be bulky and allow less flexibility in rearranging furniture. The Space Planning includes Natural Shapes and Forms with natural colors and materials in furniture and interior elements alongside the Natural Patterns and Processes with the addition of a tree as a focal point. This feature is an aspect of space planning and is used as a decorative and biophilic feature. Light and Space as a BID-M relates as well using natural lighting and interior colors since they affect how spacious the area appears. Human-nature Relationship is achieved with windows, allowing outdoor views while the low ceilings create a cozier environment.

As for Indoor Health, the operable windows allow natural ventilation as well as natural lighting. There is the use of ACs for indoor cooling and comfort in the heat, while indoor greenery and views of the landscape and the waterfront allow

connections with nature. These features relate to the BID-M through Environmental Features such as natural ventilation and visuals of nature. Natural Shapes and Forms and Indoor Health are related to botanical motifs and natural themes in the interior, as well as the use of natural materials and colors. Natural Patterns and Processes are integrated with the circadian rhythm of natural lighting, the tree focal point, and decorative elements that add to natural systems and Indoor Health.

Well-being Interior Aspects in Relation to BID-M for Restaurant 2

Connection to Context is directly related to all restaurants since the same location allows the same indoor-outdoor connection of the waterfront and the use of floor-to-ceiling windows which are also operable. The restaurant is also situated on the ground, which receives less sunlight but is closer to the waterfront. Natural materials relate to Environmental Features and Place-based Relationship. How these materials are used within the interior space alongside the BID-M Natural Shapes and Forms adds to the connection to context as well. Similarly, Light and Space as a BID-M relates to windows, natural lighting, and how it connects the indoors to the outdoors.

Functional Requirements such as dining experience and socializing are dependent on furniture, seating arrangements, and comfort of the person. The different types of seating allow people to choose where to sit, while lighting and thermal aspects based on seating next to the window or under artificial lighting or AC, affect functions. For this reason, Light and Space alongside Human-nature Relationship relate as BID-M relate to Functional Requirements due to seating arrangements, spatial variability, and visual accessibility of outdoor views. Additionally, all features which influence the senses such as the BID-M of Environmental Features, Natural Shapes and Forms, and Natural Patterns and Processes, are what function relies on. They impact the comfort and what type of activity a person wants to fulfill within the space.

Psychological well-being is how much autonomy is present, and within a restaurant, this is available through where a person wishes to be seated. The choices include near the window for better views and the corners of the interior for more refuge and privacy. As for the BID-M, Light and Space and Human-nature Relationship is most significant since mobility and spaciousness are vital in the

autonomy of choosing a table. This is another factor that relates to social well-being since it creates a variety of public and private seating arrangements.

Social well-being is dependent on the seating arrangements, while since the area is generally open, there is a lack of refuge areas for privacy. Additionally, there are grouped tables of four seats per table or a minimum of two seats per table. The BID-M Light and Space relates to Social well-being because of how the space is divided or arranged due to seating. For this reason, Human-nature Relationship is related to Social well-being through social interactions, integration, contribution, and the coherence of an individual. The people within the restaurant can relate to create a sense of community of a shared experience.

Sensory aspects of well-being are through visual, auditory, olfactory, and tactile features, which is why all BID-M components serve together to create a dining experience. This is achieved with indoor cooling, darker furniture, and neutrals to keep the temperature consistent, warm lighting, natural lighting, materials, natural themes, colors, and motifs. Additionally, the use of reflective surfaces, soft textiles, and cool tables against the rough and jagged textures of the walls, adds depth to the interior.

Ergonomics as a well-being aspect is integrated with bulkier seating with padded textiles for comfort. It secures a person in their seat while the tables are thin and smaller. However, the set seating arrangements do not allow for flexibility of furniture since the tables and chairs accommodate a specific number of people, otherwise, it will be crowded. As for the relation to the BID-M, this can be seen through Environmental Features such as natural materials, and colors alongside Place-based Relationship. Light and Space are integrated too to impact the seating and how the space is used to accommodate the seating arrangements as well as the lighting, illumination and comfort.

As provided below in (Table 10), the evaluation of the sustainable interior aspects and the well-being are assessed. Then, the connection between these concepts and the BID-M is highlighted to portray how it is related.

Table 10

Information card for the analysis of Restaurants through Sustainability and Well-being within the context of BID-M

Evaluation of Restaurants through Sustainability and Well-being within the BID-M		
Restaurant 2 **Type of Restaurant: Latin American**		
Sustainability Interior Aspects	**Evaluation of Sustainability Aspects**	**Connection with BID-M**
Energy Efficiency	• LED lights used in spotlights • Natural lighting • There are no dimmers • The interior is dark yet warm due to artificial lighting	• Environmental Features of natural lighting and views with warm lighting • Natural Shapes and Forms with Natural Patterns and Processes created with lighting mimicking fire • Light and Space elements due to natural and artificial lighting which affect how dark and warm the interior appears
Materials	• Wood is durable, renewable, biodegradable, recyclable • Marble is environmentally friendly • Stone is natural and sustainable • Venetian plaster and normal plaster are natural and non-toxic	• Environmental Features with natural materials including Natural Shapes and Form • Place-based Relationship through a variety of smooth and rough textures
Space Planning	• Open coffee bar • Visual connection to all areas and outdoor views • Furniture is evenly divided and creates enough space. However, the sizing of furniture and tables appears as if they may not accommodate more than the standard arrangement. This causes there to be less flexibility	• Environmental Features with outdoor views of nature alongside furniture with natural materials • Natural Shapes and Forms with interior furniture colors and materials • Light and Space with a mix of light and dark colors • Human-nature Relationship with windows, allowing outdoor views

Table 10 (Continued)

Sustainability Interior Aspects	Evaluation of Sustainability Aspects	Connection with BID-M
Indoor Health	• Operable windows which allow natural ventilation during winters • Natural Lighting • Cool indoors using AC • Visuals of nature, greenery, and natural themes or motifs • Wood, marble, plaster, and stone are sound absorbing	• Environmental Features with natural ventilation and visuals of indoor greenery • Natural Shapes and Forms, and Natural Patterns and Processes with natural motifs and colors • Natural lighting impacts how the Light and Space factors are perceived • Windows creates a Human-nature relationship with an indoor-outdoor connection
Well-Being ID Framework	**Evaluation of Well-being in Interiors**	**Connection with BID-M**
Connection to Context	• Relation to natural and built environment through glass floor-to-ceiling windows which also open and allow views of the waterfront • The restaurant is on the ground floor which receives less sunlight but is closer to water elements • Use of natural materials	• Natural materials with Place-based Relationship, Human-nature Relationship, and Environmental Features integrated within Natural Shapes and Forms • Light and Space with natural lighting and outdoor visuals influence spaciousness and connection
Functional Requirements	• Fulfilment of activities such as eating, drinking, socializing • Various seating arrangements according to comfort, number of people, and preferred views • The lighting and thermal comfort varies in the interior as well based on the seating next to the window	• Light and Space and Human-nature Relationship through seating arrangements, spatial variability, and visual accessibility of outdoor views • Environmental Features, Natural Shapes and Forms, and Natural Patterns and Processes connected with sensory variability and how it impacts functions

Table 10 (Continued)

Well-Being ID Framework	Evaluation of Well-being in Interiors	Connection with BID-M
Psychological	• There is a degree of autonomy present in if a person wants to sit near the window, in the middle of the interior, or off to the side • There are no refuge areas, yet seating within corners of the room is more private	• Light and Space, and Human-nature Relationship due to spatial variability, spaciousness, and mobility
Social	• Social interaction is based on seating arrangements and the number of people. • Evenly divided spaces between tables offer privacy • It is an open space • There are grouped tables of a maximum of 4 and a minimum of 2	• Light and Space, and Human-nature Relationship due to spatial variability between different sets of seating arrangements
Sensory	• Doors are closed in hot weather, but there is indoor cooling • Natural lighting is limited due to the location • Natural aesthetics and themes • Variety of materials that are smooth, rough, and reflective in relation to the softness of the textures	• All BID-M components connect with sensory aspects since they influence the visual, auditory, olfactory, and tactile senses
Ergonomics	• Movable furniture • Chairs are bulkier than tables • Mobility between spaces • Seats have comfortable padding and heights to ensure dining experience • Some tables are too small for the number of seats available, and arrangements do not accommodate more than 4 people	• Environmental Features, Place-based Relationship, Human- nature Relationship based on natural materials used within furniture

(S.A. Amin, 2024)

BID-M for Restaurant 3

Environmental Features in BID-M include natural colors such as green, blue, red, and yellow. With the use of blue lighting and colors, this mimics water features, while red highlights mimic fire. With the use of indoor greenery, natural wood materials, and views of nature, there is a visual connection with environmental aspects. Furthermore, the restaurant includes a cow design feature to connect the interior with animal motifs. This is related to the BID-M Natural Shapes and Forms, while there are botanical themes in the wallpaper that portray plants and natural shapes. There are also shells, spirals, and non-linear lines within the wallpaper which contrast the linear lines in the booths, and on the walls. Additionally, these lines are reminiscent of swimming pools due to the style, and this is another factor relating to water features. The hanging lights from the ceiling are in the shape of spheres as well, and they look like bubbles. Natural Patterns and Processes can be seen with the shifting of light throughout the day since the interior is strikingly different in the day and night. The restaurant is meant to be visited during the night because the LED lights are brighter and are used as a decorative feature influencing the dining experience. The complementary contrasting colors of red and blue add to the biophilic element while there are complex and dynamic themes within the wallpaper. The ceiling is exposed as well, but there is a red grail partially covering it, which also impacts the scale and ratio within the space.

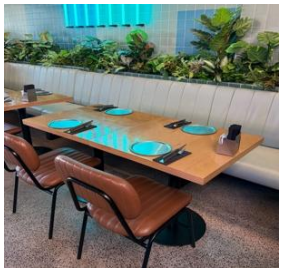
The BID-M Light and Space is integrated with natural lighting, recessed lighting, and LED lights. Materials in the space have a finish that reflects lighting, such as in the tables and the glass separators in the open kitchen. Additionally, there is easy mobility within the space due to more built-in furniture, but it is also more crowded than other restaurants since it is a smaller space. Place-based Relationship is through the cow decorative feature which relates to the geographical and cultural connection as well as the connection to context since the restaurant serves American burgers. Moreover, the natural indoor greenery and such connect with ecology. Human-nature Relationship is achieved with the prospect of an open space with dimmed and dark interiors to create refuge and privacy for people. The use of wallpaper contrasts with the seating by the complexity of the shapes and forms, and the order of built-in seating. This information is better provided below in (Table 11) where the evaluation of BID-M for Restaurant 3 is available alongside the images of the interior.

Table 11

Information card for the analysis of Restaurants within the Biophilic Interior Design Matrix

Evaluation of Restaurants According to the BID-M		
Restaurant 3 **Type of Restaurant: American**		
BID-M	**Evaluation of BID-M**	**Images**
Environmental Features	• Natural colors of blue, green, red, yellow • Water mimicry through blue themes and lighting • Green plants • A design feature of a cow is placed on the wall • Fire through red highlights of color within the interior • Natural materials of wood • Natural views	
Natural Shapes and Forms	• Botanical themes in natural plants and wallpaper to mimic plants and water • Columns are filled with wallpaper • Shells or spirals • Lights are in the shape of circles • Non-linear lines in the wallpaper	
Natural Patterns and Processes	• Lights are brighter during nighttime to create a dark space filled with blue lighting • Complementary contrasts between red and blue • Dynamic themes within the wallpaper • Scale and ratio within the exposed ceiling	

Table 11 (Continued)

BID-M	Evaluation of BID-M	Images
Light and Space	• Natural light, recessed lighting, and LED • Bursts of light through LED • Materials used in the interior reflect light through tables and glass • Blue lights create a pool effect • Easy mobility but it is more crowded than other restaurants	 
Place-based Relationships	• A cow decorative feature on the wall to connect with animals and geographical and cultural connection • Natural indoor greenery to connect with ecology	 
Human-nature Relationship	• Prospect of open space with dimmed and dark interior to create a sense of refuge and privacy • Order and complexity of the wallpaper, organized seating, and diagonal seating areas	

(S.A. Amin, 2024)

Sustainable Interior Aspects in Relation to BID-M for Restaurant 3

Energy Efficiency in Restaurant 3 includes LED lights while they receive very little natural lighting for the intention of creating a unique dining experience.

They prefer customers to visit during the evenings to experience the lights and the atmosphere. Moreover, their lighting is for decorative purposes rather than for functional reasons. How this relates to the BID-M is within LED lighting used to implement Environmental Features with natural colors of blue and red. Natural Shapes and Forms are through the sphere-shaped lighting fixtures, while complementary contrasts of red and blue colors are themes of Natural Patterns and Processes. Light and Space alongside Human-nature Relationship by the natural lighting and outdoor views of nature with floor-to-ceiling windows.

The materials used are wood, leather, and ceramic or porcelain tiles. As explained before, wood is durable and sustainable, however, the polishing of wood is dependent on whether the brand uses VOCs. Furthermore, leather is a sustainable material, and ceramic as well as porcelain tiles are too. These relate to Environmental Features due to the use of natural materials while it connects with Natural Patterns and Processes by implementing dynamic themes, and colors within these materials. Light and Space can be influenced as well through the polished finish in materials, which bounce light off the surface. The materials used relate to Place-based Relationship as well as displaying cultural and geographical elements.

Space Planning shows how the restaurant is an open area with visual access to all spots, while there is an open kitchen that can be seen with glass windows. Furniture is evenly divided and is simpler than in other restaurants, allowing movability and flexibility. The built-in furniture booths save space as well due to how small the interior is. Floor-to-ceiling windows allow there to be a connection with BID-M Environmental Features by providing a view and connecting the interior to the exterior, thus fulfilling Human-nature Relationship too.

Indoor Health is achieved by operable windows, allowing natural ventilation during wintertime. This relates to Environmental Features due to how it grants people a view of the landscape and waterfront, while indoor greenery and natural motifs add to this aspect. For this reason, the BID-M aspects of Natural Shapes and Forms alongside Natural Patterns and Processes are fulfilled, especially when interior elements are reminiscent of natural systems or features, such as how the restaurant reminds people of a swimming pool.

