

Towards a methodological approach to apply Biophilic Interior Design in hospitality spaces A Case study based on Emotional Design

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ABSTRACT:

The impact of Biophilic design on users resulted from the relation between human biology, built environment and the surrounding nature of the establishment which enhanced user psychological and physiological health. Understanding the user needs to evoke positive feelings through certain design criteria is based on the recommendations of previous studies. For example: Francis (2016) explained that there is a need to find a tangible tool to measure the impact of biophilic design in hospitality spaces. Brey (2016) called for further research based on case studies to develop a methodological approach that aids design for well-being. Moreover, Terrapin Bright Green (2014) suggested developing more integrative biophilic design strategies. Consequently, this paper aims to enlighten the impact of biophilic design on the users in hospitality spaces. The main purpose of this research is to develop a methodological approach of biophilic interior design in hospitality spaces to gain a unique user experience. Based on the following methodological approaches user centered-design and case study of Four Seasons Sharm el shiehk were examined. The results revealed a design process formed of four stages based on a matrix between 14 patterns of biophilic design and 5 senses of emotional design. This design process eligibility was checked through a case study design.

1. INTRODUCTION

The impact of Biophilic interior design on users resulted from the relation between human biology, built environment and the surrounding nature of the establishment which enhances user psychological and physiological health. [1] The importance of this study lies in showing the impact of biophilic interior design on users of the space. This is applied through harmony of 14 patterns of biophilic design according to the functional needs of the interior space, In order to evoke user well-being through using emotional design as a monitor to the reflected emotions. This is applied in order to achieve aesthetically combination and memorable user experience. Moreover, integrating nature in the interior space helps to design a user experience, through activities that engage them with the interior space to nourish user emotional well-being.

2. OVERVIEW AND BACKGROUND

1. Hospitality of Biophilic design via user experience

1.1 Biophilia and Biophilic design movement

Biophilia is a philosophy of loving nature innately, through the bonding of three aspects human biology, built interior spaces and surrounding nature. This is based on the biologist Edward O Wilson who defined biophilia as follows “innate tendency to focus on life-like process”. In 1964 the psychiatrist Erich From declared a term to show the relation between human and nature, so he presented it as follows “‘bio’ means life and ‘philia’ means attraction or love”. Furthermore, Kellert, the professor of social ecology and Herwagen the environmental psychologist defined Biophilic Design in 2008 “the expression of the inherent human need to affiliate with nature in the design of the built environment”. (5) And the principles of biophilic design were classified as the adaptation of interior space to surrounding nature which resulted in development of health and wellness of the users and the factor of raising the emotional attachment to the interior space. Moreover, the interaction between man and nature enhances and supports man’s sense towards nature societal responsibility. (6)

1.2 The relationship between user and nature in biophilic hospitality establishments

The relationship between user and nature in built environment revealed positive mood, increased cognitive performance and enhances user creativity which consequently develops emotional connection between

users and interior space. Recently, many Scientific research have supported biophilic design in several areas after providing interior spaces with these certain criteria, like natural lighting, fresh air and green areas. According to data comparison the findings were proved within the following results: Firstly, Increasing the happiness and productivity of the employee in the field of work. Secondly, increasing grades of children in the field of school. Thirdly a speedy recovery for patients in the field of hospitalization took place. Then, the collaboration between the following institutes (Terrapin, Interface and Gensler) which was based on evidence-based design approach. There was nothing related before on how the design affects the guest experience, room rates or customer attitude. The economic aspect of Gensler company showed an increase in the demand of scenic rooms by 18 % through the study. Moreover, the user spent more time in public spaces including Biophilic principles by 38% based on quantified parsing from hotels.com. Therefore, guests will not pay much for rooms with a scenic view but will spend more time in public areas such as reception and restaurants. (7)

The designers understand that biophilic design is an evidence-based strategy to create a beautiful and economically viable hospitality environment. Lorraine Francis showed that it is hard to incorporate biophilic design in hospitality because there is little quantitative evidence to support it. Moreover, in medical sector speedy recovery rates proved a high economic value. Therefore, Lorraine was working in a research project with industry cooperation to set standards, to measure provided comfort and its impact on longer stays periods, so the user realizes the impact of the interior space on him through feeling comfortable. For example, while walking in some spaces gives the user the feeling that the space is too long or too wide. This study is looking forward to know the reflex action of the users towards biophilic hospitality spaces and its economic aspect. (7)

