ABDALLAH ALKILANY

SENSE OF PLACE IN BIOPHILIC INTERIOR SPACES

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SENSE OF PLACE IN BIOPHILIC INTERIOR SPACES: A CASE STUDY OF JORDAN

A THESIS SUBMITTED TO THE INSTITUTE OF GRADUATE STUDIES NEAR EAST UNIVERSITY

By
ABDALLAH ALKILANY

In Partial Fulfilment of the Requirements for the Degree of Master of Science in Interior Architecture

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I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that I have fully cited and referenced all material and results that are not original to this work, as required by these rules and conduct.

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Date: 24 of May 2021

To all that supported me...

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ABSTRACT

Biophilic design principles involves the use design strategies which are categorized into human nature relationship, the experience of nature; both directly and indirectly. This research is a study of the sense of place and how biophilic design principles impact it in interior spaces, the study was carried out to analyze case studies in Amman, Jordan using the attributes of biophilic design under the place and space experience. Case studies were visited for observations, documented and findings were drawn on how the implemented and non-implemented attributes of place and space experience impact perceived sense of place in the interior spaces. This study has found attributes of experience of place individually impact the sense of place in an interior space, which then come together to enhance the overall experience of place. Also, the research found the use of biophilic design principles are effectively suitable for both relatively high budget and low budget, small spaces and large spaces.

Keywords: Sense of place; biophilic design; experience of space and place; biophilic interior design; interior space

ÖZET

Biyofilik tasarım ilkeleri, insan doğası ilişkisi, doğrudan doğa deneyimi ve dolaylı doğa deneyimi olarak kategorize edilen kullanım tasarım stratejilerini içerir. Bu araştırma, yer duygusu ve biyofilik tasarım ilkelerinin onu iç mekanlarda nasıl etkilediğinin bir çalışmasıdır, çalışma Ürdün Amman'da biyofilik tasarımın niteliklerini mekan ve mekan deneyimi altında analiz etmek için yapılmıştır. şunları içerir: beklenti ve sığınma, organize karmaşıklık, parçaların bütünlere entegrasyonu, geçiş alanları, hareketlilik ve yol bulma ve yere kültürel / ekolojik bağlılık. Gözlemler için vaka çalışmaları ziyaret edilmiş, belgelenmiş ve mekan ve mekan deneyiminin uygulanan ve uygulanmayan özelliklerinin iç mekanlarda algılanan mekan duygusunu nasıl etkilediğine dair bulgular çıkarılmıştır. Bu çalışma, yer deneyiminin niteliklerinin bir iç mekandaki yer hissini bireysel olarak etkilediğini ve daha sonra genel mekan deneyimini geliştirmek için bir araya geldiğini bulmuştur. Ayrıca araştırma, biyofilik tasarım ilkelerinin hem nispeten yüksek bütçe hem de düşük bütçeli, küçük alanlar ve geniş alanlar için etkili bir şekilde uygun olduğunu buldu.

Anahtar Kelimeler: Yer duygusu; biyofilik tasarım; mekan ve mekan deneyimi; biyofilik iç tasarım; iç alan

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CHAPTER 1

INTRODUCTION

1.1 Introduction

The social trend of urbanization has caused an increase in building constructions and a burst in population, as these contemporary built environments may be pointed to be economic progress it has also been associated with the isolation of people from the experiences of the natural system which is the natural ecosystem of the world (El-Ghobashy and Mosaad, 2016). There are also factors such as the lifestyle changes which people embark upon which also play a significant role in their isolation from the inherent natural environment, contact with the natural environment in most developed societies and countries have been shown to have significantly reduced in recent times, and in some places it has also been completely lost, it has been reported that due to lifestyle changes people tend to spend up to 90% of their time indoors which isolates them from experiencing the natural system outdoors (Stankovic et al. 2018). According to Kellert et al. (2008) the human mind and body has the evolutionary context of development and using a sensory world which uses critical factors and elements such as vegetation, animals, light, air, color, water and landscapes, the wellbeing of people is highly dependent on contact and experiences with the natural environment, and should be emphasized upon more than the fitness and satisfaction lifestyle of the urban society (Salingaro, 2015).

Biophilia as a form of architecture has been applied and used by architects as a tool to have an indelible reflection on the minds of people (Wang et al. 2019). Biophilic design has been described as process or tool of architecture which is not just the mere greening of spaces and buildings to increase the appeal of aesthetics, but it is a way of finding and inserting people into nature and putting nature into its place in people's spaces (Browning et al. 2014). Biophilic spaces and environments have been reported with good and substantial evidence to have a healing effect on the human body (Kellert et al. 2008), having contact with nature affect the human health in so many ways such as the air quality improvement, social cohesion, and stress reduction. The natural balance of the production and emission of oxygen and carbo dioxide has been disturbed because of the rapid development of humans, this needs to be somehow

rebalanced using architectural design principles which are in line with nature. Biophilia as a design tool has been associated with bringing a perceived balance to the natural order of the environment, it reduces stress, improves creativity, and also improves the overall state of the human health, designers hence need to incorporate such tools into their designs to improve the human wellbeing (Browning et al. 2014).

From the onset of creation, humans have been immersed into nature and have been surrounded by it ever since, the harmony in nature has been used by so many throughout time as a source of inspiration in so many ways. Architecture in every society is a remarkable and significant feature which cannot be detached form nature, biophilic designs have been translated as a way which shows the connection of people to natural systems, nature themed designs can be found in some of the earliest structures built by humans, several cultures over the course of history have used natural representations in their designs in both decorative aesthetic designs and also symbolic ornaments, the consistent use of these natural themes in structure have come to imply that biophilic designs are not a new phenomenon as many would think, however long years of urbanization in recent history which have been geared by the use of computerized design practices have disconnected most designs from the use of biophilic design. Biophilia is a representation of the human love for natural environments and it can be used to influence architectural spaces of all kinds.

The fusion of nature into design of spaces can improve the experience of the dwellers of a space, this can also go a long way in fulfilling sustainable design. According to Kellert (2008), biophilic design has two dimensions to it which contain six design elements, the two dimensions of biophilic designs are naturalistic/organic and vernacular/place-based dimensions. The naturalistic or organic dimension is the dimension which deals with the reflection of the human love for nature in the built environment through either direct or indirect experiences. The second dimension; place-based, this is the dimension which deals with the connection between the culture, locality, ecology of a place and the building or landscape, this dimension is a also inclusive of the spirit of a place and the meaning it has to people with regards to their identities (Kellert et al. 2008).