Well-being Interior Aspects in Relation to BID-M for Restaurant 3

Connection to Context is the same as all restaurants with the exterior windows allowing views of the waterfront. This restaurant is on the ground floor, which is why it receives less sunlight and is in closer proximity to the waterfront. Additionally, all restaurants include outdoor seating with plants and decorative greenery. For this reason, the BID-M aspect of Environmental Features is most prominent, as well as Light and Space since it influences the atmosphere within. The darkness of the interior impacts the dining experience, and with the lack of sunlight, causes the space to appear smaller and more intimate.

Functional Requirements can be achieved with various seating arrangements because they impact activities of eating, drinking, and socializing. The lighting is consistent with LED and areas next to the window or walls receive more illumination. However, the more shaded areas appear secluded and allow more privacy for customers. These features relate to Light and Space as well as Human-nature Relationship because lighting fixtures, LED, and natural lighting are what influence functionality within the space. With comfortable seating and evenly divided areas, there can be easy mobility. However, booths, for example, are tighter, and this may not allow flexibility for customers. Sensory variability is important in the interior, and this is related to BID-M elements of Environmental Features of greenery and tall windows, Natural Shapes and Forms such as the visual comfort of lighting fixtures, colors, and the stimulation of visual aspects.

Psychological well-being, as previously discussed, relates to autonomy in the same manner as it is present in other restaurants due to the freedom of choice for a customer. With a variety of seating options, such as booths or tables, this also allows an individual to choose if they prefer more secluded areas or not. These features influence interaction levels as well. Furthermore, the BID-M relates within this restaurant to psychological well-being through Light and Space aspects that affect seating, spaciousness, zoning, and mobility. Moreover, it can be noted how Human-nature Relationship are significant too judging by the feeling of prospect of an open space with dimmed and dark interiors which allow people to be comfortable.

For Social well-being, this involves the social interaction brought by seating arrangements and the number of people dining together. Because the space is evenly divided, it offers privacy, but there are fewer instances of refuge since the area is small. Additionally, there are grouped tables with seating of 6 people, and a

minimum of 2 people per table. The BID-M of Light and Space is most related due to how light influences the space. The reflective light, and LED on the walls serve as guidance for customers as well as their interaction within the space. Furthermore, there are outdoor seating areas available, offering a different social interaction between indoor and outdoor environments.

Sensory factors for Restaurant 4 include operable windows, warm and cool LED lighting with the theme of blue and red within, a lack of natural lighting, natural themes and motifs, and materials that offer different tactile experiences that are smooth and or reflective. All BID-M elements are related to sensory experiences since all interior features tie together to stimulate an individual. However, there are no smells and music, however, with the presence of food, it may allow olfactory senses.

Ergonomics can be seen in the furniture and mobility within the interior. Since the furniture is mainly light, they are flexible and can be moved around, which suits the almost 'fast-food' theme of the restaurant. Despite this, there are more built-in booths for seating, and this is fixed and unmovable. This relates to Light and Space as a BID-M element, influencing how the space is used. Furthermore, Environmental Features and Place-based Relationship can be seen with the use of natural materials for the furniture, hence impacting the ergonomics and style. Furthermore, (Table 12) explains the BID-M for Restaurant 3, and its relation to the sustainable and well-being aspects below.

Table 12

Information card for the analysis of Restaurants through Sustainability and Well-being within the context of BID-M

Evaluation of Restaurants through Sustainability and Well-being within the BID-M		
Restaurant 3 **Type of Restaurant: American**		
Sustainability Interior Aspects	**Evaluation of Sustainability Aspects**	**Connection with BID-M**
Energy Efficiency	• LED lights and spotlights • Very little natural lighting because they	• Natural Shapes and Forms with Natural Patterns and Processes created through colored LED lighting to

Table 12 (Continued)

Sustainable Interior Aspects	Evaluation of Sustainability Aspects	Connection with BID-M
Energy Efficiency	want to create a darker atmosphere • There are no dimmers, and they prefer customers to visit during evenings for the dining experience • Their lighting is not used for functionality, and is more for décor and to build a unique experience • Central AC	add decorative effects with blue, pink, and purple hues • Light and Space, and Human-nature Relationship elements due to natural and artificial lighting which affect how dark and warm the interior appears
Materials	• Wood is durable, renewable, biodegradable, and recyclable while the polished finish depends on the brand and if they include VOC • Leather is sustainable and durable while faux leather is not renewable Ceramic and porcelain tiles are sustainable and natural	• Environmental Features with natural materials including Natural Shapes and Form in implementing natural themes • Reflective materials bounce light off the surface influencing Light and Space • Place-based Relationship with smooth textures, and lighting used to display cultural and ecological elements
Space Planning	• Kitchen is visible through a window • Visual connection to all areas and outdoor views • Furniture is evenly divided and creates enough space. • Furniture is simple and basic to accommodate flexibility while there are also built-in furniture and booths for larger groups of people	• Environmental Features with outdoor views of nature • Natural Shapes and Forms with interior colors and patterns • Light and Space makes warmer in contrast to the cool colors used in the walls and LED light • Human-nature Relationship with windows, allowing outdoor views

Table 12 (Continued)

Sustainable Interior Aspects	Evaluation of Sustainability Aspects	Connection with BID-M
Indoor Health	• Operable windows • Dimmed lighting • Cool indoors using AC • No smell within the interior • Visuals of nature, greenery, and natural themes or motifs • Sound-absorption wood, ceramic and porcelain	• Environmental Features with natural ventilation and visuals of indoor greenery • Natural Shapes and Forms, and Natural Patterns and Processes with natural motifs and colors • Natural lighting impacts how the Light and Space factors are perceived
Well-Being ID Framework	**Evaluation of Well-being in Interiors**	**Connection with BID-M**
Connection to Context	• Relation to the environment through operable glass floor-to-ceiling windows which allow views of the waterfront • The restaurant is on the ground floor which receives less sunlight but is closer to water elements and greenery	• Natural materials influence and connect with Place-based Relationship, Human-nature Relationship, Environmental Features integrated within Natural Shapes and Forms • Light and Space due to how LED lights influence the atmosphere within
Functional Requirements	• Fulfilment of activities such as eating, drinking, socializing • Various seating arrangements, which people can choose according to comfort, number of people, and preferred views • The lighting is consistent while thermal comfort varies in the interior based on AC and natural ventilation • Secluded arrangements allow privacy and refuge	• Mainly connected towards Light and Space and Human-nature Relationship through seating arrangements, spatial variability and visual accessibility of outdoor views • Environmental Features, Natural Shapes and Forms, and Natural Patterns and Processes connected with sensory variability and how it impacts functions

Table 12 (Continued)

Sustainable Interior Aspects	Evaluation of Sustainability Aspects	Connection with BID-M
Psychological	• Autonomy is present within the type of seating arrangement they prefer with either separate table seatings, booths, or secluded seating in the corner • These functions influence interaction levels	• Light and Space, and Human-nature Relationship due to spaciousness levels, and mobility
Social	• Social interaction is dependent on seating arrangements and how many people are dining • Evenly divided spaces between tables offer privacy • Small instances of refuge with reclusive seating • There are grouped tables of a maximum 6 and a minimum of 2 people per table	• Light and Space, and Human-nature Relationship due to spatial variability between different sets of seating arrangements
Sensory	• Doors are closed in hot climates, but indoor cooling is comfortable • Lighting is both cool and warm while interior is blue and bright • Natural lighting is limited due to the location, and they want to create a darker atmosphere • Natural aesthetics and themes • Variety of materials which are smooth and reflect light	• All BID-M components connect with sensory aspects since it influences the visual, auditory, olfactory, and tactile senses
Ergonomics	• Movable furniture • Chairs are simple and light to allow flexibility and mobility	• Environmental Features, Place-based Relationship, Human- nature Relationship based on natural materials utilized

Table 12 (Continued)

Sustainable Interior Aspects	Evaluation of Sustainability Aspects	Connection with BID-M
Ergonomics	• Seats have comfortable padding and heights to ensure dining experience while they are simpler to portray a 'fast-food' theme for short-term customers. • The booth areas seem crowded and allow limited movement	• Light and Space impacting how spaciousness is perceived between seating alongside lighting comfort and illumination

(S.A. Amin, 2024)

BID-M for Restaurant 4

Environmental Features can be seen with the use of natural colors such as brown, beige, turquoise, pink, and yellow. Furthermore, the blue colors are motifs of water, which are used within the cushions in the chair and the cladding of the service bar in the restaurant. There is natural ventilation through indoor plants, and operable windows which open during winters. Fire motifs are present with warm lighting and recessed lighting while natural materials such as wood, bamboo, rattan, and marble are present. Just like all restaurants in Al Qana, there are natural views with the same floor-to-ceiling windows. Natural Shapes and Forms are shown through indoor plants, while light structures, such as the one above the service bar, mimic natural landscapes found in nature. Egg-like, oval, and tubular forms are present within the lamps used in the ceiling, while the egg-like shape can be seen in the seating pods at the side of the restaurant which includes arched lines. Additionally, the curved lines on the floor are wooden and terrazzo to create a walking path. Natural Patterns and Processes with circadian rhythms of how natural lighting shifts throughout the day while artificial lighting is dimmed in the night for the intimate atmosphere. Windows are open during the evening as well, and the main focal point in the restaurant is the service bar due to the lighting structure above. Transitional spaces are achieved through the flooring design, and the seating area along one side of the restaurant relates to built-in furniture, creating a part of a whole aspect. Complementary contrast colors are present such as turquoise and magenta, dynamic balance and tension through the lighting structure, and hierarchy and scale with long hanging lights and the exposed ceiling.

Light and Space aspects are natural lighting, LED, and recessed lighting. The shadows from the lamps create shapes and mimic natural systems. The tabletops also reflect light, while the area is narrower than other restaurants. For this reason, they have made built-in seating to save space. Place-based Relationship can be seen most significantly within this restaurant through geographical, historical, cultural, and ecological connections to Thailand's nature, and traditions. The decorative features and Buddhist structures decorating the wall are reminiscent of Thai themes alongside the use of materials of bamboo and rattan. Human-nature Relationship is also achieved with tall windows while refuge is possible in partially hidden seating pods while some seating areas are in the corner and are more secluded than other furniture. There are complexity and order aspects within the decorative corner of the restaurant, which is full of Thai themes, hanging lights that are not in a straight line, and the floor design is in terrazzo. (Table 13) below describes the information and analysis of the BID-M for Restaurant 4, cohesively portraying the data with images from the interior.

Table 13

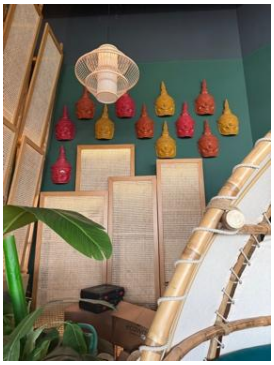
Information card for the analysis of Restaurants within the Biophilic Interior Design Matrix

Evaluation of Restaurants According to the BID-M		
Restaurant 4 **Type of Restaurant: Thai**		
BID-M	**Evaluation of BID-M**	**Images**
Environmental Features	• Natural colors of brown, beige, turquoise, pink, yellow • Motifs of water with blue, turquoise colors in the seat cushions and service bar • Natural ventilation with plants • Fire motifs from recessed lighting, hanging lamps and warm colors throughout the interior • Natural materials of wood, bamboo, rattan, marble. • Natural views indoors and outdoors	

Table 13 (Continued)

BID-M	Evaluation of BID-M	Images
Natural Shapes and Forms	• Indoor plants and light structures that mimic natural shapes and forms • Egg, oval, and tubular shaped lamps • Egg-shaped seating area which also has arches and a dome structure • Non-linear lines and curved lines on the floor where one section are wooden and the other is terrazzo. • Non-linear shapes within the lighting structure above the service bar	
Natural Patterns and Processes	• Natural lighting shifts throughout the day and lighting is dimmed at night • Windows open during evenings • Focal points of the service bar and decorative corner of hanging lamps and LED décor on the wall • Transitional space divided by flooring • Parts of a whole through a connected seating area following the entire curved wall • Complementary contrasts of turquoise and magenta • Dynamic balance and tension of the wavy lighting structure • Hierarchy and scale with long hanging lamps with an exposed ceiling	 
Light and Space	• Natural light, LED and recessed lighting • Shadows create shapes from the lamp, mimicking plants • Reflected light from tabletops • The space is narrow but built-in seating along the curved wall saves space	

Table 13 (Continued)

BID-M	Evaluation of BID-M	Images
Place-based Relationships	• Geographic, historic, and ecological connection with Thai nature, culture, and elements • Decorative features are reminiscent of Thai themes • Bamboo and rattan • Indoor greenery	 
Human-nature Relationship	• Prospect with tall windows and refuge through partially hidden seating areas through furniture or indoor greenery • Order and complexity of the decorative corner, lighting structure, and flooring design	 

(S.A. Amin, 2024)

Sustainable Interior Aspects in Relation to BID-M for Restaurant 4

Energy Efficiency within Restaurant 4 can be seen with LED lighting, natural lighting, natural ventilation with operable windows, and light dimmers during evening time. Natural lighting and the accessibility of visual views through windows relate to the BID-M element of Environmental Features. Furthermore, how light is used can relate with Natural Shapes and Forms alongside Natural Patterns and Processes due to circadian rhythms and natural shifting of light throughout the day. Additionally, the lighting is used to emphasize natural shapes such as the lighting fixture above the bar, while lamps create certain shadows due to the texture. For this reason, this relates to Light and Space, influencing how the interior is perceived.

Materials used within the restaurant are directly connected to Environmental Features and Place-based Relationships with the use of natural materials which connect with the ecology, culture, and geography of the Thai cultural aspect of the restaurant. The materials used are wood, bamboo, rattan, marble, terrazzo, and velvet. These materials are sustainable since they are durable, renewable, absorb carbon dioxide, are fast-growing, and are natural as well as eco-friendly. However, it is important to note that velvet may not always be sustainable due to production.

Space Planning can be seen similarly throughout all restaurants with open kitchens which include service bars, and a main reception area, which in this case, is a focal point, relating to the BID-M element of Natural Patterns and Processes. There is a visual connection to all areas, even if it is curved while the built-in furniture alongside the curved wall is connected to portray parts of a whole, guiding customers. The restaurant is narrow, and the middle area has curved details in wood as a transitional space, while the seating areas include terrazzo flooring to create zoning. This is another aspect of Natural Patterns and Processes. The floor-to-ceiling windows allow a visual connection with nature, and with outdoor seating and views of Al Qana, there is an indoor-outdoor relationship, relating to the BID-M Environmental Features, Light and Space, and Human-nature Relationship. Additionally, the materials and furniture are made of natural materials and shapes such as eggs, or pods for refuge purposes. This is reminiscent of the BID-M aspects of Natural Shapes and Forms as well as Place-based Relationships.