The recommendation of Lorraine Francis (2016) was to study the multi-comfort program to reach the possible maximum benefit of the of biophilic interior design application which enables the designers to measure the impacts of the interior space, especially in hospitality establishments. Here comes the role of research in clarifying what this program is, multi-comfort program is as defined by Saint Gobain the feeling of human satisfaction with the internal space by pro-

viding the comfortable lighting percentage, the sound and temperature level .Those points make us feel happy, live, work and play in healthy internal spaces. It is not just to protect people from external weather, pollutants, and noise. [8]

1.2.1. proposed techniques to support the multi-comfort program in biophilic hospitality establishments:

This illustration will be reinforced by examples to enhance multiple comfort program application at the following three levels :(Thermal comfort - lighting ratio - sound level) will be summarized as follows:

- The importance of controlling daylight entry by natural light into the building to reduce carbon dioxide, improves the user experience, which is reflected positively in the economic aspect .And could be achieved by Activating the role of lighting in the interior design by avoiding the use of complementary industrial lighting as much as possible. In addition to, Enhancing natural lighting that occurs by taking into consideration, the location of the interior walls , architectural glass Façade ,the height of the partitions and the furniture distribution method .All these elements must be studied by sun movement in relation to the building location.. [10]
- The water shelves result in the reflection of natural light in nature in the interior space deeper ,through the use of a shelf in the outer façade containing a simple surface with water when the water moves as a result of the wind with the lighting of the sun, reflected in the interior space in different water formations as shown in the following pictures . This cycle creates variable reflections in the interior ceiling design and recommends using this application in waiting areas to reduce the tension resulting from waiting. [9]

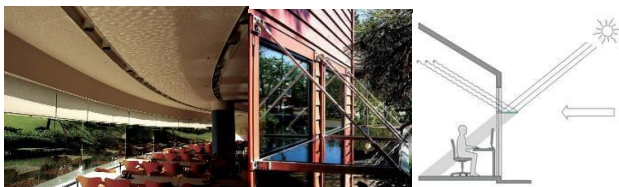


Figure 1: shows light reflections in the interior space and shows arch. Façade and shows detailed section Image source: [10]

- Dynamic Gazling glass enables the user to control the building's glass for natural light and outdoor visibility. Through electrometric technology, it is

possible to control glass blindness degree using the appropriate colour. using the mobile app can be utilized to control and avoid entry of unwanted sunlight and harmful rays, this type of glass eliminates the need for any type of shadow devices (curtains) that can close the external vision which deprives the users from external nature. [11]



Figure 2: dynamic gazling glass Image source: [11]

- Sound masking system: a designed system specifically to balance voice control and thermal comfort for users through technology that uses electronic components to distribute sound through speakers to cover the sound of HVAC conditioning for ventilation. [4]
- Using Carpeted Flooring in Lebra a Telecom company that mimic nature, which Simulates the concrete tiles used in landscape sidewalks interspersed with plants. [5]

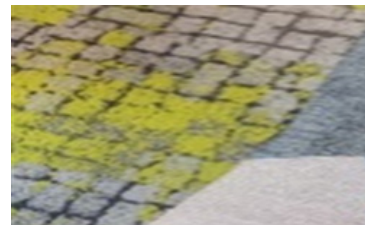


Figure 3 shows carpet flooring image source: [5]

1.3. Using design for user experience in biophilic design hospitality

Using design for user experience in biophilic design hospitality is important due to the need of humans to nature in our mostly unnatural or 'built' environment. According to the sustainable consulting design firm "Terrapin Bright Green " explained 14 patterns of biophilic design which can reduces stress, enhances creativity and clarity of thought, improve our well-being and a speedy recovery rate, enhance the love of the place. [7] Ambius recommends stimulating user's experience through triggering emotional attachment to the interior spaces of hospitality establishments .Which leads to distinctive memory that could be achieved by evoking the 5 senses: (vision): it is en-

hanced by colour, plants, natural materials, natural elements and green walls .(smell): make sure to provide scents to stimulate the sense of smell and the following positive impression on the user .(taste): provide a hosting drink .(touch): add natural materials and plant decorations to make a sense of comfort ,richness and luxury. (sound): Use plants that maintain sound balance, interior design and incorporate the water element to achieve the desired level of acoustic comfort. Therefore, the human being prefers to observe external atmospheric factors through interior space with the feeling of refuge and shelter with the provision of multiple comfort applications to give the user free movements. This enhances user experience via nature connection forming emotional bonds to get attached to the place to repeat the visit. [9]

The general orientation of biophilia in the field of hosting. The design of an interior space that is concerned with the user experience rather than creating an interior space using easy regular maintenance makes it more comfortable and with the latest technology [5]. The International Journal of Hospitality Management October issue showed that “biodynamic” designs triggered positive emotional and behavioural responses.