1.1.1 Biophilic interior design

Interior design is a considerably complex process, interior design is more than a spatial arrangement of objects in an interior space. Interior architecture is beyond the mere decoration of a given space, interior architecture and design is the transformation of a space or place into a livable space with the consideration of stability, individuality, cultural hierarchy and the desired order. Research has shown that most people spend about 90% of their time in interior spaces, and with the contemporary built environment giving a considerable isolation from the benefits of nature and natural influences (Totaforti, 2018). The activities of people in interior spaces over time gets combined with other social relationships which influence the emotional state of the dwellers of the said space. In all interior spaces which include housing and or professional spaces there has been a reported case of fatigue which occurs over a long period of time and it has also been reported that some contact with natural elements rejuvenates the fatigued psychological state (Gillis and Gatersleben, 2015). Biophilic designs can be achieved for both indoor spaces as well as outdoor spaces, through the use of sensory stimulation and the fusion of interactive natural elements like water, plants, and animals this biophilic design in an interior space becomes possible, which gives further meaning to the design of the interior and the objects inside it and subsequently gets reflected on the users of the interior space (Yin et al. 2020). Interior design within the context of biophilia is an intended practical methodology which has a goal of having an effective built environment design. Biophilic design is more than just a technical tool, it is a way of adopting a conscious sense towards nature and also a design tool which seeks to incorporate nature within spaces.

1.1.2 Sense of place and biophilia

Sense of place in architecture is a term which is often used, sense of space is an architectural term used to describe the relationship between humans and space, this is often done within the context of the characteristics of the environment and the subjectivity of the imaginations of humans with the environment. It is safe to say sense of place is a subjective experience which may vary from one person to another, but it is noteworthy to understand it is very much influenced by the objective context of the environment. Hence sense of place can be defined as the experience that spans from the sentimental affection and judgement of a place by a person

experiencing it, and what a place or space is able to create in people experiencing it in the context of having a sense of belonging within the space (Mohammed et al. 2017).

Biophilia as an architectural and design too has a strong establishment of sense of place, as previously discussed with regards to the two dimensions of biophilia, the second dimension being the place-based or vernacular dimension is a central factor for sense of place, which is basically the meaning or identity people in a space or place project unto it and how it collectively affects them and their identity.

1.2 Aims and Objectives of the Study

This study is proposed to research biophilia as an interior design tool and also study biophilia as a design tool with respect to sense of place, the study is aimed at researching the effects and impacts of biophilic interior design on the overall sense of place on individuals.

As the definition of interior design entails the diversity of the environment, interior design as a discipline goes beyond the objects placed within a space, it transcends unto other factors of human environmental behavior, on the other hand biophilia is a centered experience of both physical and sensory elements within an interior space, this study proposes to comprehensively shed light on how biophilia enhances space within the context of sense of place.

1.3 Methodology

The proposed methodology of this research is the qualitative research methodology, an intensive literature review is proposed to be carried out with respect to the subject of this study, to understand the theories and framework of biophilia as an architectural design tool. Case studies of implemented biophilic interior designs in public spaces will be selected in Jordan, the selected case studies will be reviewed and documented based on the collected data with regards to their implemented design and how they establish and or enhance the sense of place in their respective spaces.

CHAPTER 2

LITERATURE REVIEW

2.1 What is Biophilia

Biophilia is a term which is coined from two words; “Bio” and “Philia”, bio means nature and philia means love or affinity. Biophilia as a term is a word which articulates the relationship between a built environment and nature so humans may experience the benefits of both nature and artificially built environment, biophilia is a concept which is based off the theory that humans always have the need to connect to the nature on levels which are physical, metal and social to foster wellbeing.

Biophilia has been defined as the inclination of humans to affiliate themselves to nature which has been persistent throughout the existence of humans, biophilia has been noted to be very critical to the wellbeing of humans; both physical and mental wellbeing. Biophilia is an idea which originated from the comprehensive understanding of the evolution of humans, where the history of humans has been associated with adapting to the natural elements rather than the human created forces, as humans have evolved in a biocentric manner.

Humans have an inclination to respond to the forces of nature and stimuli, in a study conducted by Öhman (1986), a Swedish psychologist who studied some subjects who were subliminally exposed to some elements such as guns, snakes, spiders and electric wires, the study revealed the majority of the subjects responding to the natural elements images and remained indifferent to the human made objects’ images, the result produced results which illustrates the inherent human response to natural elements and forces even in the modern world. There is a growing number of reports from researches that give scientific evidences on the inherent tendencies of humans in seeking affiliation with nature and the significant effects nature has on the human wellbeing in both physical and mental contexts, these reports go ahead to imply and support the impact of nature on human’s quality of life and its profoundness (Browning et al. 2014).

According to Kellert (2012), contact with nature giving benefits to humans is very much dependent on a habit of repeated experiences, in as much as there is an inherent inclination on

the part of humans to connect with nature, this attraction to the forces of nature needs to be nurtured and developed. The distinctive learning and growth of individual humans is reliant on our capacity to choose specific courses of actions, with regards to biophilia and in such context humans may choose to seek a connection with nature or inherently severe ties with it as is the case of most modern built societies, where several obstacles of nature have been built to block it out, this has led to an increasing and alarming disconnection of humans from the natural world, the growing disconnection of humans from nature in the modern society can be seen in in sectors of manufacturing, agriculture, education healthcare and lastly architecture (Aleksandra et al. 2019). The impediments of nature's experience in today's world can be seen in the design and development of built environments in the current modern societies, this is problematic because humans have been evolving in the natural world as their habitat and the contemporary man has become primarily an indoor dweller in indoor environments by spending about 90% of our time indoors. The need for contact with nature by humans has been reported to be critically beneficial to the wellbeing of humans and a level of satisfactory contact to this regard in today's-built environment has proven to be very much challenging, as the major approach to modern buildings does not treat nature as an element to be factored into its design and construction rather than an obstacle which it most times seeks to get rid of, and sometimes it even sees nature as a trivial and irrelevant factor.

The result of the lack of factoring of nature into the modern built environment has led to an increasing disconnect of humans from elements of nature such as natural lighting, vegetation, natural forms and shapes, materials and ventilation. Much of the modern built environments can be regarded as structures which are sensory deprived, and sometimes even likened with zoo cages which have also been banned and categorized as inhuman (Finnegan, 2011).

2.2 Biophilic Design Principles

Biophilic design has the primary goal of addressing the challenges faced in contemporary buildings and landscape through the establishment of satisfactory natural connection experience frameworks within the built environment and landscapes (Kellert et al. 2008). Browning et al. (2014) regarded biophilic design and seeking to create and provide good habitat for people

within the modern built environment which in turn advances their wellbeing in both physical and mental contexts. A well implemented biophilic design constitutes some basic principles which need to be addressed as a representation of fundamental conditions for biophilic design, and these principles include:

- Repeated and sustained engagement with nature in a biophilic design.
- Focusing biophilic design on the adaptation of humans to natural elements that have improved the wellbeing of people.
- The encouragement of emotional attachment to places through biophilic design.
- The promotion of interactions that are positive between people and nature.
- The promotion and reinforcement of integrated architectural solutions.

Biophilic design seeks to implement and sustain the natural system within a built environment with respect to function and productivity over a prolonged period of time. The obstruction or altercation of natural systems by the implementation of modern built environments have become a process of the design and construction of such modern spaces, even though the natural system uses its organisms in transforming the environment while it inhabits it. As change is definitely bound to happen and verily inevitable, the question is while change happens, is it a sustainable change which contributes to productivity and function in the environment or is it destructive, such changes occur on the elements and indicators of the natural environment such as biomass, biological diversity, decomposition, pollination, hydrologic regulation, nutrient recycling and other factors which are essential to the sustenance of the ecosystem (Guo, 2016).