Indoor Health is relatively like other restaurants within Al Qana due to operable windows, natural lighting, cool indoors with AC, as well as visual connection with nature through indoor greenery and botanical themes. There are no

auditory aspects with no music while there is no smell either. These features relate to Environmental Features, Place-based Relationship, and Human-nature Relationship through natural ventilation and nature themes, as well as natural materials. Nature themes, motifs, and colors all tie together to connect with Natural Shapes and Forms, and Natural Patterns and Processes due to biomimicry in the lighting fixture for example, or the floor design. This relates to the BID-M of Light and Space with how lighting creates shadows or light pools within the interior, especially with the focal point lighting fixture which adds a unique aspect to the restaurant.

Well-being Interior Aspects in Relation to BID-M for Restaurant 4

Connection to Context in Al Qana restaurants consists of the same aspects since the restaurants look out and provide views of the waterfront. However, the location of the restaurant is what influences the sunlight levels, and since it is situated on the ground floor, the cantilever for the outdoor seating obstructs direct sunlight. The outdoor seating, and greenery, alongside the waterfront, allow the indoor-outdoor connection, and this relates to the BID-M aspect of Environmental Features, Human-nature Relationship, and Light and Space influencing the energetic atmosphere amongst the vivid colors.

Functional Requirements in Restaurant 4 can be considered regarding the built-in seating, allowing more use of the already narrow space and creating better mobility and functionality. However, with built-in furniture, they are less flexible, except with the isolated seating on the other side of the restaurant, which allows people the choice to choose where they wish to sit according to lighting and thermal comfort, as well as their social activities. The addition of egg-like pods allows more privacy, influencing what function the customer requires. Lighting and spatial variability of illumination, and how it impacts function relate to the BID-M aspects of Light and Space, and Human-nature Relationship. Environmental Features, and other BID-M aspects such as Natural Shapes and Forms, and Natural Patterns and Processes, are associated with sensory variability through circadian rhythms, indoor greenery, natural shapes, colors, and motifs.

Psychological aspects of well-being are mainly related to autonomy, and in this case, there is an air of intrigue and mystery present within the restaurant due to how busy it is inside. The colors are bright, vivid, and energetic, and with the floor design, and decorative Thai features, it can feel as if there are no refuge options or

privacy. However, with indoor greenery serving as partitions and visual obstructions, especially with private pods, it allows people more options to choose for seating. This is related to the BID-M aspects of Natural Patterns and Processes with transitional spaces and zoning, impacting the level of public and private spaces. For this reason, Light and Space and Human-nature Relationship through darker areas create more privacy and influence the prospect aspects of the interior.

Social well-being is dependent on seating arrangement, and with multiple options, this impacts the levels of social interaction between people. The use of built-in furniture is significant as well because the seating is closer and may allow more interaction with others. Additionally, there are outdoor seating areas that serve different social interactions for people but also allow people the choice to integrate the outdoors to the indoors. Natural Shapes and Forms as a BID-M element relate to the structure of seating arrangements through curved shapes, and an integration of nature. This can be seen in dining pods which allow more privacy and refuge, relating to Human-nature Relationship while Natural Patterns and Processes can be seen in transitional spaces and the zoning of seating.

Sensory well-being is how the interior element of the restaurant influences the senses, and this is achieved with indoor cooling, bright interiors that are energetic and busy, warm interior, no smell, natural aesthetics, and theme alongside cultural aspects, while materials are smooth, cool and soft to touch. For this reason, all BID-M components are related with sensory aspects since all interior features influence the sensory variability.

Ergonomics within Restaurant 4 are varied depending on built-in seating, which are more crowded, and some corners of tables seem to obstruct mobility. The seats all padded well, with soft textures. However, there is no flexibility of furniture due to the limitations of the interior, which is too narrow to allow furniture to move. These aspects relate to the BID-M components with Place-based Relationship and Human-nature Relationship according to comfort levels depending on natural materials, adding a tactile sensory experience as well. To display this information in table form, the sustainable interior aspects, and well-being features of Restaurant 4 are seen in (Table 14) below alongside the connection towards the BID-M.

Table 14

Information card for the analysis of Restaurants through Sustainability and Well-being within the context of BID-M

Evaluation of Restaurants through Sustainability and Well-being within the BID-M		
Restaurant 4 **Type of Restaurant: Thai**		
Sustainable Interior Aspects	**Evaluation of Sustainability Aspects**	**Connection with BID-M**
Energy Efficiency	• LED lights used in all lighting • Natural lighting • They have different lighting during the night and day • Doors open in the evenings • AC • Light is dimmed at night	• Environmental Features of natural lighting accompanied by natural outdoor views • Natural Shapes and Forms alongside Natural Patterns and Processes created through lighting depending on night or day • Light and Space elements due to natural and artificial lighting and how it impacts the interior
Materials	• Wood is durable, renewable, biodegradable, recyclable • Bamboo absorbs carbon dioxide • Rattan and wicker are sustainable due to fast-growing reasons • Marble is a natural stone • Terrazzo is highly sustainable and eco-friendly as well • Velvet on furnishing may be sustainable due to its production	• Environmental Features of using natural materials that implement nature themes • Natural Shapes and Form and Natural Processes within materials and textures • Place-based Relationship using materials found in Thailand that connect to culture and ecology
Space Planning	• There is no open kitchen, but it includes a service bar and main reception area which is a focal point • There is no open kitchen, but it includes a service bar and main reception area which is a focal point	Environmental Features and Human-nature Relationship with outdoor views of nature alongside furniture with natural materials • Natural Patterns and Processes with transitional spaces to create zones

Table 14 (Continued)

Sustainable Interior Aspects	Evaluation of Sustainability Aspects	Connection with BID-M
Space Planning	• Visual connection to outdoor views and indoor greenery • The space is narrow and due to the floor design, it does not allow flexible space planning for furniture to move around especially since the middle area is used as a transitional space • Zoning with a partially hidden dome	• Natural Shapes and Forms within the interior furniture and visual connection to natural elements • Light and Space is dependent on lighting and how it allows the space to look spacious
Indoor Health	• Operable windows • Natural Lighting • Doors are opened in the evenings and wintertime • Cool indoors with comfortable AC • There is no smell of food • Visuals of nature through indoor greenery and botanical themes • Wood, rattan, wicker, marble, and terrazzo are sound absorbing.	• Environmental Features and Human-nature Relationship • Natural Shapes and Forms, and Natural Patterns and Processes with natural motifs • Light and Space and natural lighting • Place-based Relationship with cultural themes of Thailand
Well-Being ID Framework	**Evaluation of Well-being in Interiors**	**Connection with BID-M**
Connection to Context	• Relation to natural and built environment in terms of the context glass floor-to-ceiling windows which allow views of the natural and architectural landscape • The restaurant is placed on the corner of the ground floor which receives less direct sunlight during the day • Use of natural materials	• Natural materials with Place-based Relationship, Human-nature Relationship, Environmental Features alongside how they are implemented within Natural Shapes and Forms • Connected with Light and Space due to how natural lighting influences the vibrant and energetic atmosphere
Functional Requirements	• Fulfillment of activities such as eating, drinking, socializing	• The main connection is towards Light and Space and Human-nature

Table 14 (Continued)

Well-Being ID Framework	Evaluation of Well-being in Interiors	Connection with BID-M
Functional Requirements	• With built-in seating on one side of the restaurant and separate tables on the window side, people choose where they want to sit and what type of seating they prefer • The lighting and thermal comfort varies in the interior as well, influencing functions • Most of the seating arrangements accommodate for 4 people at once with a few for a minimum of 2 people.	• Relationship through seating arrangements, spatial variability and visual accessibility of outdoor views • Environmental Features, Natural Shapes and Forms, and Natural Patterns and Processes are associated with sensory variability and its impact on functions
Psychological	• Autonomy in if a person wants to sit along the built-in furniture side or next to the wall, and there are pods for dining as well while some seating is more reclusive	• Natural Patterns and Processes, Light and Space, and Human- nature Relationship due to transitional spaces, spatial variability, and zoning
Social	• Proximity of seating • There are grouped tables of maximum 5 and minimum of 2 • Levels of social interaction are according to seating arrangements. There is less space and mobility due to the narrow area, creating less privacy	• Natural Patterns and Processes portray transitional spaces and built-in seating • Natural Shapes and Forms relate with the structure of seating arrangement such as the dining pod which allows privacy and refuge, connecting with Human-nature Relationship.
Sensory	• Doors are closed during the day and summertime, but indoor cooling is comfortable • Bright interiors allow the space to feel warm alongside warm lighting • There is no smell in the interior	• All BID-M components connect with sensory aspects since it influences the visual, auditory, olfactory, and tactile

Table 14 (Continued)

Well-Being ID Framework	Evaluation of Well-being in Interiors	Connection with BID-M
Sensory	• Natural aesthetics and themes • Materials used are smooth, cool, and soft to touch	
Ergonomics	• Built in furniture while seating is fixed due to the narrow space of the interior • Seats have comfortable padding and heights to ensure dining experience • Flexibility of furniture is limited due to the space	• Place-based Relationships with Human-nature Relationship based on comfortable and natural materials influencing the functions

(S.A. Amin, 2024)

BID-M for Restaurant 5

Natural colors such as brown, beige, and gold are reminiscent of Environmental Features. An aspect of the interior is that the AC causes condensation on the exterior which usually drips water occasionally. This, unintentionally, allows water features to be present within the interior. There is natural ventilation with indoor plants and operable windows. Fire motifs are present with warm and reflective lighting used in the restaurant bar. Additionally, natural materials such as wood, stone, and marble are used, while there are natural views of the waterfront and outdoor seating. Natural Shapes and Forms can be seen with domed and tubular hanging light pendants. Arches and non-linear lines are used in the built-in bar alongside curved brass lines on the floor. Simulation of nature is achieved with the textured walls made of stone and wooden walls. Natural Patterns and Processes refer to natural lighting, artificial lighting, and light dimmers which are used in the evenings. The main focal point is the bar which appears golden and bright. There is dynamic balance and tension present within the wooden décor on the wall and the wooden beams on the ceiling to cover the exposed ceiling.

These wooden beams add to the BID-M Light and Space to influence the scale and ratio within the interior. Additionally, the reflected light of the brass colors allows the interior to be brighter and larger. With the use of floor lights next to the walls, it mimics fire elements, creating bursts of light shadows on the wall. There is enough mobility as well with evenly divided seating. Place-based Relationship is

integrated with Mediterranean themes such as the arched bar, wooden beams, gold, and warm details in the interior as well as the earthy shades. The stone walls add landscape features, connecting with ecology and cultural style of interior design. Human-nature Relationship as a BID-M aspect can be shown with floor-to-ceiling windows, and corner seating against the wall which allows some privacy for individuals. Moreover, the wooden wall fixtures and curved floor details add order and complexity. Furthermore, (Table 15) below describes the BID-M elements of Restaurant 5.

Table 15

Information card for the analysis of Restaurants within the Biophilic Interior Design Matrix

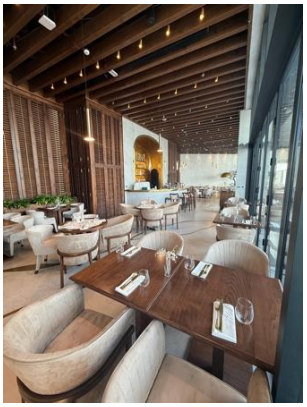
Evaluation of Restaurants According to the BID-M		
Restaurant 5 **Type of Restaurant: Mediterranean**		
BID-M	**Evaluation of BID-M**	**Images**
Environmental Features	• Natural colors of brown, beige, gold • Condensation on the AC which sometimes drips water • Natural ventilation with plants and open doors • Fire themes through warm reflected lighting in the bar area and on the floor • Natural materials such as wood, stone, marble • Natural views and indoor greenery	
Natural Shapes and Forms	• Domed lighting • Tubular formed hanging pendants • Arched bar area • Non-linear and curved lines on the floor • Simulation of nature with textured stone walls and wooden themes	

Table 15 (Continued)

BID-M	Evaluation of BID-M	Images
Natural Patterns and Processes	• Natural lighting and artificial during the day with dimming at nighttime • The bar is the focal point • Beige and brown colors • Dynamic balance and tension of the wooden décor on the wall and beams on the ceiling which cover the exposed area.	
Light and Space	• Natural light and LED lights • Shadows • Reflected light of the gold materials used in the bar area • Lights creating shadows on the wall to mimic fire • Spacious and easy mobility	 
Place-based Relationships	• Mediterranean themes with arches, wooden beams, gold and warm details, white walls, earthy tones • Landscape features with stone plastered walls	

Table 15 (Continued)

BID-M	Evaluation of BID-M	Images
Human-nature Relationship	• Prospect with floor to ceiling windows and some corner seating with refuge options • Order and complexity within the wooden wall features and curved floor details	

(S.A. Amin, 2024)

Sustainable Interior Aspects in Relation to BID-M for Restaurant 5

Energy Efficiency can be achieved with LED lighting, light dimmers, natural lighting, operable windows, turning off AC during winter seasons to open windows and allow natural ventilation. These features are within the context of the BID-M due to Environmental Features through natural views and an indoor-outdoor connection, while it is also reminiscent of Natural Patterns and Processes through natural systems and circadian rhythms brought by ventilation and lighting.

Materials are sustainable with the use of wood, marble, plaster, and concrete with brass details on the floor. The furnishing of the seating may be suede or velvet, which may not be sustainable based on production. Natural materials are mainly connected with Place-based Relationships due to natural materials which are available and most used in Mediterranean countries within interiors. Environmental Features as a BID-M aspect relates with materials as well with natural materials and implementations of natural themes alongside Natural Shapes and Forms, and Natural Patterns and Processes with how materials are used. This can be seen in the stone walls and wooden themes which simulate nature, while it creates dynamic balance and tension within the space.

Space Planning can be seen with a bar space in the interior and a visual connection with all interior aspects due to how it is an open space without obstructions. There are outdoor seating areas which create a seamless theme within the outdoor and indoor, especially with the same windows as the rest in Al Qana restaurants. The interior is narrow, but it is not narrower than other restaurants,

allowing flexibility of seating arrangements. The tables can be joined together while some are square tables, and others are round. The indoor-outdoor aspects are within the context of Environmental Features and Human-nature Relationship, alongside Light and Space since the warm lighting on the floor mimics nature and reflects pools of light on the wall.