In addition, customers view hotels with Biophilic designs as superior in quality.” [6] A report entitled “Biophilic Design in Hospitality” Terrapin and the international designer of interface carpet tile (2017) shows that the water view adds an 18% increase in the average daily price, and that hotel guests received the highest 36 % accommodations in the lounges of vital hotels. It increases the value of the room and increases time in key revenue-paying areas such as hotel and restaurant bars as well as reception space. [7]

2.An analytical study of scientific methods that support design for well-being

In recent times, well-being designers, philosophers and sociologists, had shown interest in this field and need a clear approach that meets the human needs to obtain well-being and comfort, so we will study the following approaches based on the comparison made by Perry (2015),through an analytical table of the pros and cons of scientific approaches .Specialized in activating the well-being and comfort of users of the interior space and the product of the users in to show which approach is consistent with the patterns of Biophilic design and to enhance the user experience.

An analytical study of scientific methods	
2.1. Emotional Design	<p>1-In 2005, Donald Norman launched emotional design term, a design method that evokes the user's emotional experience to increase pleasure and positive feelings of well-being and comfort.</p> <p>2- The designer Patrick Jordan is one of the pioneers to focus on positive feelings in design, emphasizing the importance of making the design fun along with its ease and usability, as well as explaining four types of pleasure and linking it to the design as follows:</p> <ul style="list-style-type: none"> ○ Physical pleasure: (touch- taste - smell - appearance - sound) ○ Psychological pleasure: (the user's cognitive and emotional reaction towards the product which also should be easily used). ○ Social pleasure: (Results from social relationships). ○ Personal pleasure: (comes from aesthetic values, moral values, personal ambitions, and religious values). <p>✗ In Emotional Design, Donald Norman outlined a design approach geared to the user's emotion that seeks to provoke positive emotions by classifying them at three levels:</p> <ul style="list-style-type: none"> ○ In-depth level (Visceral level): Individuals develop a rapid reaction, making quick judgments about good, evil, safety and danger that are observed through the user's biological side by indicating to the muscles and other parts of the brain where it forms a behavioural level. ○ Behavioural level: Individuals are interested in the possibilities and effectiveness of the product by observing functionality, usability, and physical feeling. ○ Reflecting level: The product evokes culture, self-image, personal memento, and messages to others and applies in design using materials. <p>Leading users to flow state, which is an emotional state between boredom and anxiety. Flow: Is a feeling of activity, full focus and a high level of pleasure and fulfilment where there is a good balance between challenge and skill so that the task ahead is not too difficult and does not represent enough challenge.</p>
2.1.1 pros	A design method designed to evoke positive emotions by relying on flow to balance users' skills and challenge.