Biophilic design applications may also have an altering effect on the natural environment in or around a build space, however the changes on the natural environment by a biophilic design may only be negative in the short term, and planned with ultimately having a sustainable benefit on the long-term run. The application of biophilic design should have a robust and sustainable effect and offer support to the ecology of the space it was applied or implemented in the natural environment, an effective and successful application of biophilic design should have the end result of a wide spectrum, which should include benefits on behavioral wellbeing, physical wellbeing and mental wellbeing of the people in the environment. Physical wellbeing includes

lowering of blood pressure, enhanced physical fitness, increased comfort and increased satisfaction, improved general health. Mental wellbeing includes lessening of stress, lessening of anxiety, increased mental satisfaction, and increased motivation. While behavioral wellbeing includes mastery of skills, improvement in coping, increased and enhanced attention and concentration, and the lessening of aggression and hostility (Kellert and Calabrese, 2015).

2.3 Biophilic Design Application

Biophilic designs constitutes the application and implementation of strategies which vary but all have the sole goal of enhancing the built environment with respect to the natural environment, and these strategies are often referred to as attributes and experiences (Kellert & Calabrese, 2015). The choice of which strategy of biophilia to apply is primarily dependent on the circumstances of the built environment project; with factors such as size, landscape, economic implication and regulations to be considered accordingly as well as the ecological conditions of the environment. However, any application of a desired strategy must adhere to the principles of biophilic design best practices as previously outlined and noted, all well applied biophilic designs must have a seamless and harmonious application and integration in the ecosystem as a whole (Wang et al. 2019).

There are three distinct representation of nature which form the categories of biophilic design frameworks, these are the direct experience of nature, indirect experience of nature, and the experience of space and place. Direct experience of nature as a category simply refers to biophilic design which provides actual contact with the physical environmental features that have been integrated into the built environment which include lighting from natural sources, air ventilation, water features, landscapes and other natural elements that may have been integrated into the built space. Indirect experience of nature simply refers to the contact of a representation of nature within the built space rather than the natural elements themselves, the representation of nature in this case maybe patterns and processes and their characteristics in the natural world which could be in the forms of objects in the built environment such as furniture, artwork and other forms of ornaments. The last of the categories which is the experience of space and place simply refers to biophilic design which deals in spatial features of the natural environment

application in the built environment, spatial features with the known characteristics of advancing the wellbeing of humans, these include spatial features such as organized complexity, refuge and prospect, mobility and way finding. The three categories of biophilic design experiences have been identified to have 24 attributes of biophilic design which are listed as follows:

- Direct Experience of Nature: light, water, air, plants, animals, weather, fire, natural landscapes.
- Indirect Experience of Nature: natural materials, images of nature, evoking nature, biomimicry, information richness, simulation of natural air and light, natural shapes and forms, natural geometries, information richness, and natural colors.
- Experience of Space and Place: transitional spaces, prospect and refuge, organized complexity, cultural and ecological attachment to place, integration of parts to wholes.

All the biophilic design experiences and their following attributes are experienced and perceived using the various human senses of touch, sight, smell, taste, and sound. While all human senses are very critical, the visual sense is the dominant sense of them all, as it is the major sense of perceiving the natural world and how humans respond to it through the other senses. When the human sense of vision sees natural elements it leads to a triggering of several responses in the human body, and it is also notable that aesthetically good looking features of nature are known to attract and arouse the human interest, and stimulate curiosity, creativity and imagination, hence when humans have no visual natural world contact it triggers and leads to fatigue and boredom in a built environment and space, which may sometimes lead to abnormality in the human psychology in some severe cases. The seeming heightening of the visual sense does not however mean that other sense are not significant, all other senses also have a great significance in our response to nature and its elements, and hence contributing to the advancement of wellbeing and comfort within a built environment (Hartig et al. 2014).

2.4 Biophilic Design Elements

Understanding how much depletion there is due to the development of the modern built environment is very critical in the understanding of how much sustainable and modern green design goes a long way in yielding significant remedy measures to the environment and the wellbeing of humans, however the development of sustainable design has been noted to primarily concentrate and focus in developing methods and frameworks which impact the environment in the least possible ways and leaving insufficient solutions to cater to the biophilic design elements (Mendler et al. 2006). The net benefit of primarily focused green and sustainable buildings have very little and insignificant effect on biophilic design goals, hence biophilia has been termed the missing link in the approaches of sustainable building designs. The understanding of the elements of biophilic design elements will go a long way in pursuing the practical application of biophilic design at its best. There are two known dimensions of biophilic design, which are *Organic or Naturalistic dimension* and *Place based or Vernacular dimension.* These two dimensions collectively have six biophilic design elements as follows:

- Natural shapes and forms
- Light and space
- Environmental features
- Evolved human nature relationships
- Natural patterns and processes
- Place-based relationships

2.4.1 Place-based relationships

Place base relationship as an element of biophilic design is referred to as the fusion of ecology and culture in a geographic context successfully. The inherent need of humans to connect to places and establish territory or control of spaces is reflected in place-based relationship as an element of biophilic design. Place based relationships as an element is responsible for the evolutionary need of humans to achieve security in a space, facilitate and quench the yearn for home and it remains a deep need in most humans up until now, place-based relationships as an element has eleven attributes as defined by Kellert (2008) which are as follows:

- Geographic connections: this is an attribute which is defined by the feelings of connection to a specific geographic area of a built environment which is often achieved through the emphasis of the geographic features around the built environment.
- Historic connection: the passage of time is often associated with a relationship to a place which people find meaningful and associate with a place, the sense of participation in a place's history is fostered through the provision of continuity within a built space by a proper representation of the past, the present and linking the seeming future to form the history of a place.
- Ecological connection: the ecology of a place is sustained through having an integrated connection to the place, especially through the proper usage of the dominant ecological features which are found naturally in the environment, the building of a place is known to inevitably change or alter the ecology of a place but the important factor is ensuring it alters it in such a way that it does not diminish the ecology but promotes the ecological development of the place.
- Cultural connection: cultural connection as an attribute of place-based relationships culminates three attributes into one; history, ecology and geography. Cultural connection to a place follows the human need of both collective and individual identity which has been sustained over time though our evolution as a specie through heritage of several factors such as architecture.
- Indigenous materials: the utilization of locally sourced materials in building a space has been known to be associated with positive relationship between a place and people, locally sourced resources have the ability to resonate the culture and history of an environment, and also provide an economic advantage of requiring less energy and effort to be integrated into the built environment.
- Landscape orientation: the orientation of landscapes is known to have the effect of embellishing an environment of built space which significantly contributes to sense of place. This attribute emphasizes the need to highlight the natural landscape features of an environment in order to take advantage of the natural biometeorological conditions of the environment.