Indoor Health is related to operable windows, natural lighting, cool indoors, the use of scent machines, and nature themes within the interior. Natural ventilation, lighting and nature motifs relate to the BID-M Environmental Features and Natural Shapes and Forms, and Natural Patterns and Processes with natural systems and circadian rhythms. Natural lighting and artificial lighting are related to Light and Space, especially with reflective lighting and light pools on the wall, mimicking fire.

Well-being Interior Aspects in Relation to BID-M for Restaurant 5

The natural and built environment in the context of Al Qana, and the Connection to Context is related to the aspects of BID-M with natural materials which allow a Place-based Relationship. With floor-to-ceiling windows that are operable and opened in winters, it allows indoor-outdoor connection which is significant in Human-nature Relationship. For this reason, Light and Space is related to Connect to Context with natural lighting and how it influences the spatial variability in terms of opening windows and allowing free movement.

Functional Requirements include the ergonomics, spacing, lighting and thermal comfort, as well as the seating arrangements. The restaurant includes separate and isolated seating which allows privacy for groups of people while the bar includes stools for individual people. The reflective light, and light-colored walls alongside plenty of lighting, it allows easier function for eating, drinking, and socializing. The seating arrangements accommodate for 4 people at once, while only some tables allow more seating since the tables are small. The BID-M of Light and Space and Human-Nature Relationship is related to spatial variability, scale, prospect, and lighting, influencing functions through illumination and thermal variability. Other aspects which involve senses relate with the BID-M of Environmental Features, natural materials, colors, motifs, and themes used within Natural Shapes and Forms, and Natural Patterns and Processes, impacting the functions.

Autonomy is significant in Psychological well-being, however, there is a lack of different seating arrangements since there are no built-in options or any space of refuge. For this reason, the BID-M element of Light and Space and Human-nature Relationship may relate due to spatial variability and the ease of visual access, lighting, and mobility.

As seen in (Table 16) below, Social well-being is dependent on seating, and there are outdoor seating areas, allowing different social interactions for people, but also providing people the chance to move easily between both spaces. The seating arrangements mostly accommodate for 4 people at one table while there is a minimum of 2 or 1 individual stool for the bar area, while in the outdoor area, there is a long table for 12 people at once. Like Psychological well-being, the BID-M aspects of Light and Space and Human-nature Relationship may connect to social well-being since spatial variability and mobility, as well as privacy between tables, allow easier social interaction.

Sensory well-being is evident within Restaurant 5 through features such as stimulation of smell through scent machines, and bright interiors that are warm, comfortable, and cozy due to wooden themes. Meanwhile, the natural materials used in the walls and ceiling emphasize natural aesthetics with indoor greenery. Although this is unintentional, the AC drips water from the ceiling, and this creates another sensory aspect. For this reason, all BID-M components are connected to sensory aspects through all interior features. Additionally, the arched lines and curved features create dynamic themes, and with smooth, cool, and soft textiles or textures, it offers different sensory aspects.

Ergonomics in Restaurant 5 include comfortable seating with padding to ensure the dining experience. The furniture is most flexible within this interior as well since there is no built-in furniture, and this allows tables to connect, and chairs to be moved around easily. There is easy mobility and evenly divided spaces to allow different functions. The BID-M aspect of Place-based Relationship and Human-nature Relationship is based on the spatial comfort, lighting, materials used, and the textures or textiles available. With some seating in the corners of the restaurant, this allows more privacy and refuge too even though those areas are more tightly arranged together. (Table 16) below describes this information cohesively through the lens of sustainable interior aspects, well-being, and its connection to BID-M.

Table 16

Information card for the analysis of Restaurants through Sustainability and Well-being within the context of BID-M

Evaluation of Restaurants through Sustainability and Well-being within the BID-M		
Restaurant 5 **Type of Restaurant: Thai**		
Sustainable Interior Aspects	**Evaluation of Sustainability Aspects**	**Connection with BID-M**
Energy Efficiency	• LED lights • Dimming at night • Natural lighting • Operable windows • Central AC but it keeps collecting condensation on the exterior of the ducts • They don't use AC during wintertime	• Environmental Features of natural lighting accompanied by natural outdoor views • Natural Shapes and Forms alongside Natural Patterns and Processes created through lighting depending on night or day, especially with light dimmers • Light and Space elements due to natural and artificial lighting and how it impacts the interior
Materials	• Wood is durable, renewable, biodegradable, recyclable • Marble is a natural stone • Suede or velvet for furnishing may be unsustainable • Plaster is sustainable and recyclable • Concrete and brass detailing on the floor	• Environmental Features of using natural materials that implement nature themes • Natural Shapes and Form and Natural Processes within materials and textures • Place-based Relationship using natural materials to Mediterranean countries which connect to culture and ecology
Space Planning	• There is no open kitchen, but it includes a bar and main reception area which is a focal point as well • Visual connection to all areas, which allows the space to be seamless	• Environmental Features and Human-nature Relationship with outdoor views of nature alongside interior details with natural materials • Light and Space is dependent on lighting and

Table 16 (Continued)

Sustainable Interior Aspects	Evaluation of Sustainability Aspects	Connection with BID-M
	• Outdoor views of Al Qana and indoor greenery • The space is narrow but there is enough space for flexibility since the square tables are joined together to create groups of tables and can be separated	how it allows the space to look spacious
Indoor Health	• Operable windows • Natural Lighting while the interior does not get direct sunlight • Doors are opened in the evenings and wintertime • Cool indoors with comfortable AC • They use a scent machine • Visuals of nature through indoor greenery and botanical themes • Concrete, marble, wood, and plaster are sound-absorbing	• Environmental Features and Human-nature Relationship with natural ventilation and nature motifs which relate to Natural Shapes and Forms, as well as Natural Patterns and Processes • Natural lighting and artificial lighting connect with Light and Space • Place-based Relationship of cultural and local themes of Mediterranean style
Well-Being ID Framework	**Evaluation of** • **Well-being in Interiors**	**Connection with** • **BID-M**
Connection to Context	• Relation to the natural and built environment in terms of the glass floor-to-ceiling windows, allowing views of the natural and architectural landscape • The restaurant is placed on the corner of the ground floor and because of the architecture, it receives less direct sunlight during the day • Use of natural materials	• Natural materials with Place-based Relationship, Human-nature Relationship, Environmental Features, relating to the context of the interior • Connected with Light and Space due to how natural lighting influences how bright the interior is
Functional Requirements	• Fulfillment of activities such as eating, drinking, and socializing	• Light and Space alongside Human-nature Relationship through seating arrangements, spaciousness and visual

Table 16 (Continued)

Well-Being ID Framework	Evaluation of Well-being in Interiors	Connection with BID-M
Functional Requirements	• With separate tables on the window side, people choose where they want to sit and what type of seating they prefer • The lighting and thermal comfort varies in the interior as well, influencing functions • Most of the seating arrangements accommodate for 4 people at once with a few for a minimum of 2 people.	accessibility of outdoor views which impacts functions • Environmental Features, Natural Shapes and Forms, and Natural Patterns and Processes influence sensory experiences, and it impact on functions
Psychological	• Autonomy to choose where a person wishes to sit based on personal preference • The seating is all the same but are differentiated based on number of seatings, circular tables or square tables • Seating near walls and corners offer more privacy and refuge	• Light and Space, and Human-nature Relationship due to spatial variability
Social	• Levels of social interaction are according to seating arrangements. • Seating arrangements consist of grouped tables of maximum 4 and minimum of 2 • The bar consists of stools • Outdoor seating allows larger groups of people with a large table for 12 people	• Social aspects are related to Light and Space, and Human-nature Relationship due to how the interior space is perceived according to mobility and seating arrangement
Sensory	• Indoor cooling is comfortable • Bright interiors allow the space to feel warm with the help of warm colored lighting • The interior is cozy because wooden details used in the walls and in the wooden beams on the ceiling • A scent machine is used • Natural aesthetics and indoor greenery	• All BID-M components connect with sensory aspects since it influences the visual, auditory, olfactory, and tactile

Table 16 (Continued)

Well-Being ID Framework	Evaluation of Well-being in Interiors	Connection with BID-M
Sensory	• Condensation from the AC sometimes drips • Materials used are smooth, cool, and soft to touch	
Ergonomics	• Seats have comfortable padding and heights to ensure dining experience • Flexibility of furniture is limited due to the space • There is no built-in furniture besides the bar	• Place-based Relationships with Human-nature Relationship based on comfortable and natural materials influencing the functions

(S.A. Amin, 2024)

BID-M for Restaurant 6

For the Japanese restaurant, the natural colors consist of brown, beige, gray, and highlights of black, and green with the use of indoor greenery. Natural ventilation is achieved with operable windows, while fire motifs are present with warm recessed lighting on the walls, ceiling LED lights, red colors in paintings, and red tissues placed on the tables. Natural materials are wood, stone, rattan, and glass and there are natural views of Al Qana. Natural Shapes and Forms are seen with botanical motifs in paintings of nature and natural elements, shapes, and forms. Non-linear lines and curves are seen in spirals and semi-circles in the paintings and floor design as well as the dome-like lights. Natural shapes are used in egg, oval, and tubular forms in the lamps and the decorative pots used as decoration. Biomimicry can be seen in the circular floor pattern and the natural shapes in paintings, and through the partitions which allow transitional spaces. Natural Patterns and Processes as an aspect of BID-M are seen with the smell of seafood to represent the culture while they play soft EDM on the speakers. They use table lamps in the evenings and dim lights for a different dining experience. The main focal point is the bar and counter which can be seen directly in the entrance. There are transitional spaces present since one side of the restaurant is dedicated to seating, and in the middle is a ‘hallway’ of sorts which leads throughout the interior. Additionally, there are partitions that hide certain seating spaces and are made of rattan. Complementary contrasts of color are using off-white and black shades, and the scale of the interior is

highlighted with the partition, exposed ceiling, and the floor-to-ceiling shelves full of décor.

As seen below in (Table 17), Light and Space elements are implemented with natural lighting, recessed lighting, and table lamps. The circular-shaped lighting creates different shadows while the interior is spacious with zoning between areas. Multiple obstructions with indoor greenery and partitions allow the space to feel more mysterious while the sense of exploration is enhanced. Moreover, dark colors with warm lighting create a comfortable environment. Place-based Relationship is achieved with rattan partitions and a 'Zen' theme reflecting Japanese culture. Additionally, they use greenery on tables and minimalistic furniture with neutral shades reminiscent of Japanese interior design. Human-nature Relationship as BID-M can be seen with the prospect of open spaces obstructed with partitions and design features that create a sense of refuge and privacy. Order and complexity are portrayed in the asymmetrical and intentional clutter of décor used on the shelves, circular patterns on the floor in some areas and clean wooden floors in others.

Table 17

Information card for the analysis of Restaurants within the Biophilic Interior Design Matrix

Evaluation of Restaurants According to the BID-M		
Restaurant 6 **Type of Restaurant: Japanese**		
BID-M	**Evaluation of BID-M**	**Images**
Environmental Features	• Natural colors through shades consisting of brown, beige, gray and highlights of green with greenery • Natural ventilation with plants and open doors • Fire motifs with warm colored recessed lighting and ceiling LED lights • Natural materials of wood, stone, rattan, and glass • Indoor natural greenery and outdoor natural views	 

Table 17 (Continued)

BID-M	Evaluation of BID-M	Images
Natural Shapes and Forms	• Botanical motifs through paintings of nature and natural elements, shapes, and forms • Spirals and semi-circles within paintings, floor design, and in the hanging lights • Eggs/oval/tubular forms in lamps and floor decorative pots • Arches and dome-like shapes in the pendant lamps, and in the paintings hung on the wall • Non-linear lines and circles within paintings and in the floor design • Simulation of nature and biomimicry in the floor pattern and paintings of natural shapes.	 
Natural Patterns and Processes	• The smell of seafood within the interior • Passage of time through natural lighting and during nights, they dim the lights • Table lamps in evenings • Calming EDM playing on the speakers • The focal point is the main bar and counter in the front of the restaurant • Transitional spaces which lead to a refuge section of the restaurant • Complementary contrasts of off-white and black • The hierarchy and scales between the partitions. Tall partitions made of rattan which are placed diagonally • Floor to ceiling shelves filled with décor	 
Light and Space	• Natural light, recessed light, and lamps • Shadows of light create circular shapes • Reflected light through materials used on the tables and floors • Spacious with the zoning of one entire area of the restaurant being the seating section. Dark colors with warm lighting create a comfortable environment	

Table 17 (Continued)

BID-M	Evaluation of BID-M	Images
Place-based Relationships	• Rattan partitions • A 'Zen' theme through pots of greenery on tables, and arched patterns with lines within wall decoration • Minimalistic furniture and neutral shades • Materials of wood and stone • Indoor greenery and outdoor views	
Human-nature Relationship	• Prospect through open spaces with hidden areas in the back, achieved through partitions and design features, creating refuge • Order and complexity within asymmetrical and intentional clutter of décor on the shelves. • The circular floor pattern in comparison to the wooden clean floors. • Wall decorative designs have patterns	

(S.A. Amin, 2024)

Sustainable Interior Aspects in Relation to BID-M for Restaurant 6

Energy Efficiency in Restaurant 6 can be seen through natural lighting, light dimmers, portable table lamps, and operable windows for natural ventilation. The BID-M aspects related to the sustainability of energy connect with Environmental Features and Light and Space because of natural lighting and natural views from all seating areas. Natural Patterns and Processes can connect with energy efficiency since the shadows created by interior elements can create shadows mimicking natural systems. The shifting of light throughout the space can affect the sense of space as well while the interior is more intimate at night compared to the daytime from light dimmers and table lamps.

Materials used in the restaurant consist of different types such as wood, rattan, and marble, which are all sustainable materials due to them being natural and fast-growing or durable and renewable. These materials relate to BID-M aspects such as Environmental Features because of natural materials that are used to implement nature themes and colors. Moreover, the BID-M of Natural Shapes and Form

alongside Natural Patterns and Processes is achieved with materials in the furniture and other interior elements to create motifs of nature such as the spiral floor design, a focal point found within the main reception and counter, and a transitional passage within the restaurant made of wood. For this reason, the BID-M aspect of Place-based Relationship is implemented as well because the materials are reminiscent of Japanese interior design and cultural features.