2.1.2 cons	The emotional design approach, is a design method intended to well-being and not an exhaustive approach to human needs.
2.2 Positive psychology	An approach within psychology focused on studying and improving people's positive performance and well-being by Seligman and Csikszentmihalyi (2000), this interesting positive psychology approach was developed by Ruitenberg and Desmet (2012) on strong points. Which was based on long-term user satisfaction rather than short-term experiences or emotions. product design depends on integration of temporary positive emotional experiences.
2.2.1 pros	Focuses on long-term user satisfaction and includes a vision of meaningful activities and then product design that enables or inspires people to participate in these activities so that they learn about product-oriented design strategies as found in emotional design methods.
2.2.2 cons	This approach does not consider the full life in which this routine is supposed to work and contribute to a general example of well-being. Thus, Focuses on relatively isolated behavioural routines.
2.3. Design Capability	This approach was created by Economic Amartyesen in (1980) developed by the philosopher (Nussbaum) in 2000, focuses on enhancing the user basic abilities to achieve quality life .by developing their abilities through the interest in the job by practicing activities where it directs it to public health and well-being .
2.3.1 pros	1-The Capability design based has an advantage over the emotional design, which best considers the indirect and lasting effects of product use for well-being. 2-Focuses on expanding lasting capabilities to enhance, basic requirements of well-being. 3-The design capability approach emphasizes functionality, rather than other design features, in order to enhance the basic capabilities of a good life, rather than other functions that cannot be clearly linked to the capabilities needed to live a good life.
2.3.2 cons	1-This approach is aimed at well-being but based on the premise that a person's ability to achieve well-being depends on the development of one's self and the possession of certain capacities that allow them to engage in activities that promote well-being. 2-Little interest in the fleeting pleasures.
2.4. Life Based Design	Ludwig Vitgenstein focuses on life forms, rather than behavioural routines by studying the role of technology in human life. Life based design explains lifestyle: a practice or a system of actions that follow the rules.
2.4.1 pros	Focus on life forms rather than more specific behavioural routine which is the core of positive psychology.
2.4.2 cons	A modern approach that needs to develop its methodology through more research and studies based on case study. It lacks a general framework to determine the values of well-being and comfort. like positive psychology approach, which aims to develop new behavioural procedures, and the potential weakness is that it only focuses on improving current life forms. [5]

Table (1): shows design methods for well-being

3. Emotional design via interior spaces

Desmet defined “ Emotion ”as “a multifaceted phenomenon, which includes expressive reactions, behavioural reactions, physiological reactions and subjective reactions”(2005) [8].Donald Norman ,in his book “Emotional Design” explained that we all go through three stages before we love or hate something. The first instinctive reaction to a product or space is an in-depth response which can generate an irrational desire to buy. Norman invites us to stop designing practical things and start designing fun products and services that bring us pleasure because the goal of emotional design is to make our lives more enjoyable and ‘make attractive things work better’, while balancing efficiency with aesthetic values.

Architect Lilian Flores stated that “emotional design consists of enjoying the space when you’re experiencing it and having its memory stay with you, that you want to go back or relive it again! You associate the design with mind and the emotions with the heart. You play with the five senses that we use to perceive the world: the sensory nature of the materials, smells, textures, sounds etc.” and “If we want to achieve emotional design in our projects, we must take into account each and every one of the steps in the process, because if something is missing in the global experience, the other good decisions won’t be good for (almost) anything”.

Ilse Crawford became one of the pioneers of applying emotional design to interior design. As she points

out, places can generate emotions and affect our behaviour and mood “When I look at making spaces, I don’t just look at the visual aspect of interior design. I’m much more interested in the sensory thing, in thinking about it from the human context, the primal perspective, the thing that touches you”. She was looking for a method to connect the user to the inner space and not only by the sense of vision but using the senses of all human beings to reach an interior space that has a distinctive effect on the human and confirms that the philosophy of an interior space in the near future is user centred design beside using balance and harmony. The emotionally stimulating design goes beyond aesthetics, it’s the design of an experience that generates a product or service and for that reason, the right balance between beauty and efficiency must be in harmony. [2] Where the user’s emotion is observed according to Rodaway (1994) by the following aspects which is sensation and cognition where the user receives the void surrounding it using the five senses, the perception is based on a mental process and the user explains the emotion resulting through verbal expression and physiological reaction of the human body, psychologically and physiologically towards the interior spaces. [8]

3.1. Techniques that fall under the emotional design

Measuring the impact of the user’s psychologically and physiologically reaction towards interior spaces could be achieved through the following techniques:

EEG	EEG uses electrodes applied to the scalp and measures changes in the electrical field of the brain area beneath it.
Breathing sensor	Breathing sensors measure the depth and speed of breathing. Quick and deep breathing shows excitement, anger, fear or joy. Slow and deep breathing shows a comfortable state of relaxation or withdrawals, such as depression or quiet happiness. (5)

Table 2: shows available techniques for human measurements [8]

The overlap of integrated Science branches with each other helped the application of biophilic design as an evidence-based approach. Moreover, there is a research that supports direct communication with nature in the built environment by studying several different sciences (cognitive psychology, biological anthropology, neuroscience and behaviour,.....).As the techniques of studying the impact of nature on the human brain progress, we find a remarkable development not only in the brain but also on physiological and psychological health so that technique (EEg head set) was chosen. Where this system helps to provide biometrics for the users to help them assess their fit-

ness and behaviour. To reach a healthier life through innovative biosensors techniques by brain sensors. [9] 4.The deduced relationship between Emotional design and the Biophilic design