- Landscape features: the features of a natural landscape are elements which distinguish a built environment's form, this enables the built environment to integrate into the natural environment seamlessly without being isolated from the natural context of the environment.
- Landscape ecology: this attribute is used to reinforce the ecological elements of the natural environment over a long period of time, this is achieved by the consideration of structures and patterns of the natural landscape in and around a built environment to ensure a connectivity of the natural environment and other natural systems.
- Culture and ecology integration: long term sustainability of a biophilic design is highly dependent on the efficient fusion of ecological attributes and cultural attributes of the place-based relationship element of biophilic design, this ensures achieving a transformation and enrichment of the two attributes.
- Spirit of place: this attribute basically signifies the meaning which is extended unto a place by the people using the space in both natural and built environment context, the spirit of a place is the metaphoric established relationship which a built environment has with its natural environment with respect to long-term stewardship and responsibility which enables the sustenance of both ecology and culture over the course of history.
- Avoiding place lessness: place lessness is the opposite is the desired achievement of place-based design as an element, and this is to be avoided by all means necessary to ensure a proper application of biophilic design according to its principles, unfortunately most modern built environments have place lessness in them as they successfully divorce the natural environment from the built environment which has resulted in the decline in the relationship of humans and the natural environment.

2.5 Biophilic Interior Design

Interior design is a process which is more complex than most people think of it as a spatial arrangement of objects within a space. Interior architecture is heavily debated according to the distribution of functions in a place, interior design transcends mere decoration of a space, interior architecture is a complete and comprehensive covering of an engineered structure, interior architecture is a critical and necessary dimension of architecture which transforms a

built environment into a livable space while considering factors such as individuality, stability, sustainability and cultural hierarchy (Guo, 2016).

Research have shown most time spent by people is in interior spaces of built environments, this has made the benefits of the natural environment to be significantly isolated from people who live in most contemporary built environments. Human activities within a built environment or space over a period of time is known to heavily affect their physical and emotional wellbeing, contact with elements and attributes of nature within an interior space has been associated with promoting a positive wellbeing which restores the mind and body from fatigue. The connection of a built environment with the natural environment is very much possible to be achieved in both the exterior and the interior of a built environment, these are made possible through the utilization of stimulation of the sensory forms of people, or via the provision of natural elements for the human interaction within the built environment in the forms of plants, animals, light, air, water or any other elements or attributes of nature, doing so ensures adding a more valuable meaning to the interior space of a built environment which will then be reflected on the mental and physical wellbeing of the dwellers of the interior space (Stankovic et al, 2018).

A good interior space is considered to be a space which has a sound ecology and gives productivity to the people living in it or using it by making them function at their optimum. Interior design using a biophilic approach utilizes an advanced framework with the sole goal of improving the practicality of the interior space of a built environment, and the successful application of a biophilic design in an interior space depends on the conscious adoption of the principles of biophilia with respect to the natural environment around the built environment which is meant to a practical and effective design and implementation of an interior space (El-Ghobashy and Mosaad, 2016). Design in the context of biophilia of interior spaces is meant to make people understand and acknowledge the impact of the natural environment and its elements on their overall wellbeing, the importance and effect of biophilic designs is rapidly growing and this is influencing a lot of adoption of the biophilic design in interior spaces, there are concepts which are being adopted which are in line with the principles of biophilic design, with concepts such as the natural concept furniture and naturalistic influenced interior space

designs. Biophilic interior design is often misunderstood as a “green” interior design, even though green interior design is an aspect of biophilic design, it is not the only aspect on biophilic interior design, as the presence of greenery in an interior space is definitely therapeutic, but there are also other elements of biophilic interior design (Stankovic et al. 2018).

Guo (2016) conducted and research which reported a support to the claim of interior spaces with biophilic design application having a positive visual appearance as well as advancing the wellbeing of people, biophilic designs are successful in drawing the attention of people which in turn generate a positive feeling towards the built environment’s interior space, the study also lays emphasis on non-natural objects which have a naturalistic approach to them such as realistic paintings also triggered positive responses in the participants of the study. The study conforms to the theories of some researches which have suggested the use of natural materials in an interior space of having a positive response and are able to lead to reduction of stress in people, and this is applicable to both natural elements and simulated natural elements placed in an interior space, based off the three experience of nature according to biophilic design the presence of nature in interior spaces can be categorized as direct experience of nature, indirect experience and human nature relationship in interior spaces.

2.5.1 Direct presence of nature in interior space

This refers to when there is a direct presence of nature in an interior space physically, such physical presence of nature in the interior space may be in the form of any of the elements of nature which may include air, wind, natural light, plans and animals. Some of the most common presence of nature directly in an interior space is the presence of plants, and interior water features, a very effective and efficient of such natural element presence in an interior space with respect to biophilic design is achieved through the creation of meaningful connections between the interior space and the natural elements present inside it (Wang et al. 2019). Direct presence of nature in an interior space is also sometimes referred to environmental features, this involves the use of characteristics of the natural environment within the interior space of a built environment, the attributes of direct presence of nature in interior spaces with respect to biophilic design are discussed as follows (Kellert et al. 2008):

- Visual and non-visual connection: the direct representation of nature in an interior space can be in a direct visual form connection of a non-visual from connection with the natural environment. The emphasis of having a view of the exterior environment to appreciate the natural landscapes and vegetation is termed as the visual connection of the direct presence of nature in an interior space. The non-visual connection of nature in the interior space is seen through the use of other non-visual triggering attributes of nature to connect with nature, this could be in the form of haptics of auditory attributes which give reference to the natural environment.
- Air and thermal variability: air is an essential element of nature which is critical in a space, when it comes to ventilation there is a high preference to natural air ventilation rather than artificial air ventilation in an interior space due to the impact of natural air ventilation on the wellbeing of people within an interior space. This attribute of direct presence of nature in an interior space involves the proper use and mimicking of the natural air ventilation and flow in an interior space which effectively stimulates the smell and feel of people within the interior space, the proper application of this may be achieved through the use of simple windows or using a more sophisticated technology.
- Presence of water: water is an natural element which is very critical to the creation and sustenance of life, water has the ability to evoke a strong response from people in both exterior and interior spaces, the presence of water in an interior space is known to lead to stress relief, promotion of satisfaction and other positive advances in the wellbeing of people. Water is a natural element which is perceived by multiple human sense which include sight, touch, taste and movement. The proper application of water in interior space biophilic design is a complex process which needs careful considerations, water features in an interior space in so many forms which include but are not limited to fountains, aquariums, swimming pools and much more.
- Natural light: natural lighting is another essential element of nature which humans need, the presence of natural lighting in an interior space is also preferred over the use of artificial lighting in an interior space, the efficient use of natural lighting in an interior space is capable of boosting the comfort and wellbeing of people in the interior space,

the proper use of natural lighting in an interior space through manipulation of light leads to effects of stimulation and mystery in the interior space. The effective application of natural lighting in an interior space involves the use of simple windows to allow the penetration of light or the use of other materials which may reflect light and give the same feeling.

- Plants: plants are a very fundamental element which ensure the sustenance of both humans and other life forms in the natural environment, they provide both food and security. The insertion of vegetation in an interior space is one of the most common ways of applying biophilic design in an interior space through the use of flowers and plants in pots, this enables the direct experience of nature in an interior space. The effective application of plants in an interior space is associated with efficient contribution to the human physical and mental wellbeing.