The Space Planning of Restaurant 6 is based on zoning and transitional spaces. There are several partitions within the area which allow there to be divisions and obstructions that create privacy and refuge. They include an open kitchen while one section of the restaurant, which is next to the window, is dedicated as a seating space, while the middle is a transitional area, and the other side is the kitchen, and staff zone. For this reason, the BID-M aspect of Natural Patterns and Processes and Human-nature Relationship are most significant through the hierarchy, scale, lighting, and prospect as well as refuge features. Furthermore, Environmental Features and Light and Space can relate to the views of the waterfront, and outdoor seating, connecting the indoor-outdoor while allowing sunlight inside.

Indoor Health is achieved within this restaurant with similar aspects such as operable windows, natural lighting, indoor cooling with ACs, calming EDM playing on speakers, and natural themes through indoor greenery and botanical themes. Environmental Features and Human-nature Relationship as the aspects of BID-M are relevant through natural ventilation and materials, alongside natural themes brought by colors and indoor greenery. The use of Natural Shapes and Forms, and Natural Patterns and Processes are significant with natural motifs and colors brought by transitional areas and partitions, while the “Zen” theme is calming and is meant to create a positive atmosphere. Additionally, the natural materials relate to Place-based Relationships.

Well-being Interior Aspects in Relation to BID-M for Restaurant 6

Connection to Context is about the natural and surrounding environment is shown in the waterfront and outdoor seating which connects both the interior and outdoor space. This is achieved through floor-to-ceiling windows while the restaurant is located on the ground floor. Additionally, the use of natural materials that are reminiscent of the cultural aspect of the restaurant relates to the BID-M of

Place-based Relationship, as well as Environmental Features and Light and Space due to lighting and visual access to the outdoors.

Functional Requirements in Restaurant 6 can be seen with built-in seating, and isolated seating arrangements, while all seating is next to the window, it allows everyone to receive the same amount of illumination, creating comfortable lighting for functionality. Most indoor seating accommodates 4 people at once, yet the tables are large, and seats can be rearranged for more. As for BID-M aspects, Light and Space are significant alongside Human-nature Relationship since lighting, and the prospect or refuge features of the interior influence privacy for customers, influencing the way they interact in the space. Environmental Features, Natural Shapes, and Natural Patterns and Processes are vital to Functional Requirements since natural themes, colors, and motifs, while the "Zen" theme of the restaurant is meant to create a calming space, allowing comfort and stress relief.

Psychological aspects of Well-being relate to the BID-M through Human-nature Relationship, Light and Space, and Natural Patterns and Processes. This is achieved through the feeling of autonomy and refuge provided by the interior, allowing people to be comfortable to choose. Additionally, there is spatial variability and order of seating which creates a simple interior and zoning as well as dividing areas.

Social well-being is like Psychological aspects of well-being with how seating arrangements influence social interaction. Lighting is unique within this restaurant can be considered unique as well with the use of light dimmers and table lamps which allow there to be intimate gatherings during evenings. For this reason, Light and Space aspects relate since the social interaction can be different in the morning versus the evening time. Place-based Relationship as a BID-M is connected to Social well-being with a Japanese theme and a calming atmosphere, which allows people to connect with the cultural themes and feel relaxed. Furthermore, the natural themes and motifs, colors, and décor are reminiscent of Natural Patterns and Processes, which impact social integration and cohesion through transitional areas. Additionally, Human-nature Relationship aspects such as prospect and refuge are significant to Social well-being alongside how there is outdoor seating to allow possible integration between the two areas.

As discussed throughout the findings, all BID-M components tie together to relate to the Sensory well-being of an interior space. These features are seen in the

operable windows, indoor cooling with ACs, bright and dark colors, warm lighting, seafood, and meat smell, calming EDM playing over the speakers, a “Zen” theme with natural aesthetics and materials that are smooth and cool to touch. Natural ventilation, indoor greenery, and red shades add pops of color within the area, creating intrigue while there are partitions and botanical motifs in décor. There are order and complexity themes as well with asymmetrical and intentional clutter of décor which is intriguing within the neat and organized interior.

As shown in (Table 18) below, Ergonomics in Restaurant 6 can be seen in built-in furniture which is fixed and has a wider seating space while the chairs are not padded and are small and simpler. Furniture is flexible as well and the restaurant is spacious enough to accommodate more people if the opportunity arises. These elements relate to the BID-M aspect of Place-based Relationship due to the use of natural materials which allow comfort and natural themes as well. Additionally, Human-nature Relationship may also correlate with Ergonomics through the way built-in furniture is used to integrate indoor greenery and allow privacy. These create more comfortable scales of furniture.

Table 18

Information card for the analysis of Restaurants through Sustainability and Well-being within the context of BID-M

Evaluation of Restaurants through Sustainability and Well-being within the BID-M		
Restaurant 6 **Type of Restaurant: Japanese**		
Sustainable Interior Aspects	**Evaluation of Sustainability Aspects**	**Connection with BID-M**
Energy Efficiency	• Natural lighting alongside warm artificial lighting • They dim lights during nighttime and evenings to create an intimate atmosphere • They use table lamps as well • Operable windows	• Environmental Features of natural lighting accompanied by natural outdoor views • Natural Patterns and Processes created through lighting depending on night or day • Light and Space elements due to natural and artificial lighting and how it impacts the interior

Table 18 (Continued)

Sustainable Interior Aspects	Evaluation of Sustainability Aspects	Connection with BID-M
Materials	• Wood is durable, renewable, biodegradable, recyclable • Paper is sustainable due to fast-growing reasons • Marble is a natural stone • Plaster and Venetian plaster	• Environmental Features of using natural materials which implement nature themes • Natural Shapes and Form and Natural Processes within materials and textures • Place-based Relationship using materials found in Japan which connect to culture and ecology
Space Planning	• There is an open kitchen • Spaces are divided using partitions to give privacy • Visual connection to outdoor views and indoor greenery • The space is narrow, but they reserve one entire section of the restaurant to be the seating areas while the middle is a transitional space • Some of the partitions include greenery which obstruct views	• Environmental Features and Human-nature Relationship with outdoor views of nature alongside furniture with natural materials • Natural Shapes and Forms within the interior furniture and visual connection to natural elements • Natural Patterns and Processes with transitional spaces to create zones • Light and Space is dependent on lighting
Indoor Health	• Operable windows • Natural Lighting • Cool indoors with comfortable AC • There is the smell of seafood and meat • Light and calming EDM is playing on the speakers • Visuals of nature through indoor greenery and botanical themes • Wood, marble, and plaster are absorbing	• Environmental Features and Human-nature Relationship with natural ventilation and nature themes through furniture • Natural Shapes and Forms, and Natural Patterns and Processes with natural motifs, colors • Natural lighting connects with Light and Space

Table 18 (Continued)

Well-Being ID Framework	Evaluation of Well-being in Interiors	Connection with BID-M
		• Place-based Relationship with cultural and local themes of Japan
Connection to Context	• Relation to natural and built environment in terms of the glass floor-to-ceiling windows which allow views of the natural and architectural landscape • The restaurant is placed on the corner of the ground floor which receives less direct sunlight during the day • Use of local and natural materials	• Natural materials with Place-based Relationship, Environmental Features alongside how they are implemented within Natural Shapes and Forms • Connected with Light and Space due to how natural lighting is related with windows.
Functional Requirements	• Fulfillment of activities such as eating, drinking, socializing • With built-in seating and separate tables on the window side, people choose where they want to sit and what type of seating they prefer • The lighting and thermal comfort varies in the interior as well, influencing functions • Most of the seating arrangements accommodate for 4 people at once with a few for a minimum of 2 people	• The main connection is towards Light and Space and Human-nature Relationship through seating arrangements, spatial variability, and visual accessibility of outdoor views • Environmental Features, Natural Shapes and Forms, and Natural Patterns and Processes are associated with sensory variability and its impact on functions
Psychological	• Autonomy in the several seating areas which are obstructed by views and allow refuge. There are many private areas through booths and partitions.	• Natural Patterns and Processes, Light and Space, and Human-nature Relationship due to transitional spaces, spatial variability, and zoning
Social	• Levels of social interaction are according to seating arrangements. • There is plenty of space and mobility while the use of partitions and indoor greenery allow there to be private areas	• Natural Patterns and Processes portray transitional spaces and how the seating connects one entire side of the restaurant • Light and Space with intimate lighting

Table 18 (Continued)

Well-Being ID Framework	Evaluation of Well-being in Interiors	Connection with BID-M
Social	• There are grouped tables of maximum 5 and minimum of 2	• Natural Patterns and Processes and Human-nature Relationship portray transitional spaces and how the seating is connecting one entire side of the restaurant • Place-based Relationship through Japanese themes
Sensory	• Doors are closed during the day and summertime, but indoor cooling is comfortable • A mix of dark and light colors allow the space to feel comfortable alongside warm lighting • There is a seafood and meat smell • EDM music • Natural aesthetics and themes • Materials used are smooth, cool, and soft to touch	• All BID-M components connect with sensory aspects since it influences the visual, auditory, olfactory, and tactile
Ergonomics	• Built in furniture while seating is fixed due to the design of the interior • Chairs are simple and do not include padding while built-in seating is more padded and comfortable • Flexibility of furniture is limited but there is enough space for movable furniture	• Place-based Relationships with Human-nature Relationship based on comfortable and natural materials influencing the functions

(S.A. Amin, 2024)

Each restaurant within an Al Qana can be seen to implement biophilic themes through the BID-M elements, focusing on the interior aspects. Moreover, the integration of sustainable interior aspects and well-being features can be seen within the BID-M to portray a distinct experience for everyone in a variety of different ways. However, the connection needs to be clearly defined to examine the relationship between the BID-M, sustainable interior aspects as well well-being interior design frameworks.

The Evaluation of the Connection Between Biophilic Interior Design, Sustainability and Well-Being

According to the evaluation of the restaurants in Al Qana, it is important to explain and describe how each aspect of BID-M relates to sustainable interior aspects and well-being in interior design. This proposed table available below in (Table 19), can be used to portray the findings in terms of their direct relationship based on how it is present within the restaurants in Al Qana. The table supports the findings of this research and highlights the basic correlation between BID-M in terms of sustainable interior aspects, then how it is related to the well-being interior design framework.

Table 19

Information card for the analysis of the BID-M in relation to sustainability and well-being in interiors

BID-M in Relation to Sustainable Interior Aspects and Well-being ID Framework		
BID-M	**Sustainable Interior Aspects**	**Well-being ID Framework**
Environmental Features	• Energy Efficiency • Materials • Space Planning • Indoor Health	• Connection to Context • Functional Requirements • Sensory • Ergonomics
Natural Shapes and Forms	• Energy Efficiency • Materials • Space Planning • Indoor Health	• Connection to Context • Functional Requirements • Sensory
Natural Patterns and Processes	• Energy Efficiency • Materials • Space Planning • Indoor Health	• Functional Requirements • Psychological • Sensory
Light and Space	• Energy Efficiency • Materials • Space Planning • Indoor Health	• Connection to Context • Functional Requirements • Psychological • Social • Sensory

Table 19 (Continued)

BID-M	Sustainable Interior Aspects	Well-being ID Framework
Place-based Relationships	• Materials • Indoor Health	• Connection to Context • Sensory • Ergonomics
Human-nature Relationship	• Energy Efficiency • Space Planning • Indoor Health	• Connection to Context • Functional Requirements • Psychological • Social • Sensory • Ergonomics

(S.A. Amin, 2024)

As seen above in (Table 19), the BID-M aspects are clearly defined as to how they correlate with sustainability and well-being. According to the findings, Environmental Features and sustainable Interior aspects are interrelated with utilizing energy-efficient features such as natural lighting, natural materials, visual connection in space planning, and the interior health of the space through visuals of nature. Meanwhile, Environmental Features relate to Connection with Context in relation to the natural and built environment, Functional Requirements and Sensory based on lighting, seating arrangements, and comfort, and Ergonomics due to how natural materials are used within the furniture and interior space.

Natural Shapes and Forms are related to all aspects of sustainability with the presence of biomimicry and simulation of nature within lighting fixtures, furniture, and interior elements, influencing spatial variability and mobility. For this reason, Indoor Health correlates with this BID-M aspect, influencing the illumination, thermal comfort, sensory features, and the natural motifs or greenery. Similarly, the well-being aspects of the natural and built environment, functionality of the space according to interior elements, and sensory features through visual connection with nature are connected to the Natural Shapes and Forms.

Natural Patterns and Processes are seen in sensory features, focal points, transitional spaces, integration of a whole, and complementary contrasts of color. These aspects relate to sustainability with how lighting shifts throughout the day, mimicking circadian rhythms. With complementary contrasts of colors and

sustainable materials, it can connect this BID-M aspect with sustainability. Furthermore, the presence of transitional spaces is evident in the planning and zoning of the interior, while indoor health is dependent on lighting and sensory comfort.

Light and Space are the natural lighting, shadows, reflected light, spaciousness, and spatial variability. These are related to sustainability with natural lighting, the finishing of materials that allow reflective surfaces, the zoning and visual connection within the space, and the interior elements that provide sensory comfort and thermal comfort through natural lighting. As for well-being in interiors, windows and natural lighting refer to the natural and built environment while lighting allows functions such as eating, drinking, and socializing to occur. Additionally, the variation between public and private areas and the sense of autonomy is relevant to the lighting and spatial variability in terms of allowing people to choose their own space and find refuge. The levels of social interaction are based on this as well since there is the possibility of social integration within the space through seating arrangements while the illumination and thermal aspects will correlate with the sensory features.

Place-based Relationships are directly related to the geographic, historical, ecological, and cultural connection through natural materials reminiscent of the country the restaurant represents. For this reason, sustainable materials are significant since they are used within the furniture, walls, ceiling, flooring, and other interior elements which make them unique. The sensory features such as visual, auditory, olfactory, and tactile can be stimulated with these features through materials, textiles, the smell of cultural food and scent machines, and cultural music. For this reason, the sensory aspects of well-being are fulfilled, while the use of local and natural materials correlates with the context of the natural and built environment. Moreover, the furniture and ergonomics are dependent on materials used to provide comfort to the user.