Since Donald Norman adopted the Emotional design term in 2005, and Biophilic design term was launched in 2007. Therefore, Emotional design is one of its pillars. [3] [10]Biophilic design, based on nature, interior space and biology and aims to design user experience. Emotional design uses the design for user experience, so we find a complementary relationship between them, through designing user experience to meet the user's psychological and physiological needs

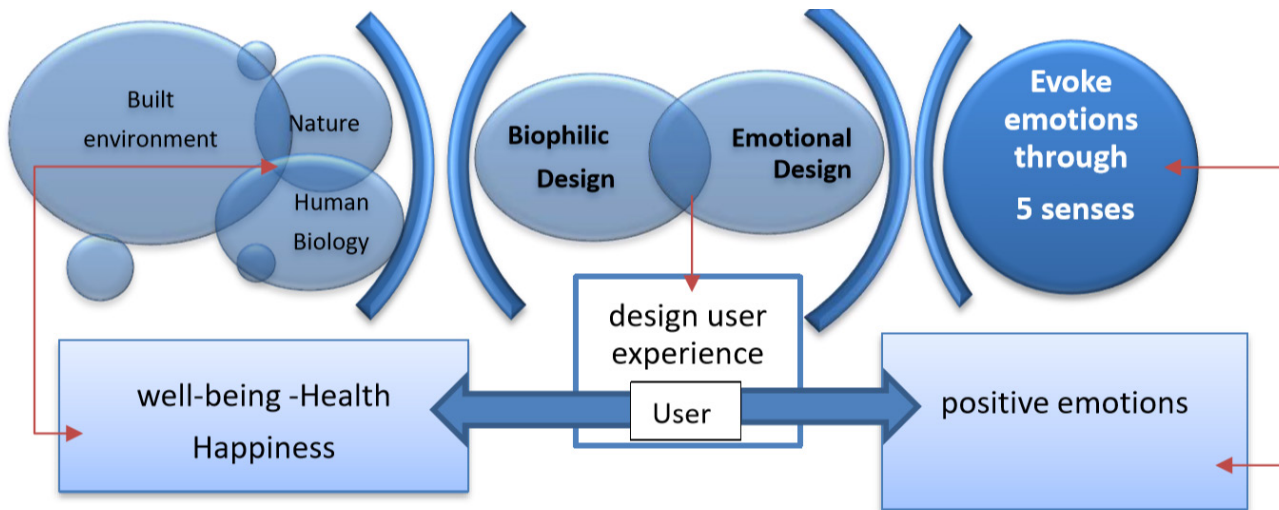


Diagram number (1): shows the link between biophilic and Emotional design

5. The effect of linking emotional design and biophilic design on the users

This research aims to integrate biophilic and emotional design as a design tool in a matrix. The matrix will find the relationship between them through the five senses (sight-touch-hearing-smell- taste) and their relationship to 14 Patterns of biophilic design.

Biophilic Design [1]			Emotional Design						
Impacts of biophilic patterns on users			14 patterns of biophilic design	5 senses					Emotions [8]
STRESS REDUCTION	COGNITIVE PERFORMANCE	EMOTION, MOOD & PREFERENCE		Sight	Touch	hearing	Smell	Taste	
Lowered and Improved blood pressure and heart rate Positively impacted mental engagement/attentiveness Improved attitude and overall happiness			1- Visual Connection with Nature						Happiness
Enhanced systolic blood pressure and stress hormones. Improved cognitive performance. Positively impacted in mental health and tranquillity.			2- Non-Visual Connection with Nature						pleasure
Perceived improvements on heart rate, systolic blood pressure and sympathetic nervous system activity enhanced behavioural measures of attention and exploration Positively impacted comfort, well-being and productivity. Positively impacted concentration. Improved perception of temporal and spatial pleasure.			3- Non-Rhythmic Sensory Stimuli						wonder
Reduced stress, increased feelings of tranquillity, lower heart rate and blood pressure. Enhanced concentration and memory restoration. Improved perception and psychological responsiveness. Remarkable preferences and positive emotional responses.			4- Thermal & Airflow Variability						pleasure
Enhanced circadian system functioning Improved visual comfort			5- Presence of Water						Anticipation pleasure Desire Hope Interest Courage
Improved positive health responses; transformed perception of environment			6- Dynamic & Diffuse Light						Hope
Noticed view preference			7- Connection with Natural Systems						Acceptance
Reduced diastolic blood pressure Improved creative performance Enhanced comfort			8- Biomorphic Forms & Patterns						Acceptance Interest
Favourably influenced perceptual and physiological stress responses Observed view preference			9- Material Connection with Nature						love Acceptance Interest
Decreased stress lowered boredom, irritation, fatigue level Improved comfort and notable safety			10- Complexity & Order						Acceptance Interest
Enhanced focus, attention and recognition of safety			11- Prospect						Acceptance Interest
Arising strong pleasure response			12- Refuge						Acceptance Interest
Caused a strong dopamine or pleasure responses			13- Mystery						Wonder Happiness
			14- Risk/Peril						Happiness pleasure