2.5.2 Indirect presence of nature in interior spaces

The indirect presence of nature in an interior space involves the use of indirect evocations of nature through the use of non-natural elements to achieve the desired feel for the required responses. This entails the use of colors, shapes, objects and patterns that are synonymous to those found in the natural environment, these are then manifested in the forms of furniture, art works, pigments/paints, and other forms, these are used to evoke the interest and imagination of the dwellers of an interior space, this is effectively done through the appropriate use of analog natural experiences in line with the principles of biophilic design to achieve the desired effect (Browning et al. 2014). The indirect presence of nature in interior spaces has the following attributes:

- Biomorphic forms and patterns: this attribute of indirect presence of nature in interior space consists of the simulations and representations of the natural environment. It consists of shapes and patterns which mimic the natural environment in an interior space, they are naturalistic forms, shapes, and patterns which include but not limited to domes, arches, lines and animal motifs and much more. Biomorphic forms and patterns may be used in the context of biophilic design to achieve both functional and aesthetic effects in

an interior space, some of the forms and patterns used in this regard may not literally resemble any naturalistic element but are however viewed as organic forms and patterns and may enhance the ambience in the interior space with respect to biophilic design.

- Natural materials: the use of natural materials in an interior space or even in an exterior space is highly preferred to the use of artificial materials, this is because artificial materials unlike natural materials are unable to give the organic process of aging and dynamism. The representation of aging and dynamism through the use of natural materials enable the understanding of the energy of the natural environment and how to react to it. Some of the natural materials found in interior spaces used in line with biophilic design principles are wood, cotton, and leather, these natural materials may be used to achieve so many aspects of the interior of the built environment.
- Natural colors: natural colors as seen in the elements of nature are very attractive to people, these include the rainbows, flowers, water, and other such natural elements. These colors are very bright colors for the most part, and bright colors are pretty challenging to apply in interior spaces and need really careful considerations, hence the major use of lesser bright colors of the earth, rocks, and plants to apply biophilic design in most interior spaces.

2.5.3 Human nature relationship in interior space

This is the reflection of the human based biological affinities towards connecting with the natural environment. The tendencies of people to use their senses to respond to their built environment is important and is often followed by feeling of emotions and intellectuality. Researches have reported the cumulation of multisensory responses to natural elements in an interior space has a significant impact in increasing comfort and overall human wellbeing. This has been associated with the innate desire of humans to connect with the natural environment and seek to learn further what is unknown to them (Browning et al. 2014). The human nature relationship in interior space are explained in three outlined attributes as follows:

- Sensory variability: the overall satisfaction of people and their wellbeing is dependent on their ability to perceive and respond to variability of their senses, this is particularly

seen in a built environment and especially in the interior spaces, hence the aesthetic attraction of humans towards nature is one of the strongest human inclinations. Sensory variability is very much responsible for the human imagination, curiosity, creativity, and exploratory tendencies towards nature.

- Prospect and refuge: this are the representation of people to perceive dangers and opportunities in their built environment, and also the identification of safety and security within the built environment. This biophilic design element is achieved through the proper use of strategies that expose the exterior vistas of the natural environment and connect them visually to the interior space of the built environment.
- Ecological and cultural attachment: humans have been known to be an evolved species which are territorial in nature, this can be clearly seen in people's affinity towards places they are familiar with, these familiar spaces are particularly enhanced via cultures and ecology. The aspect of a design which promotes the connection of a space and sense of the human identity is known as the cultural aspect, while the ecological aspect is known to establish a connection between emotional attachments to a space and the people withing the space through the use of elements such as the local plants and fauna, and other meteorological conditions.

2.6 Space and Interior Architecture

Space as a concept is a very familiar term in the architectural community, and it has also been noted to be a very complex concept. Establishing meaning through the interior and exterior of our built environment is a major key in the realization of meaning by people. Interior designers and architects are professionals tasked with the responsibilities of properly defining the spaces they create in a way that they will efficiently provide spaces for people that will give them meaning and a sense of belonging in that space. According to Butterworth (2000) spaces transcend what most people think they are; lives prop. Space have a symbology embedded within them, history, cultural and personal meaning, and finally a sense of belonging. The primary necessity in a building space is having safety and shelter, however to have a balance in wellbeing then the space needs to be consciously designed to cater to the needs of self-belonging of the inhabitants. An environmental is not a place for mere existence; it is a place of where we

are supposed to derive meaning from, because we interact with it. When speaking of the experiences of a space, the need of aesthetic is a present factor, because it is a factor which further strengthens the spatial experience of a space, aesthetic of a space is an element which makes a space come alive in the efforts to make its dwellers feel comfortable and provide the meaning a space is supposed to have on people. According to Nasar and Augustine (2007), human experiences in a space are greatly influenced by the perceived visuals existing in the space, and such attributes of a space have a way to actively or passively suggest what may be done in the space and vice versa while they impacting the feeling they are designed to have. Aesthetics of a space are known to have an impact on a lot of things regarding people in the space, these things include but are not limited to psychological state of mind, productivity, and general wellbeing. The authors furthermore stressed the fact the point that most people prioritized visual aesthetics of their space which in some case contradicts the image which may be desired in the space to attract and contribute to their wellbeing. Poor implementations of space should be foreseen and prevented by interior designers and architects.

The creation and adaptations of designs of spaces are very much advised to factor in the person in people that will use the space in the design and adaptation endeavor. The space, materials, design process and the designer should all work in harmony to proffer a final space to interpret into something that will promote the entire wellbeing of the user or users of such space. There are theories in the discipline of space design that help with the realization of effective and optimal design of a space, some of these theorize conceptualize space as either concrete or static, there are definitions and categorization of spaces that are subjective to the relationship of the space and its user, and some realize the value of the space based on its own location. Burns (2003), According to Lefebvre there is an attached value to a space being understood as a production of social endeavor, professionals in the discipline of space design are involved in conceptualization phases in their processes, these conceptualization processes are done with the intention of providing an understanding of the user of the space and the environment which the space is being designed at. Space is an essential component of architecture and interior design, and it needs to be considered more often from the philosophical vantage point rather than the most often considered perspective; site of design. According to Lefebvre (1991), space is a

continuous production rather than a one-off achievement to be implemented, space produces in reaction to the actions being done on it, which makes space not a void to be filled, rather a product to be fused with activities of the user, Lefebvre further categorized and interpreted space into three; representational space, representations of space, and spatial practice. As Ganoe (1999) rightfully stated that there are several theories which explore the understanding of designers and other human interpretations of their built environment, these theories are narrative, semiotic and phenomenological, and they all investigate and explain the use of language and human interactions to understand the human interpretations of the built environment otherwise known as space. In the production of space, Lefevbre (1991) discussed the how recognizing built environments with regards to culture are important ad which may also make spaces have different interpretations across multiple cultures. Meanings that are symbolic which are communicated across individuals to cultures are what are known as semiotics, whereas phenomenology prioritizes the experiences of individuals to arrive at interpretations which are gotten through their feelings and thoughts of the space. Each and every one of these theories contribute very much to the general understanding of our built environments or spaces.