Human-nature Relationship is portrayed in prospect, refuge, order, and complexity. For sustainability, this is seen in natural lighting and floor-to-ceiling windows which save energy on providing lighting and allowing visual connection within the interior. These aspects are also relevant to Space Planning and Indoor Health through illumination and visuals of nature. Furthermore, operable windows allow the indoor and outdoor connection to be easily related to each other, relating to the waterfront with outdoor seating while providing indoor views of it as well. The

flexibility of the space allows easier function and mobility as well, while it allows people the autonomy to choose between public and private areas, or outdoor and indoor seating, thus impacting their levels of social interaction. With ergonomics, fixed or movable furniture, and spatial elements, the prospect and refuge can change, either opening the space or creating more private areas for people.

CHAPTER V
Discussion

Biophilic interior design can be implemented in restaurants to promote the sustainability and well-being of the people. By analyzing this, design criteria are assessed based on interior elements within all aspects of the research to be focused on. Furthermore, restaurants within the area of Al Qana are analyzed within six different types of restaurants, which allows the interior to be unique for each. Additionally, the discussion of the findings is categorized according to biophilic interior design, sustainability aspects, well-being features, and how sustainability and well-being relate to biophilic design within restaurant interiors.

By following the BID-M, the restaurants within Al Qana were evaluated based on the six principles: Environmental Features, Natural Shapes and Forms, Natural Patterns and Processes, Light and Space, Place-based Relationships, and Human-nature relationships. Since each restaurant followed a different cuisine and design based on cultural aspects, there were a variety of different ways in which biophilic design was present. According to the literature review and related research, the presence of biophilic aspects allows the customers to spend time on an enhanced dining experience which creates a welcoming and healthy atmosphere for them. Moreover, the first research question is focused on how biophilic design is implemented in restaurants.

To begin with, all restaurants followed the theme of natural colors by utilizing plenty of green shades, and especially neutrals such as brown, beige, and gray shades. This ultimately allowed people to perceive the area as including biophilic themes, especially when all restaurants emphasized indoor greenery and plants as well as botanical motifs within the design through artwork, patterns, and floor design. However, no restaurant included any aspects of water features besides visual access to the waterfront and its proximity. Despite this, blue shades were most significantly seen in Restaurant 3, implementing water themes, thus fulfilling the aspect of a water feature. Moreover, there are motifs of fire established through warm lighting and spotlights which are either placed on the floor beside the walls or on the ceiling, shining on the wall. This mimics a fireplace and allows people to perceive the space as cozy and comfortable. The gastronomy within Al Qana implements the same exterior for all restaurants, and for this reason, all windows are

floor-to-ceiling while they provide the same view of the waterfront from various perspectives. Additionally, all restaurants have a canopy or sunshade at the front where customers can sit outside to enjoy the weather and receive a better view of the waterfront. This causes there to be less direct sunlight, and because of it, the lighting is dependent on the brightness of the day and the artificial lighting used within.

With the use of light dimmers during evenings and table lamps to create an intimate atmosphere, the brightness levels and natural lighting may not be a priority of designers. This may be due to how the UAE experiences hot climates and it is less likely for people to visit restaurants during the day while the nightlife is a significant element of the lifestyle in the country. Natural elements and shapes are utilized within the interior lighting as well by using natural materials such as wood, marble, rattan, and bamboo while designing the lighting fixture in the shape of a natural element such as a seashell or a tree with hanging light bulbs. Integrating biophilic themes in this manner allows the space to feel cohesive and refreshing as well as making it unique. Botanical motifs are seen in interior décor within the wallpaper, and floor design which includes natural shapes, the presence of arches, ovals, and tubular forms, while some artwork can include natural themes. Biomimicry is apparent as well with the presence of a wavy ceiling structure in Restaurant 1, or the integration of stone-like plaster to create a natural wall feature in Restaurant 2. This is shown in the Thai restaurant through the lighting fixture, which mimics natural landscapes. Domed structures for private seating allow a sense of refuge alongside referring to natural shapes. With oval, egg-like, and tubular-shaped lamps or pots as a floor decoration, this adds scale and ratio within the area. Through high ceilings that are exposed as well, it causes the space to appear larger and more spacious.

Biophilia is also achieved with certain interior smells and auditory features to stimulate the senses. Some restaurants chose to use scents while others smelled of the cuisine, such as the smell of seafood or meat. Furthermore, the use of light music in the background added sensory stimulation. Other sensory stimulation is achieved using common natural materials like wood, bamboo, stone, marble, and rattan, which helps to add natural themes. Additionally, interiors include a focal point, whether it is a hanging garden, a natural feature such as a corner dedicated to a tree, a lighting fixture, a cultural corner, or a bar or reception counter. There can be different scales of hierarchy and scales with lighting fixtures which are all at different heights, or the use of partitions and exposed ceilings. Transitional spaces are significant within

restaurant interiors as well to implement biophilic processes since they divide the area and create zones. This is achieved through floor designs which vary according to zone or seating area or is shown with the use of glass partitions and doors to separate areas.

Natural and artificial lighting is evident in restaurants since all of them include natural lighting, even though some receive it more than others based on the placement of the restaurant itself. It is important to note that all restaurants receive no direct sunlight due to the cantilevers and sunshades on the exterior. This is because of the hot and humid climate of the country, while direct sunlight can be discomforting for people unless it is wintertime. There are outdoor seating areas for all restaurants as well, and for this reason, the interior is dependent on natural lighting during the day. Light within the interior can influence the space with the use of recessed lighting, highlighting areas, or in other cases, the materials used can be reflective, allowing light to be spread and create brighter interiors. Shadows can be created with lights as well by using patterned light fixtures which can create natural shapes, or interior obstructions such as partitions can affect the spatial variability of the space. For example, the Mediterranean restaurant uses light on the floor which reflects pools of light onto the wall, mimicking fire, thus creating a cozy and warm environment. Additionally, light influences colors and how vivid they can be during the day versus the night. If light dimmers and less lighting are used in the evenings, the space can appear darker, especially if interior colors are in darker shades. This shifting of light and its impact on the interior influences the spaciousness and mimics the circadian rhythms.

Another important aspect of biophilic design is the place-based relationship. This was dependent on the cultural aspect of the restaurant since the materials used, décor elements and some indoor greenery reflected the country the restaurant represented. Elements like Arabic lamps, Arabic music for Arabic, and lush materials reflected Arabic themes whereas Zen elements, minimalistic furniture, and calming music reflected Japanese themes. For this reason, they follow a certain style to create a unique aspect in each. For example, there are rich textiles and patterned fabrics used in the Lebanese restaurant, while in the Latin American restaurant, themes are displayed in the interior design style such as deep brown, red-like colors with rugged and textured walls. The cultural representation can be achieved in other ways as well, such as the décor in the Thai restaurant, which displays religious and traditional

aspects through wall decorations, furniture, and different phrases in Thai used as a decorative feature.

As for Human-nature Relationship, the aspects of prospect, refuge, order, and complexity are most significantly seen in the exposed ceilings, and floor-to-ceiling windows, while some seating may be reclusive to add privacy. The Thai restaurant, for example, has dining pods that are partially covered and allow customers to find refuge within the interior. In other restaurants, such as the Lebanese restaurant, they include a smoking or non-family zone which is divided by glass doors. This area is still visible, and it allows visual connection and cohesiveness within the interior. Furthermore, the use of complex features in contrast to order aspects is seen in seating arrangements which are mainly organized and follow a pattern. Meanwhile, the interior décor and features may be more clustered to add a complex and intriguing factor to add depth. Restaurant 2, the Latin American restaurant, achieves this with shelves that are full of décor, and the same can be seen in Restaurant 6, the Japanese restaurant, with the shelves that stack along one entire wall and are asymmetrical. Lighting can influence the sense of refuge as well through darker interiors, which allow people to feel more relaxed since brighter interiors cause them to be alert. However, not all restaurants provided partitions or obstructions within the interior, and most were open spaces. Despite it, a sense of refuge and intrigue in the interior was achieved with restaurant booth seating areas in Restaurant 3, or Restaurant 6, by allowing customers to feel as if they are partially closed off from the rest.

Moreover, in the first related research, the study focuses on the sense of place and biophilia using aspects such as prospect, refuge, organized complexity, integration of whole, transitional spaces, mobility, and lastly cultural and ecological attachment, which are indicators of the BID-M as well. These features were seen within the findings, which are relevant to how biophilic design in restaurants allows people to feel as if they belong in the interior, hence allowing them to feel a place attachment. This is because of the subjective way each area influences a person based on their personal experience through interior features. For this reason, their well-being is considered as a factor discussed in the literature review and in the other related research studies. This is highlighted within the research question of this thesis as well, describing how biophilic design is significant in improving well-being. For example, the second related research discusses the importance of biophilic elements

such as nature-infused features, non-visual connection with nature, lighting, and natural and organic aspects. The study emphasized the importance of ventilation, the visual aspects of nature through indoor greenery, themes, and motifs, as well as the dynamic aspects of lighting according to customers within restaurants. Other features are significant, such as the cleanliness and the views of nature, which allow people to feel calmer while proper lighting reduces headaches, allowing visual comfort. This can be seen in the findings through the presence of LED lighting, recessed lighting, and natural lighting, creating brighter spaces. On the other hand, findings show that most restaurants dim lights in the evening time and are not concerned with lighting in terms of creating a more intimate atmosphere for people. Additionally, the related research highlights how biophilic design in restaurants can be restorative, reduce stress, increase sales, and have positive health benefits while being sustainable. Especially with the use of natural materials and colors, this can be seen in the findings as well through all restaurants, which implement these within furniture, textiles, and interior elements. These materials consist of wood, marble, plaster, and concrete, all materials which are significant in indoor health in terms of acoustic and visual comfort while they are relevant to the cultural aspect of the restaurant, providing a Place-based Relationship in the context of biophilic design.

As discussed within the literature review and related research, the link between biophilic design and sustainability is achieved by the addition of natural landscaping, views of nature, energy-efficient technologies such as LED lighting and spotlights or using natural materials in lighting fixtures, natural materials, built-in and multipurpose furniture, indoor health, and the cultural aspect within the restaurant interiors. However, since the concept of sustainability in interior design is vast and may not be so easily defined, several features are chosen by researchers to evaluate in interiors, whether it's materials, energy efficiency, or the integration of indoor greenery. To connect sustainability and biophilia, the overlapping aspects consist of indoor plants, daylight, natural materials, natural colors, biomimicry, and vernacular elements. As seen in the findings of the research, the use of LED lights and natural lights was a common factor in being energy efficient as well as biophilic, especially when interior lighting was integrated to mimic fire elements to create a cozy atmosphere. Furthermore, lighter-colored interiors were brighter and did not require excessive lighting, saving energy while implementing natural colors of beige and tones of brown. LED lighting could be used to create a unique design element as

well, such as in Restaurant 3, where blue lighting and colors are directly related to water features. With windows in Al Qana being operable to open in the evening time or wintertime, this allows natural ventilation, decreasing the use of AC while enhancing the human-nature connection and remaining sustainable.

Not only is it significant to connect with the natural landscape, but it is also important in restaurants to include aspects of prospect and refuge in the space planning with open kitchens. The findings show how some restaurants did add open kitchens, or in some cases, they included a bar or service counter for customers. This creates zones within the interior, and separates the seating arrangements, especially if there are specific floor designs such as in Restaurant 4, where they implemented zoning with terrazzo and wooden floors. Space planning is significant in built-in furniture as well since it saves space in smaller restaurants while in some cases it can be biophilic through aspects of order and complexity. Additionally, partitions and indoor greenery are used to obstruct the visual accessibility of the interior, implementing themes of biophilic patterns found in nature.

Perhaps the most significant aspect of biophilic, well-being and sustainability can be seen in the sustainable aspect of Indoor Health in restaurant interiors. The features of Indoor Health consist of the presence of operable windows, ventilation, thermal comfort, sensory comfort, acoustics, and the visuals of nature. It can be stated that with operable windows allowing natural ventilation and sunlight while connecting with the context of the space through outdoor seating and the waterfront, it is sustainable, biophilic, and enhances well-being. Some restaurants in the findings include other sensory stimulation such as scent machines which exude a pleasant smell for customers, while others integrate auditory stimulation through music. Cultural themes in interiors are related to the Place-based Relationship, allowing people to feel connected with the space according to the country the restaurant represents, especially with the smell of the cuisine as well. Indoor greenery serves as a refreshing element providing visual comfort and is pleasant to smell. According to the literature review and related research, these aspects are related to well-being and create healthier, sustainable environments. Similarly, the integration of natural materials relates to multiple aspects of biophilic design while it is sustainable and adds to the well-being of customers by creating a tactile and visual experience. Furthermore, natural materials are used within furniture, impacting the functionality and sensory aspects of well-being, and the space planning of sustainability. This

influences how flexible or movable the furniture is within the space, creating the possibility of furniture being rearranged for seating and relating to the functional qualities. Moreover, the sensory qualities of well-being are most relevant to the BID-M due to how all interior aspects can determine how an individual experiences a space. These interior elements consider the lighting, shadows, circadian rhythms, colors, themes, natural motifs, the smell of nature, the sounds or music within the restaurant, the thermal variation, and the tactile aspects. Considering how natural themes are vital to restorative environments, the integration of biophilic themes in restaurants can be sustainable and enhance well-being by utilizing natural lighting, natural materials implemented in furniture, walls, flooring, and lighting fixtures, alongside indoor greenery.

Furthermore, the well-being and biophilic features of floor-to-ceiling operable windows are significant in relation to the context of the restaurant, and in the case of Al Qana, the restaurants all face the waterfront, hence the ability to connect the indoor and outdoor spaces. With outdoor seating as well, there is a sense of autonomy, allowing people the choice to stay indoors or outdoors while also giving them the possibility of integration between the two areas. It causes the space to appear larger, creates zones, and psychologically allows them to feel a sense of refuge or privacy if they remain in secluded seating areas. This impacts the levels of social interaction as well as social well-being, and in a restaurant, the main activity is to dine and socialize with people in the same environment. Since socializing and dining may be dependent on space planning due to seating arrangements, it provides better comfort for people to have easier mobility alongside proper ergonomics. From the findings, this is seen in a variety of methods, and more typically with tables that accommodate four people per table and by joining tables together to create flexibility in rearranging furniture. By using comfortable furniture and padding, it endorses ergonomics, thus allowing better interaction between people and providing comfort.