Table 3 linking matrix of Emotional design to biophilic design [7] [1]

The research found that the presence of a water pattern helps to stimulate a sense of (Hearing and vision) which evokes the following emotions (expectation- desire - pleasure - hope -attention).

6. Proposed design process using biophilic and emotional design

The paper reached the following design process stages, based on the study of the relationship between biophilic and Emotional design as a design tool through using the matrix of the relationship between the human emotions resulting from the arousal of those basic senses and biophilic patterns. To achieve a unique user experience based on the following recommendations of previous studies: Lorraine Francis 2016, [2]Terrapin Green Report 2014, Philip [1] (2015). [3] the research has reached a scientific methodology to achieve an emotionally distinct user experience of biophilic design in hospitality field. Therefore,

a developed proposal of design process, for designer to reach his goal by achieving an emotionally unique repeatable user experience in Biophilic interior space will be discussed as follows:

1. Determining the user needs in the interior space based on his activity.
2. Selecting the suitable biophilic design patterns, human emotions and senses. The appropriate selection will be chosen to fulfil user needs.
3. Choosing interior design elements that meet the selected patterns. then review the previous choices according to the multi- comfort program. To provide the user with ensured comfort.
4. Design the user experience in hospitality spaces.

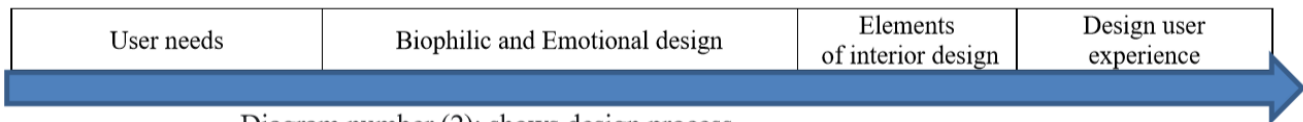


Diagram number (2): shows design process

7. Case study

The case study relied on evaluating the relationship of biophilic and emotional design as a scientific methodology that helps to design a positive user experience in the tourist establishments. It should be noted that this matrix relied on the usage of Ambius and Terrapin Bright Green report with Emotional design. Location: Sharm el-Sheikh. Project Name: Four Seasons Resort. Project type: Hospitality establishment. Case study for Four Seasons Resort in Sharm el-Sheikh using biophilic and emotional design for user experience. Hospitality Resort via Islamic theme suited biophilic design patterns. As a result of the availability of Islamic relics in the northern Peninsula Sinai, which confirms the cultural connection of the facility to its surroundings, and that's what Ms. Sturgeon confirmed. "Biophilic design is a design philosophy and has the potential to intentionally reconnect people and nature through buildings. It goes beyond adding plants or a water feature and focuses on connecting to the particular ecology of a place, to its culture and climate to create buildings that's full of life".



Figure 4 External layout shot



Image 5 showing the reception of the hotel

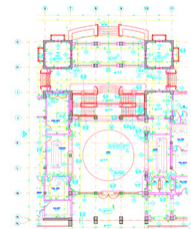
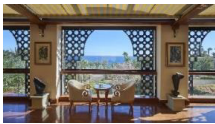
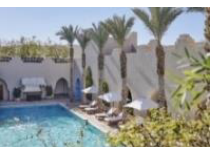


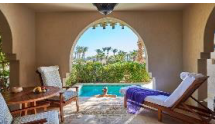
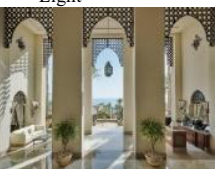


Image 6 shows architectural plan of reception area

Pattern 12: Refuge of the Biophilic design explains the feeling of acceptance, containment, protection and safety where the reception desk was placed within the Islamic arch to give a sense of shelter, which emphasizes its importance without feeling separated, as this application emphasized the common elements between the biophilic and emotional design .where they emphasized the following points (function, safety, culture surrounding and natural materials). The perception of a sense of security affects human beings through a sense of ability to focus and pay attention after arousing the sense of sight which stimulates the passion of acceptance and benefit. The following table shows the stages of the design process through the case study.