Design and the perspective of the interior space has unfortunately been feminized through time, and this has been attributed to the fat that females have been drawn to the profession more than the male gender, and it has been scientifically been proven that females feel a deeper connectedness to space than males (Havenhand, 2004). Women have a strong connection to their daily experiences and in turn strengthens their self-identity. Women have been attributed with more tendencies of ignoring differences and identifying connections instead, more than their male counterparts, these facts result in female interior designers to have an approach which fuses both subjective and objective interpretations in their adaptation of built spaces. According to Hewlett (1985) the human nature has a theory which states that inhabitation is very much sensitive to us humans as the phenomena of psychology rather than seen as objects, he further argued the most efficient interior space adaptation is not that which comes from visual orientation, technological orientation but rather that which comes from the subject of interiority itself (Perolini, 2011). Spaces are bound by constant change which makes them dynamic, this makes designers conscious of having comprehensive interior space designs that adapt both

aesthetic pleasing looks and functional experience interaction in the spaces they design. Despite these points it is still noteworthy to know that there is a subjective experience to a given space by people which are both conscious and unconscious stemming from the way they interact and react to the space. Prior researches have shown several forms of responses of people to the effect an interior space has on them, these researches have involved studies of the relationships between individuals and the space and also the built space and the natural environment in which it was built on (Dickinson & Marsden, 2009). These kinds of studies give insights on how value can be added to the design process of interior spaces with respect to positive engagements of human satisfaction and respect for the environment at large (Poldma, 2010).

2.6.1 Elements of interior space

- Space: Among the documented elements of interior spaces, space has been noted to be the most important element that needs to be gotten right due to its critical function of affecting all other elements of interior space. Space plays the role of the foundation of the elements of interior spaces, a proper implementation of space as an element is to ensure the proper utilization of the provided physical boundaries of a place that forms an interior, which is presented as a three-dimensional space in interior architecture; height, width, and length. Space as an element is subcategorized into two; negative and positive space, where negative space is considered the space that is left empty, positive space is considered to be the space that contains objects. The proper use of space means to strike a harmony between the positive and negative space within a place, often guided by the need of the dweller and the specific function of the place, the three dimensions of a space may be left empty or filled with objects subject to the desired perspective of design and desired function of the space (McCarter, 2016).

- **Lines:** Lines are among the elements of interior spaces, lines are the vertical, horizontal and dynamic aspects that shape a space, they aid in guiding the human eye. Lines as elements of interiors spaces are created using different aspects of a space, they may be created using objects within a space as well as the structural design of a place, lines are guided to form a harmony of unity and contrasts, to which they ultimately achieve a sense of stability within the space. Lines as elements of space are utilized in so many aspects to achieve different forms within a space, lines are used to give and achieve width and length in a space, not properly and efficiently

utilizing lines may result in a bad or boring aspect of sense of space within a place. Line have a critical role to play with regards to their functions as elements of interior spaces, hence the necessity of achieving balance in the use of lines in a space. Interior architects and designers make use of lines through incorporation of line of different forms to convey the desired effect within an interior space (McCarter, 2016).

- **Form/Shape:** Form is generally considered to be a product or collection of lines within a space, form or shape is combination of all three forms of lines or just a proper utilization of one or two of the three; vertical, horizontal and dynamic lines. Form and shape refer and relates to the perceived physical feel a three-dimensional space, forms of space are generally perceived in two forms; geometric and natural forms, geometric forms are made up of lines considered as hard or squared in edges, which are usually synthesized by humans, while natural forms of a space are generally the naturally occurring forms created by nature itself. A really influential factor to form and shape is the proportions of a space, proper consideration of this ensures the achievement of harmony among the elements of a space, it has been noted and reported that a typical pleasant form in a space is achieved through the use of repetition of minor objects within a space (McCarter, 2016).

- **Pattern:** Pattern as an element of interior space is a collection of forms which are themselves a collection of lines. Like their counterpart element of interior space; form, patterns are elements which accentuate a space, pattern is considered as an element which achieves texture like effects when it is combined with color which ultimately adds appeal to an interior space, pattern usage in a space factors in aspects such as geometry and stripes. Patterns are very critical in providing a heightened sense of space in a place, the proper and adequate use of patterns in a space is dependent in striking a balance and achieving balance between it and every other element of the interior space (McCarter, 2016).

- **Light:** Light is an element of interior spaces, and a very critical one too. Light as an element enables every other element within a space radiate to its full potential by functioning at an optimal level, light as an element is categorized into sub categories: task lighting, mood lighting, and accent lighting. Light as an element to be harnessed in a space needs a clever undertaking of understanding the quantity and quality of the space and how light is needed to complement

it. Light as an element and its efficient use always emphasizes the consideration of natural lighting in every space before artificial forms of lighting, light as an element has the ability to achieve both functional versatility in heightening the sense of space and also defining the sense of a space through defining the atmosphere (McCarter, 2016).

- Color: Color as an element of an interior space is considered to be to light what form is to lines. Color is an element which transcends the popular misconception of being just an aesthetic choice in an interior space, color plays a function for influencing the entirety of the mood to be felt in an interior space. Color is used to cultivate and influence the energy being felt in a space. Colors are elements which hold certain messages that need to be manipulated accordingly in their placement within a space, colors are known to stir and manipulate emotions of people in an interior space and provoke certain psychological responses, color as an interior space element is highly dependent on light to have its intended function optimally translated to achieve the desired output it was intended for (McCarter, 2016).

- **Texture:** Texture is one of the elements of interior space that often gets confused with pattern in function as elements of interior spaces. Texture is regarded as the feel of an object, this may be in the sense of metaphor or literal translation to how an object feels or the sense it resonates within a space. Texture within a space is also often overlooked, however texture is a desired element and emphasis needs to be given to it to properly achieve harmony within a space and also heighten the sense of space of a place, texture is used to translate the sense of depth in a space and usually comes in two categorized forms: visual and actual texture. Visual texture is the texture which is perceived through sight, and actual texture is the texture which is perceived through touch feel (McCarter, 2016).

2.7 Sense of Place

Sense of place in architecture is a term which is often used, sense of space is an architectural term used to describe the relationship between humans and space, this is often done within the context of the characteristics of the environment and the subjectivity of the imaginations of humans with the environment. It is safe to say sense of place is a subjective experience which may vary from one person to another, but it is noteworthy to understand it is very much influenced by the objective context of the environment. Hence sense of place can be defined as

the experience that spans from the sentimental affection and judgement of a place by a person experiencing it, and what a place or space is able to create in people experiencing it in the context of having a sense of belonging within the space (Mohammed et al. 2017).