The findings show how biophilic design and sustainability are closely related through all interior aspects of efficient energy use, natural materials, spatial variability, and indoor health. This is evident within BID-M elements such as Environmental Features, Natural Shapes and Forms, Natural Patterns and Processes, and Light and Space. As for well-being and biophilia, not all well-being aspects are met with biophilia, yet the most significant BID-M elements were Light and Space, and Human-nature Relationship. In terms of well-being, the connection between the

natural and built environment, functionality within the space, psychological aspects, social well-being, and sensory were interrelated the most with BID-M elements. For this reason, the biophilic design criteria are related to sustainable interior aspects and well-being in interior design, while all three can be interrelated to create restaurant interiors that are sustainable and enhance the well-being of customers.

CHAPTER VI
Conclusion and Recommendations

This chapter portrays the conclusions based on the findings from the Al Qana restaurants, while the objectives and sub-objectives acquired from the research will be highlighted. Moreover, the findings retrieved from the research will produce recommendations for those who wish to pursue further research on the topics of biophilic interior design, sustainable interiors, and well-being within interior spaces. This chapter aims to finalize and depict concluding thoughts through a review of the research results and providing suggestions for interior designers aiming to apply or research these aspects in the practical or theoretical field.

Conclusion

The concept of creating healthier indoor spaces has risen due to the concerning factors of urbanization, and daily stresses from work and studies, alongside the aftermath of the 2020 pandemic, while the objectives of implementing sustainability, well-being, and biophilic design have grown to be an integral part of interiors. With the rising trend of biophilia, there has been considerable research conducted within the health industry because of its positive influence on the health and well-being of patients, while it is investigated in the educational field as well for the enhancement of productivity and creativity in students. However, the hospitality sector remains unexplored, followed by other applications of biophilic design in interior spaces such as commercial sectors. To explore how biophilic design should be implemented in interiors, it is vital to follow the Biophilic Interior Design Matrix because it enables interior designers to remain focused on guidelines. This is significant in analyzing how sustainability and well-being can be enhanced.

To reiterate, this thesis evaluates and assesses the relationship between biophilic design, sustainability, and well-being, investigating the impacts and the context of the subject matter within sustainable interiors and well-being in restaurant interiors. Al Qana is a tourist spot located in the heart of the capital city Abu Dhabi, and it aims to be a location where people spend their leisure time in the various activities available such as dining, socializing, or exploring the aquarium and other recreational spaces. As for their dining hubs, biophilic design within their restaurant interiors relates to sustainability and well-being. This can be seen in (Table 19),

depicting the BID-M elements within the context of sustainable interior aspects and the well-being interior design framework. This is significant because the study sought to discuss these relationships and through the findings, the results have shown that biophilic design can be used as a tool to contribute to and enhance sustainability and well-being.

Considering the research, it can be said that biophilic design is integrated within the restaurants by incorporating cultural aspects according to the cuisine and overall themes, which allows each restaurant and dining experience to be unique. The restaurants chosen to be assessed included different themes such as Lebanese, Latin American, American, Thai, Mediterranean, and Japanese. These restaurants were investigated to analyze how the BID-M can be implemented in interiors. The BID-M served as the main tool to evaluate the biophilic interior aspects, the sustainable interior aspects, and well-being features. This research has shown a comprehensive analysis as to how the BID-M can be used to create sustainable interiors that increase the well-being of people and has shed light on how biophilic design can be implemented in restaurant interiors, a place of leisure for people.

The evaluations through findings have revealed how biophilic themes can be integrated into all interior elements such as colors, materials, indoor greenery, lighting, biomimicry, patterns found in nature, motifs of nature, animal motifs, water motifs, and lighting. Since all restaurants include operable windows that open during evenings and wintertime, this creates an indoor-outdoor connection while all restaurants provide outdoor seating as well. This is significant because the objectives of Al Qana are to integrate sustainability and create sustainable spaces for residents and tourists. Through natural lighting and ventilation, there is no need for AC and additional lighting to create brighter interiors. It is also more common for residents to spend their leisure time in the evenings while the nightlife is more vibrant, which is evident in the accessibility of indoor and outdoor seating and operable windows. For this reason, biophilic design, natural materials, and colors, as well as motifs can relate to both sustainability and well-being by creating restorative environments that induce positive health benefits. With proper space planning, seating arrangements that accommodate customers, and easier mobility, zoning is significant in creating private areas for people, giving them the autonomy to make choices as well. Another vital aspect is the sensory experience and indoor health of the restaurant. Since the restaurants represent a country, the dining experience can be distinctive through

cuisine and interior elements such as the visuals of indoor greenery or natural motifs, outdoor views of nature, lighting, thermal comfort, cultural décor or interior design styles, scents, and cultural music. This allows customers to connect with the space by providing a comfortable atmosphere in which they can relax and socialize. Furthermore, the study cohesively describes the importance of biophilic design in interiors, and how it can contribute to sustainability and well-being. These aspects are interrelated, and according to the results of the evaluation, can be implemented in a variety of ways. It can also be stated that the concepts can overlap in aspects since biophilic design influences sustainability and well-being in interiors, while sustainable interiors take biophilia and well-being into consideration, and lastly, well-being in interiors can be achieved through biophilia and sustainable elements.

As a result of the research, the significance of biophilia within interiors is highlighted since it is directly connected to achieving both sustainability and well-being. Incorporating biophilic design and the BID-M within leisure spaces can allow customers to restore themselves to a sustainable environment catered to their well-being by dining in a healthy atmosphere. Since restaurants are distinct in theme and style, it is possible to integrate biophilic design using natural and local materials, colors, ecology, and sensory features. Moreover, this study fills the gaps in previous research by implementing the BID-M, sustainable interior aspects as the well-being interior design framework, which have not been thoroughly applied in the context of hospitality and restaurants. Therefore, this research serves as a model for future research within the subjects of biophilic design, sustainability, and well-being in interiors, emphasizing a focus on the gastronomy sector.

Recommendations

This research emphasizes focus on interior elements in biophilic design, sustainability, and well-being, an aspect which isn’t explored as significantly as it is in the field of architecture. For this reason, the BID-M elements were chosen while the interior aspects of sustainability and well-being were assessed within the restaurant interiors. According to the literature review and related research, the case may be that in terms of sustainability especially, there is no one specific guideline or indicator that identifies the qualities of sustainability within interior spaces. However, because of this, it is crucial to consider the context of the interior as well since the restaurant interiors may implement sustainability focused on some features

such as energy efficiency or indoor greenery. Consequently, the importance of investigating the case area is vital to assess the criteria of sustainability.

Another aspect that is important to consider is how the United Arab Emirates consists of strict rules and regulations. In the case of acquiring contact with interior designers and such, it is often to be unsuccessful unless there are personal connections while it is rare to find a willing company who will offer to give out information about their projects. It is suggested that when investigating interior spaces, it may be better to find companies that are willing to share their process to allow a more thorough evaluation based on construction, material selection, and technical aspects.

Recommendations According to Findings

The main concern in terms of biophilic, sustainable, and well-being focused interiors is how the tools and guidelines of the concepts are vague when there is a lack of proper education and knowledge of the subject matter. Therefore, there can be gaps in the design of the interior space and despite the presence of biophilia, sustainability, and well-being indicators, there is no way to implement them in the same manner in all interiors. This is especially the case when restaurants are focused and portray a theme based on the cuisine and ambiance they wish to implement. Furthermore, some aspects aren't as evidently seen within the findings of the restaurant interiors in terms of either biophilic, sustainable, or well-being indicators. It is important to state where the interior elements of the restaurants can be improved according to these aspects and the research findings to aid designers in the future who may find this information useful. The literature review and related research have provided information and knowledge on the beneficial and positive impact of biophilic themes, sustainable integration, and well-being within interiors. For this reason, these will be highlighted below as aspects that can be added to restaurants. As a result, the findings from the thesis research suggest recommendations:

- The interior of a restaurant is primarily dependent on the theme, and because of this, the cultural features and interior design style should be considered when designing a restaurant that is biophilic, sustainable, and enhances well-being.
- The restaurants do not include water features such as indoor waterfalls or the sound of water trickling. Since the location is a waterfront, perhaps it may be enough to provide a visual accessibility to it, however, the effects of an indoor

water feature and blue color themes have shown to be a positive and beneficial factor in well-being.

- Creating spaces that offer zoning through partitions, indoor greenery, and floor design, providing refuge areas for people to feel as if they are in their private bubble of safety.
- Although canopies and sunshades help provide thermal and visual comfort, perhaps it may be intriguing to influence natural lighting by adding natural motifs on the operable windows through decals to add shadows that mimic natural systems within the interior.
- Artificial lighting in the interior can be programmed to shift and change throughout the day by changing colors or changing direction. This mimics circadian rhythms.
- A few of the restaurants didn't implement music or scent features to allow a Place-based Relationship to the interior. This is beneficial to the sensory experience by playing cultural music or sounds that mimic the geographical and ecological features of the country the restaurant represents.
- The UAE experiences hot and humid climates, while it is typically sunny, and utilizing solar energy could save energy on HVAC systems and lighting within the restaurant interiors.
- It is suggested to implement minimalist and flexible seating to allow easier movability in the case of space planning. It is also significant to integrate multipurpose furniture which can be used for multiple functions. This includes adjustable chairs and tables for different heights.
- Providing a variety of seating options impacts the social and functional requirements as well through built-in seating, which saves space, and separate tables which can be joined together to allow flexibility.
- Integrating reflective surfaces in the interior to allow the space to appear larger and brighter, adding color and mimicking aspects of water reflecting the surroundings
- The use of focal points can be more calming if there are natural themes, such as the tree nook in the Latin American restaurant, or the hanging garden in the Lebanese restaurant. Indoor greenery, which is reminiscent of the cultural and

ecological aspects of the restaurant can be biophilic, sustainable, and enhance the well-being.

- Mimicking fire motifs through warm lighting and recessed lighting such as in the Mediterranean restaurant which applies spotlights on the ground next to the wall using orange lighting.
- Using light dimmers and intimate lighting in the evenings to create a more comfortable atmosphere while saving energy alongside timers or motion sensors in lighting.
- Adding and implementing natural materials that relate to the ecology of the country the restaurant represents and utilizing them within lighting features using rattan or bamboo to create shadows in the interior.
- Integrating natural shapes, patterns, and forms with oval, egg-like, tubular, arches, domes, and non-linear shapes within lighting fixtures, floor design, furniture, and décor.
- To integrate natural and botanical motifs or shapes, wallpaper with nature themes can be applied to the walls, or the use of paintings and wall decoration.
- Not all restaurants provided an open kitchen while some included bars or service bars. The use of open kitchens allows visual cohesion and connectivity towards the interior.
- Another aspect not seen within the restaurants is animal motifs, which are part of natural systems. Restaurant 3 with the American-focused theme included a motif through a cow design feature while there were stripes in the wallpaper design. However, animal motifs can be used in textiles, décor, or patterns in interior elements to display natural themes.

Recommendations for Further Research

- In future research, it is advised to explore the other factors other than design-centered which impact their relationship with the space. This is because the experience of an individual is based on their personal preferences while some can be exposed to sensory overload and may feel overstimulated.
- The dining experience can be a focus of the topic in biophilic, sustainable, and well-being restaurants because the impact on the customers is what provides insight into the subject matter.

- Although the restaurants represent a certain cultural theme according to the country and cuisine, the scope of the research can be expanded by exploring how a certain cultural theme can be implemented within biophilic restaurants around the world. In this case, perhaps it will be a guideline as well to study a certain cultural theme and how it can integrate biophilic design within the country it represents as well. For example, investigating Thai-themed restaurants with biophilic features in the country of Thailand. It is significant in sustainability as well since the materials will be local, and pollution from transport is not an issue.
- Further research may serve to propose a design of a biophilic restaurant using a 3D model that implements sustainable and well-being features in the interior as well. In doing so, it can be a way in which interior designers can apply these concepts visually through research and in a practical manner since applications can be different in theory in contrast to the construction process. Additionally, the idea of virtual reality can be utilized to study how people feel within this environment, obtaining their perspectives on biophilic and well-being particularly.
- To identify the validity of the BID-M in the context of sustainability and well-being, further research within other interior spaces such as commercial, residential, educational, and healthcare industries can be investigated. This can help promote sustainability within educational spaces in terms of educating adolescents and aspiring designers about the importance of sustainable practices while enhancing their well-being.
- There can be further research conducted on the relationship between sustainability in the context of biophilia and well-being or the relationship between well-being in the context of biophilia and sustainability. Moreover, the concepts can be more focused on how BID-M connects sustainable interior aspects and well-being to create one guideline and tool to apply all three aspects together.
- In future studies, the topic can be evaluated in a more detailed manner by exploring how economically sustainable the energy efficiency of lighting and thermal comfort in restaurants is. Lighting is a key feature of biophilic design, well-being, and sustainability due to implementing circadian rhythms, meeting functional requirements, and energy efficiency. Similarly, acoustic comfort can

be assessed through soundscapes of interior natural materials or sensory features such as the sound of water and other natural processes.

- The use of technology in restaurants can be utilized with projections and screens within the interior to allow customers to feel as if they are in a natural environment. For example, auditory aid of sounds of nature while the interior either includes screens or projections of natural imagery to help customers be fully immersed in the biophilic environment.

References

Abdel, H. (2020, June 11). *Honeycomb Mosque / Andyrahman Architect.* ArchDaily. https://www.archdaily.com/941347/honeycomb-mosque-andy-rahman-not-ready

Abu Dhabi. (n.d.). 2gis.ae. https://2gis.ae/dubai?m=54.756359%2C24.560894%2F9.25 Date of Access: 28/11/2024.

Abu Kasim, J., Mohd Yusof, M. J., & Mohd Shafri, H. Z. (2019). The Many Benefits of Urban Green Spaces. *CSID Journal of Infrastructure Development*, *2*(1), 103. https://doi.org/10.32783/csid-jid.v2i1.47

Al Qana, the Perfect Portrait of Architectural Simplicity in Abu Dhabi. (2022). Porcelanosa. https://www.porcelanosa.com/trendbook/en/al-qana-project-winner-pipa/

Al Qana. ICON. (2023). https://iconspaces.com/project/al-qana-waterfront mixed-use/ Date of Access: 28/11/2024.