User needs	Biophilic and Emotional design					Elements of interior design	Design user experience		
Biological Impacts of biophilic patterns on users[1]	14 patterns of biophilic design[1]	Emotions [1] [8]	5 senses 1. Sight 2. Touch 3. Hearing 4. Smell 5. Taste [7] [8]					Case study [11] [12]	Analysis of user experience [1]
Lowered and Improved blood pressure and heart rate. /Positively impacted mental engagement/attentiveness/ Improved attitude and overall happiness.	1- Visual Connection with Nature  Image source: [12]	Happiness					Allows scenic view to the Red Sea, oriented towards communicating with the surrounding nature. [13]	Attracting the user's attention, sense of time, weather, and observing living creatures, through space that relates to nature.	
enhanced systolic blood pressure and stress hormones. /Improved cognitive performance. Positively impacted mental health and tranquillity.	2- Non-Visual Connection with Nature  Image source [11]	pleasure					The non-optical communication of nature is integrated through water, natural ventilation and architecture to support the connection between the interior space and the exterior landscape.	The user feels comfortable and familiar with remembering the sounds, smells and contacts that the person feels outside the building. where balanced areas are hidden from nature.	
Perceived improvements on heart rate, systolic blood pressure and sympathetic nervous system activity Enhanced/behavioural measures of attention and exploration	3-Non-Rhythmic Sensory Stimuli  Image source: [11]	wonder					During walking through that passage, observed sounds and movements resulting from natural elements are not based on a constant rhythm.	Presence of an irregular rhythm makes a user feels interested, considered as activity promoter and a welcomed distraction.	
Positively impacted comfort, well-being and productivity/Positively impacted concentration. Improved perception of temporal and spatial pleasure.	4- Thermal & Airflow  Variability Image source: [11]	pleasure					Using windows and adaptive system can enhance air control and flexibility through movement control	The user feels refreshed, energetic and comfortable, leads to human sense of control and flexibility in choosing the desired level of air flow, through ventilation systems and windows.	
Reduced stress, increased feelings of tranquillity, lower heart rate and blood pressure/Enhanced concentration and memory restoration. Improved perception and psychological responsiveness/Marked preferences and positive emotional responses.	5- Presence of Water  Image source: [12]	Anticipation -Pleasure - Desire Hope - Interest -Courage					There is a swimming pool connecting the inner space to the exterior and receives privacy by using bushes.	The user feels attracted to both sound, lighting, proximity to water and accessibility where the human being is given a sense of calmness or welcome or both.	
Enhanced circadian system functioning. Improved visual comfort	6- Dynamic & Diffuse Light  Image source: [11]	Hope					Demonstrates the interior space by allowing light to spread over time through penetrating interior space at different levels, which enhances the user's experience.	The following user feelings evoke drama and plot surrounded by calming sense. There is a change in the angles of shadows throughout the day because of the interior space that spreads of light dynamics expressing time and movement.	