The study of humanity such as the disciplines of sociology, psychology and architecture itself have had a descriptive and scientific viewpoint with regards to the topic of sense of place, in which place is a containment where people have the experience of existence all together, and doing so through the effect of events and incidents which also have an effect on the overall human orientation. According to Relph (1976), a place in the context of sense of place transcends being a mere location, rather it is a space which encompasses itself and everything else within it, which makes it a phenomenal entity with meaning. The empirical stand point on the subject of sense of place is based off the features of a place with regards to cognition of the place's components, such as the human variables and the environment itself, which further implies a space gets and finds meaning in what is contained within it; its elements (Gruter, 1999). Another explanation which is used to define sense of place was forwarded by Thomas Niss which is a more comprehensive contextual view of the definition given by Canter's model, in Thomas Niss's framework he defined sense of place as a system of sociological and physical elements which are both interpreted by the activities going on within the environment (Mohammed et al. 2017).

2.7.1 Theory of sense of place

Sense of place is used as term by many professionals inclusive of architects and urban planners to refer to the unique quality a community derives, according to Jackson (1994) there is a presumption that a unique quality of a place is derived from the guidance of a force otherwise known as a spirit. Sense of place needs a careful and conscious selection of functional and symbolic characteristics in order to achieve the desired effect in a space, these characteristics include but are not limited to cultural characteristics of a people and their community (Ryan, 2002). Sense of place is rightfully defined by its features which express it and give it meaning by forming its character and give an experience with that regard. Sense of space has been attributed with several elements which come together in harmony to cooperate and produce the

sense of space, there have been theories which are known to be created by physical and social factors of an environment to define sense of a place. Figure 2.1 below depicts the interactions between social and physical environments and in their various aspects with the interactions of real-life things known as habitus (Campello et al. 2013).

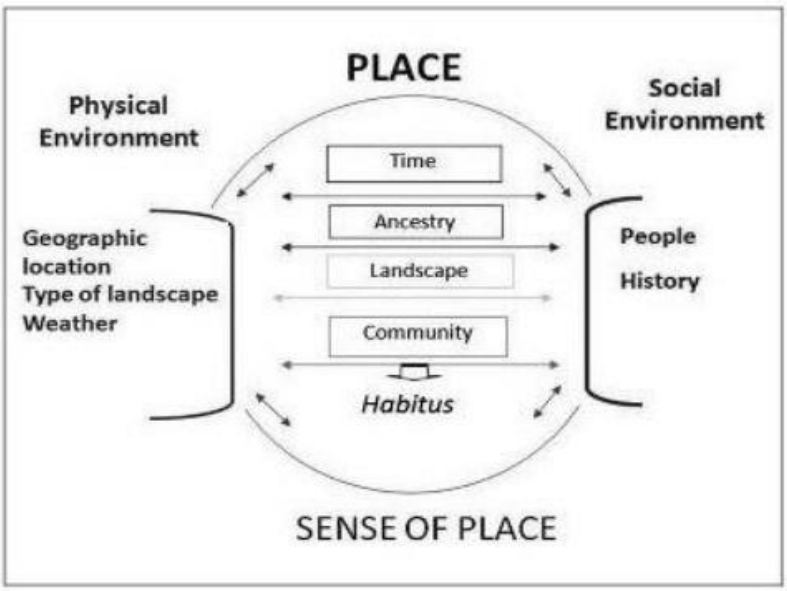

Figure 2. 1: Model depicting sense of place (Campelo et al. 2013)

Sense of place is believed to be a concept which entails of multidimensional conceptualization, this concept is said to be of features which are both physical and psychological, however it is also noteworthy that sense of space is a concept which is believed to be subjective with relation to the individual experience of the environment by a subject which is again predetermined by the persons cognition and behavior, hence the conclusion that the experience of sense of space by individuals heavily depends on the cognitive variable of an individual (Jorgensen & Stedman, 2006).

2.7.2 Sense of place measurement

The subject of sense of place has seen multidisciplinary approaches which all tried to define it, an example of such is the sociological perspective which emphasizes the characteristics of a place and social process while psychological perspective emphasizes an individual identity point of view, then the anthropological perspective which places emphasis on the effects of cultural

symbolism on a place (Low, 2000). According to Adroin (2006), sense of place contains four individual dimension elements which are: personal/psychological elements, socio-cultural context elements, biophysical environmental elements and political/economic elements, as depicted in Figure 2.2 below.

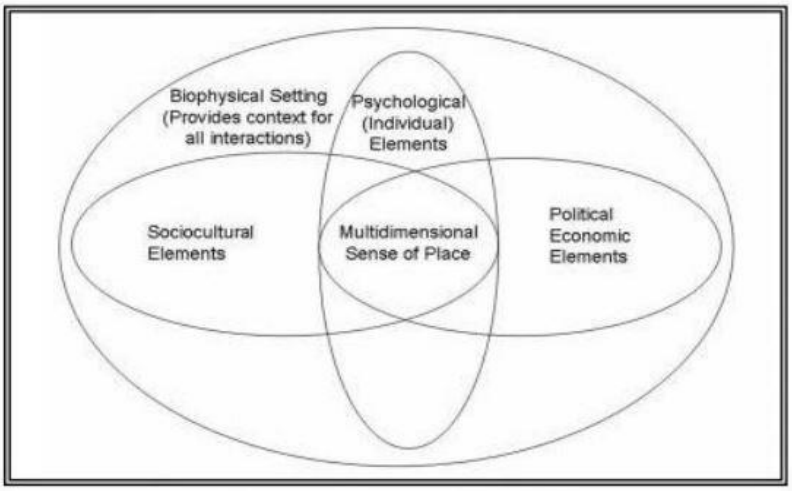

Figure 2. 2: Sense of place dimensions (Ardoin, 2006)

The importance of sense of place cannot be overemphasized in the realm of architecture, especially in interior architecture and should be given utmost priority by both architects and interior designers when carrying a space formation project. The relationship between people and a place or their surrounding is a summation of their attachment to the space which results to the sense of space they have, while this is well established, the subject of sense of space still needs further comprehensive studies especially the interior architecture aspect of the discipline of architecture (Jencks, 2005).

2.7.3 Components of sense of place

According to Twigger and Uzzell (1996), there are components which can be specifically used to effectively investigate and measure sense of place, these identified and reported components are place attachment, place identity, and place dependence as shown in Figure 2.3 below. Place dependence has been described and attributed to the provision of a place which is functional to this regard which could be both aesthetic and other seeming functions of a place, dwellers of a space tend to have a dependence on it, especially when a space has the desired condition required

by an individual, this has an immense effect on the familiarity perceived by the individual (Anton and Lawrence, 2014).

There have been studies which have researched the placement of place dependence as a hypothesis for sense of place and stated how it is subjective an relative according to individuals using a space but there was not any found consistency in such subjective differences (Farnum et al. 2005).