Alkilany, A. (2021). Sense of Place in Biophilic Interior Spaces: A Case Study of Jordan. Near East University Grand Library. https://docs.neu.edu.tr/library/9321590186.pdf

Almusaed, A., Alasadi, A., & Almssad, A. (2022). A Research on the Biophilic Concept upon School's Design from Hot Climate: A Case Study from Iraq. *Advances in Materials Science and Engineering*, *2022*, 1–12. https://doi.org/10.1155/2022/7994999

Andreucci, M. B., Loder, A., McGee, B., Brajković, J., & Brown, M. (2021). Exploring Regenerative Co-benefits of Biophilic Design for People and the Environment. *Future City*, 391–412. https://doi.org/10.1007/978-3-030-75929-2_21

Aybek, G., & Özdemir, B. (2022). Effects of ethnic restaurant experience on prospective tourist intentions: Mediating role of food image. *Tourism Management Perspectives*, *44*, 101034. https://doi.org/10.1016/j.tmp.2022.101034

Barbato, M., Al Hemeiri, S., Nafie, S., Dhuhair, B. A., & Dabbagh, N. T. (2021). Characterizing individuals accessing mental health services in the UAE: a focus on youth living in Dubai. *International Journal of Mental Health Systems*, *15*(1). https://doi.org/10.1186/s13033-021-00452-4

Barbiero, G., & Berto, R. (2021). Biophilia as evolutionary adaptation: An onto- and phylogenetic framework for biophilic design. *Frontiers in Psychology*, *12*. https://doi.org/10.3389/fpsyg.2021.700709

Beautiful Restaurant in Goa, India Made From Invasive Shrubs and Bamboo | Moss and Fog. (2024). Moss and Fog. https://mossandfog.com/beautiful-restaurant-in-goa-india-made-from-invasive-shrubs-and-bamboo/

Biophilic Design in Hospitals: The Importance of Natural Light in the Health of Patients. (2021). ETKHO Hospital Engineering. https://www.etkho.com/en/biophilic-design-in-hospitals-the-importance-of-natural-light-in-the-health-of-patients/

Boever, N. (2022). *12 Gorgeous Biophilic Interiors Epitomize "The Great Indoors" | DesignWell*. DesignWell. https://designwell365.com/design/commercial-education/12-gorgeous-biophilic-interiors-that-epitomize-the-great-indoors/

Browning, W., Ryan, C., & Clancy, J. (2014). *14 Patterns of Biophilic Design. Improving Health & Well-being in the Built Environment*. http://www.terrapinbrightgreen.com/wp-content/uploads/2014/04/14-Patterns-of-Biophilic-Design-Terrapin-2014e.pdf

Burca, J. D. (2023). *Transform Your Living Space with Biophilic Home Design*. Constructive Voices. https://constructive-voices.com/biophilic-home-design-2/

Cooper, L. (2021). *Dissertation Wellness in Interior Design. Can You Promote Wellness through Interior Design*. Academia. https://www.academia.edu/71732810/Disseration_Wellness_in_Interior_Design

CSR. (n.d.). Al-Qana. https://alqana.ae/en/csr. Date of Access: 25/11/2024.

Cvetanovic, A., Kekovic, A., & Stankovic, D. (2019). The Biophilic Approach in Interior Design: Reconnecting Indoors With Nature. PhiDAC 2019. https://www.researchgate.net/publication/342448131_The_Biophilic_Approach_In_Interior_Design_Reconnecting_Indoors_With_Nature

Dalay, L. (2020). The Impact of Biophilic Design Elements On The Atmospheric Perception Of The Interior Space. *International Journal of Landscape Architecture Research*, *4*(2), 4–20. https://ijlar.org/index.php/ijlar/article/view/476/401

Fayaz, O. (2022). *Fundamentals of Interior Design: 7 Basic Principle of Interior Design*. IIAD. https://www.iiad.edu.in/the-circle/7-basic-principle-of-interior-design/

Gaekwad, J. S., Anahita Sal Moslehian, & Roös, P. B. (2023). A meta-analysis of physiological stress responses to natural environments: Biophilia and Stress Recovery Theory perspectives. *Journal of Environmental Psychology*, *90*, 102085–102085. https://doi.org/10.1016/j.jenvp.2023.102085

Marquez, G., Jamieson, I., & Puris Sornsaruht. (2022, June). An Investigation into Factors That Affect the Wellbeing of Overseas Filipino Workers Within Filipino Restaurants in Bangkok. *13th Built Environment Research Associates Conference, BERAC2022* (pp.555-564). https://www.researchgate.net/publication/367090341_An_Investigation_Into_Factors_That_Affect_The_Wellbeing_Of_Overseas_Filipino_Workers_Within_Filipino_Restaurants_In_Bangkok_An_Investigation_Into_Factors_That_Affect_The_Wellbeing_Of_Overseas_Filipino

Gastoldi, M. (2023). *Why Biophilic Design Is Crucial in the Workplace and Beyond.* Gensler. https://www.gensler.com/blog/why-biophilic-design-is-crucial-in-workplace

Heath, O. (2016). *Biophilic Retail Spaces*. Human Spaces. https://blog.interface.com/biophilic-retail-spaces/

Heath, O., Jackson, V., & Goode, E. (2018). *Creating Positive Spaces Using Biophilic Design*. DesignLab. https://globalwellnessinstitute.org/wp-content/uploads/2018/12/biophilicdesignguide-en.pdf

Ibrahim, I. L., Khairuddin, R., Jain, A., Othmani, N. I., Mustapa, N. D., Mohamad, J., & Awang, A. (2024). Enhancing Customer Dining Experience Through Biophilic Design: A Case Study Analysis of Restaurants. *BIO Web of Conferences*, *131*, 05011. https://doi.org/10.1051/bioconf/202413105011

Kansal, S., & Rana, D. P. (2024). Bringing Nature Indoors: Exploring the Impact of Biophilic Interior Design in Restaurants. *International Journal of Architecture and Infrastructure Planning*, *10*(1). https://doi.org/10.37628/ijaip

Kilmer, R., & W Otie Kilmer. (2024). *Designing Interiors*. John Wiley & Sons. https://books.google.com.cy/books?id=8RUaEQAAQBAJ&dq=introduction+to+interior+design&lr=&source=gbs_navlinks_s

Kineber, A. F., Massoud, M. M., Hamed, M. M., & Qaralleh, T. J. O. (2023). Exploring Sustainable Interior Design Implementation Barriers: A Partial Least Structural Equation Modeling Approach. *Sustainability*, *15*(5), 4663. https://doi.org/10.3390/su15054663

League, L. (2023). *Human Behavior and the Designed Environment.* Qpractice. https://www.qpractice.com/human-behavior-designed-environment/

Lindern, E., Lymeus, F., & Hartig, T. (2017). The Restorative Environment: A Complementary Concept for Salutogenesis Studies. National Library of Medicine; Springer. https://www.ncbi.nlm.nih.gov/books/NBK435817/

Liu, Y., Zhang, J., Liu, C., & Yang, Y. (2024). A Review of Attention Restoration Theory: Implications for Designing Restorative Environments. *Sustainability*, *16*(9), 3639–3639. https://doi.org/10.3390/su16093639

Loho, P. (2022). *Inside a Biophilic Restaurant High Above Mexico City*. Metropolis. https://metropolismag.com/projects/dining-in-a-garden-56-stories-above-mexico-city/

McGee, B., and Marshall-Baker, A. (2015). Loving nature from the inside out: a biophilia matrix identification strategy for designers. *HERD: Health Environ. Res. Des. J. 8*, 115–130. https://doi.org/10.1177/1937586715578644

M. O'Reilly, T. (2018). Sustainable Interiors: Green Design Methods and its Influence on Ecopsychology. Fordham University. https://research.library.fordham.edu/cgi/viewcontent.cgi?article=1053&context=environ_2015

Mackie, A. (2024). *The Six Principles of Biophilic Design*. Vera Iconica Architecture. https://veraiconica.com/the-six-principles-of-biophilic-design/

Mahmoud, M. (2021). Beyond Sustainability-Towards Restorative Interior Spaces Through Biophilic Design. *International Journal Of Advanced Research On Planning And Sustainable Development*, *4*, 8–44. https://ijarpsd.journals.ekb.eg/article_236587_bd2869d25d6b202fb31d5e443dc47ad7.pdf

Mannapova, N. R. (2020). View of Organization And Basic Requirements For Restaurant Design Interior. *International Journal of Innovations in Engineering Research and Technology*, *7*(5). https://repo.ijiert.org/index.php/ijiert/article/view/385/362

Marselle, M. R. (2019). Theoretical Foundations of Biodiversity and Mental Well-being Relationships. *Biodiversity and Health in the Face of Climate Change*, 133–158. https://doi.org/10.1007/978-3-030-02318-8_7

Martínez-Soto, J., de la Fuente Suárez, L. A., & Ruiz-Correa, S. (2021). Exploring the Links Between Biophilic and Restorative Qualities of Exterior and Interior Spaces in Leon, Guanajuato, Mexico. *Frontiers in Psychology*, *12*. https://doi.org/10.3389/fpsyg.2021.717116

Mehta, V. (2022). *6 Indian Restaurants in Dubai to Bookmark For Your Next Visit to the Emirate*. Architectural Digest India. https://www.architecturaldigest.in/story/relish-culinary-genius-and-local-flavours-at-these-6-indian-restaurants-in-dubai/

Myers, S. (2018). *Super Stylish Restaurants That Will Inspire Your Kitchen Makeover*. ELLE Decor. https://www.elledecor.com/design-decorate/room-ideas/g24513744/best-restaurant-designs/

MZ Architects Discuss Abu Dhabi's "Daring" Al Qana Waterfront Development. (2019). Commercial Interior Design. https://www.commercialinteriordesign.com/projects/45732-mz-architects-discuss-abu-dhabis-daring-al-qana-waterfront-development

O'Keefe, S. (2022). *Natural Selection: Biophilia in Education*. Learning By Design. https://pubs.royle.com/publication/?m=31173&i=743809&p=34&ver=html5

Oduncu, C. (2020). Questing Role of Landscaping on the Visual Quality of Public Indoor Spaces Based on the User Reactions: Case of Restaurants. *Eastern Mediterranean University Institutional Repository.* http://i-rep.emu.edu.tr:8080/xmlui/bitstream/handle/11129/5674/Oduncucemile.pdf?sequence=1

Onay, N. S. (2019). Evaluation of Design Approaches for Wellbeing in Interiors. *Journal of Engineering and Architecture*. https://www.academia.edu/39704341/Evaluation_of_Design_Approaches_for_Wellbeing_in_Interiors

Onay, N. S., & Minucciani, V. (2018). Well-being Framework As a Contributor to Sustainability. *WIT Press*. https://doi.org/10.2495/SDP180591

Pacaso. (2024). Types of Interior Design: An Overview + Trends for 2022. https://www.pacaso.com/blog/types-of-interior-design

Ross, C. (2023). *Interior Design Trends: What is a Biophilic Interior Design Style?* Coco Ross Design. https://www.cocorossdesign.com/post/interior-design-trends-what-is-a-biophilic-interior-design-style

S.N., C. A., N., K., S.N., H., M.Y., H., S.I, A. S., & A., A. (2024). Conceptual framework of sustainable interior design (SID) criteria and components to hotel's operational performance effectiveness. *IOP Conference Series: Earth and Environmental Science*, *1361*(1). https://doi.org/10.1088/1755-1315/1361/1/012051

Sakalasooriya, N. (2021). Conceptual Analysis of Sustainability and Sustainable Development. *Open Journal of Social Sciences*, *09*(03), 396–414. https://doi.org/10.4236/jss.2021.93026

Şenel, P., & Yılmaz, H. (2020). Concept Restaurants as a Restaurant Type. *Journal of Tourism, Leisure and Hospitality*, *2*(1), 22–28. https://dergipark.org.tr/en/download/article-file/1157777

Singhal, N. P. (2024). A Study on the Implementation of Eco-Friendly Design Techniques in Hospitality Space (Restaurant). *World Journal of Advanced Research and Reviews*, *24*(2), 705–712. https://doi.org/10.30574/wjarr.2024.24.2.3271

Soerjono, E. A., & Primadani, T. I. W. (2024). Sustainable Interior Design in Restaurants by Applying Lumajang Locality Elements. *IOP Conference Series. Earth and Environmental Science*, *1324*, 012036–012036. https://doi.org/10.1088/1755-1315/1324/1/012036

Suess, C., Legendre, T. S., & Hanks, L. (2024). Biophilic Urban Hotel Design and Restorative Experiencescapes. *Journal of Hospitality & Tourism Research*. https://doi.org/10.1177/10963480241244720

Symons, M. (2013). The rise of the restaurant and the fate of hospitality. *International Journal of Contemporary Hospitality Management*, *25*(2), 247–263. https://doi.org/10.1108/09596111311301621

Templeton, A. (2011). Thesis Perceptions of Practicing Interior Designers: Motivations That Encourage Their Sustainable Design Practices. Mountain Scholar. https://api.mountainscholar.org/server/api/core/bitstreams/8cd55460-1d74-4fae-b8a5-32d9f96a6f90/content

The Application of Biophilic Design. (2024). Verde Profilo. https://verdeprofilo.com/en/the-application-of-biophilic-design/

The Gastronomy of Tomorrow. (2019). Al Qana. https://alqana.ae/en/news-updates/gastronomy-tomorrow

The Heartbeat of Abu Dhabi. (n.d.). In Al Qana. https://alqana.ae/sites/default/files/English-Brochure-NEW.pdf Date of Access: 25/11/2024.

Statista (2024). *Restaurants and food service in GCC.* https://www.statista.com/topics/8291/restaurants-and-food-service-in-gcc/#topicOverview

Tov, W. (2018). Well-Being Concepts and Components. Institutional Knowledge at Singapore Management University. https://ink.library.smu.edu.sg/cgi/viewcontent.cgi?article=4093&context=soss_research

Tuzunkan, D., & Albayrak, A. (2016). The Importance of Restaurant Physical Environment for Turkish Customers. *Journal of Tourism Research & Hospitality*, *05*(01). https://doi.org/10.4172/2324-8807.1000154

Varnam, R., & Kodali, S. (2023). Environmentally Sustainable Interior Design. *Encyclopedia of Green Materials*, 1–9. https://doi.org/10.1007/978-981-16-4921-9_219-1

Venturini, B. (2021). *What is Biomimicry?* EHL Insights. https://hospitalityinsights.ehl.edu/what-biomimicry

Zhong, W., Schröder, T., & Bekkering, J. (2021). Biophilic design in architecture and its contributions to health, well-being, and sustainability: A critical review. *Frontiers of Architectural Research*, *11*(1), 114–141. https://doi.org/10.1016/j.foar.2021.07.006

Appendices

Appendix A

Similarity Report