Improved positive health responses; transformed perception of environment	7- Connection with Natural Systems  Image source: [11]	Acceptance			There is a balcony with a swimming pool overlooking the public site and enjoying the observation of the exterior landscape and climate which enhances communication with nature systems	Spaces associated with nature evoke feelings of awareness of the seasonal climate and life cycles where experience gives a sense of comfort, depth and nostalgia giving the user a different vision and which adds expectation feelings.
view preference 8	- Biomorphic Forms & Patterns  Image source: [12]	Acceptance Interest			Use of floral motifs through marble cladding.	the user accepts interior spaces with biomorphic patterns due to feeling comfortable and meditated.
Reduced diastolic blood pressure Improved creative performance Enhanced comfort	9- Material Connection with Nature  Image source: [12]	love Acceptance			Use of wood material	The user feels warm, authenticity and it stimulates the sense of touch towards the spaces based on natural materials giving a luxurious look.
Favourably influenced perceptual and physiological stress responses. Observed view preference	10-Complexity & Order  Image source: [12]	Acceptance Interest			We find levels of gradient, floral decoration, floor design with geometric shapes in a harmonious complex system	Curiosity arousal is being attracted by spaces that are characterized by complexity and good order .
Decreased stress. lowered boredom, irritation and fatigue level/Improved comfort and safety.	11- Prospect  Image source: [12]	Acceptance Interest			Simple design to direct the user's vision towards outdoors.	The user gets security and control feelings through providing open spaces for a natural view.
Enhanced focus, attention, and safety recognition.	12- Refuge  Image source: [12]	Acceptance - Interest			The reception desk was placed within the Islamic arch to give a sense of shelter, which shows importance without feeling separated.	The user feels meditated, acceptance and protection due to the importance of a partly separated space from the surrounding environment.
Arising pleasure response.	13- Mystery  Image source: [11]	Wonder Happiness			The provision of light, shades and enabling user's motion. Enhances exploration and a charming sensation.	The sense of mystery evokes a sense of expectation which helps the user to conduct further investigation to solve the mystery.
Caused pleasure responses.	14- Risk/Peril  Image source: [12]	Happiness pleasure			Providing seating tents on a high rocky ridge without a barrier for safety.	Users sense of exploration and implicit threat to achieve joy due to the presence of danger element .

Table 4 shows the case study of The Four Seasons Resort in Sharm El-Sheikh [1] [7] [8]

3. PROBLEM STATEMENT

This paper stated that Biophilic design lacks the development of a methodological approach in hospitality field for a meaningful user experience. According to Philip Berry(2015), design for well-being researches is still needed based on case studies. [3] Moreover, terrapin Bright Green design Firm Report (2014) calls for more integrative biophilic design strategies . [1] Lastly, Lorraine Francis (2016) highlighted the need to put into consideration the “Multi-comfort program” to support Biophilic design in hospitality interior spaces. [2]

4. AIMS AND OBJECTIVES

The aim of this study was to develop a methodological approach for biophilic design in hospitality spaces based on exploring different well-being design approaches to demonstrate the potential of emotional design. This approach leads to discuss its suitability for design user experience within a biophilic design for emotionally meaningful user experience.

5.HYPOTHESIS AND METHODOLOGIES

This paper studied design for well-being approaches and chosen emotional design as a guide to develop biophilic design strategies, through analytical case study and user-centred design approach.

6.CONCLUSIONS

Despite the interest of many scientific approaches to achieve well-being such as :(Emotional design -Capability approach- positive psychology approach -life based design). They have not achieved a bond to biophilic design, as the emotional design did due to the balance between user skills and challenge. The matrix demonstrated the associated bond between biophilic design and emotional design with varying degrees based on the link of five senses and 14 patterns of Biophilic design, which generates human positive emotions.

The present study was undertaken in order to design a scientific methodological approach of biophilic design for hospitality. Beside recommendations of previous studies, Lorraine Francis (2016), Philip Berry (2015), Terrapin Bright Green

report (2014) led to a design process. Therefore, the research came up with a proposal of four phases process to apply biophilic design through emotional design for the user’s experience which encourages repetitional visits based on multi-comfort program.

In addition to the meeting point of biophilic and emotional design to design the user experience. By knowing the user activity in the space, we can detect emotions that need to be nourished, so we could get back to 14 patterns to biophilic design to choose certain patterns that fulfil those needed emotions to be applied and monitored. Helping further investigation for improvements in future research for hospitality of biophilic design along with emotional well-being was based on case studies to achieve an emotionally comfortable user experience. The chosen case study (Four Seasons Sharm El- sheikh) resort with Islamic design has achieved a perfect fit with biophilic design attributes and patterns.

The paper recommends the researchers to apply experimental research by EEG Headset technique-the wearable health note technology- in hospitality establishments that can be used as a service provided by the hotel. The EEG Headset will enhance observing the impact of the interior space on user’s health and the general mood as a distinct service provided by the hotel encouraging them to repeat the experience. which emphasizes the role of the user in designing his own experience. By using mobile application based on the user awareness of how each space affects them through case study. Also, users can choose the order of the experience according to their needs to obtain a distinct user experience by providing more than one arrangement of the stages of the experience so that the user chooses what suits him according to his preference.

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