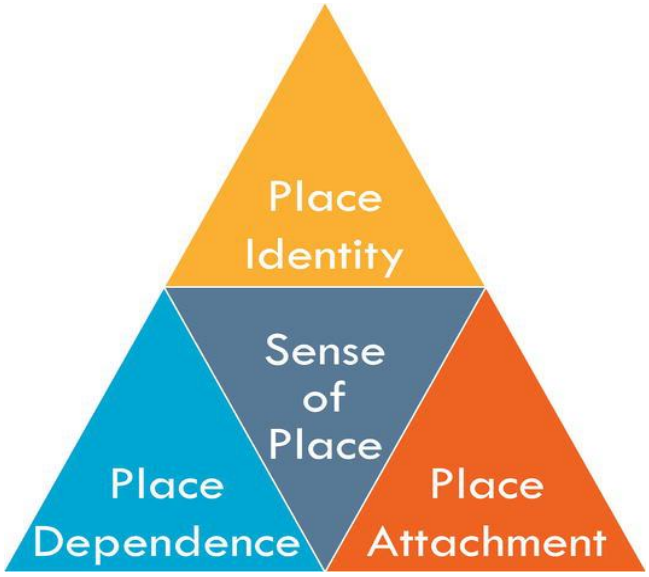

Figure 2. 3: The three subcomponents of sense of place (Kate et al. 2020)

Place identity as a component of sense of place has been described as place dependence's emotional counterpart as a component of sense of place, as opposed to place dependence being measured or quantified based on the functions of a place to cater to activity, the component of place identity is a concept which captures the construction of self of identity for an individual within a place (Manzo, 2003), there is a symbolic relevance in which a place constructs in the emotions of individuals which gives the feeling of self-identification in a place to individuals, an example of such emotional sense of identification can be seen in instances where water features giving high place identity to an individual may make a person have the sentiment of feeling water as an element is part of their personality (Anton & Lawrence, 2014).

Of the three components of sense of place, the identified subcomponent which has seen more interest in research and studies is the component of place attachment, this has been associated with the fact that it has the broadest and ambiguous sense that its counterparts with regards to being components of sense of place (Scannell & Gifford, 2010). Some literatures have even put sense of place and its component of place attachment as one and the same which makes them synonyms (Anton & Lawrence, 2014), place attachment as a component is a factor which captures the individual's emotion with a place, by gauging the relevance and importance of the place to the said individual, this captivation of emotion is known to transcend the dependencies and resources in a place (Tuan, 1974). Place attachment has been known to be increased by the local relationships to the elements found in a place, for instance the frequent visit to a place and having memories in such places creates a bond between an individual and a place, this is supported by the findings of Hammitt et al. (2004) which stated there is a high place attachment in people with repetitive use of a place. The study of place attachment, place identity, and place dependence as components of sense of place as contributing factors of to it have not been able to have an established clear cut between the boundaries of these sub components of sense of place, several literatures have found variations in the relationships between them and how they interact with one another (Mulvaney et al. 2020).

2.7.4 Place attachment

People have the need to form attachment to many things. They not only form attachments to others but they also form attachment to the environment and places around them (Lewicka, 2010), (Morgan, 2009). Just as attachments to others are important parts of being human, so are the attachments that people form to places. In this regard, studies on place attachment present insight on the diversity of meanings humans associate with the physical environment (Kyle et al., 2004). The source of place attachment is examined a mixed-use area in order to learn what draws individuals to a place, and to better predict how users and visitors may react to place. Stedman (2008) knows it an evaluative dimension of place; in other words, it describes how much place means to us.

Commencing by 1970th, phenomenological studies are the earliest sorts of literature introducing place attachment. Yet, they matured in 1992 when Altman and Low published their comprehensive discussions regarding place attachment. This formed the theoretical foundation for supporting subsequent studies in this field. Low & Altman (1992) defined place attachment as an emotional connection between people and their surroundings. They asserted that place attachment comprises of interactions between affect and emotions, knowledge and beliefs and behaviors and actions regarding a place. Manzo (2005) argued that whilst place focuses on the environmental setting, the focal point of attachment is affected. The seminal literatures revealed that affect, emotion, and feeling are the most frequently reported central ideas of place attachment, and the questions constructed by researchers who studying place attachment demonstrated it. In addition to affective aspects, attachment includes cognitive and behavioral aspects. In other words, besides the feelings people have about a place, they hold certain beliefs or memories about it, and act certain ways in places, Tuan (1977) hints to this relationship when he discusses about attachment as the accumulation of memories and experience in place, and Proshansky et al. (1983) talk about the interplay of affective, cognitive and conative clusters in their work with place identity. Place attachment also is defined as a state of psychological well-being resulting from accessibility to a place or a state of distress upon separation or remoteness from a place (Giuliani & Feldman, 1993).

Some scholars argue that long term interaction with place and memories that occur through could create attachment. While Tuan (1977) explains that it is also possible to form attachments quickly i.e., kind of love at first sight. Manzo (2005) also found that places can be assigned meaning quickly through linking the memory of an important event occurring in a specific place. Manzo (2005) called these pivotal or flashpoint moments, and these meanings connected to a particular place form the foundation for place attachment.

Farnum et al. (2005) asserted that people-place interactions are often formed through psychological procedures rather than physical contacts. It means people do not have to have physical interactions with places for making strong emotional bonds with these places. They might also integrate strong affections with mental representative places that they have never

been there. In this case, they may associate strong feelings towards some environmental components and convey the same feelings to the other places with the similar elements. In other word, they make a mental representation of the places with strong emotional impacts, and judge the new places in accordance to how these places fit in their expectations of places. Consequently, the appearance of places may elicit some levels of emotion, no matter one has previously experienced it or not. However, this may not assure that outlook of places can always shape the emotional attachments to these places and it highly depends on the existing bonds formed through previous environmental experiences.

CHAPTER 3

METHODOLOGY

3.1 Case Study Analysis Methodology

According to Kellert and Calabrese (2015), the practice of biophilic design involves the application various strategies of design. This variation of design strategies is dependent on factors such as landscape of a project, construction regulations, economic constraints and lastly the cultural and ecological conditions around. The analysis of our case studies will follow observation and report of the attributes of biophilic architecture and design which fall under the experience of space and place; prospect and refuge, organized complexity, integration of parts to wholes, transitional spaces, mobility and way finding, and cultural/ecological attachment to place.

3.2 Prospect and Refuge

Humans have been reported to evolve in response to how they adapted to prospect and refuge which they benefited from. The subject of prospect as an attribute of biophilic design refers to the long views of surrounding settings where people in a space have the ability to perceive both opportunities and danger, while the subject of refuge gives the feeling of safety and security within a given space. Prospect and refuge as attributes of biophilic design are complementary factors which give two critical conditions in a built environment which are function and aesthetic satisfaction. Prospect and refuge as attributes can be achieved through designs which exhibit vistas to the exterior from the interior, having visual connections between compartments in an interior space, and a proper setting of secured sheltered space.

3.3 Organized Complexity

Complexity is a desired factor in people whether it’s in a natural environment or in a human built environment, complexity have been known to embody richness and opportunities in a given space. In a s much as complexity is a desired factor in a given space, when it is presented in excess then it becomes undesirable, it becomes both confusing and chaotic. Complexity as an attribute of biophilic design and as a naturally desired factor becomes satisfying in a given space

when it is presented in an orderly manner, complexity of a space presents the embodiment of variability and diversity, when complexity is well organized it gives a space the feeling of connection and coherence.

3.4 Integration of Parts to Wholes

There is a natural desire of people to have a space which comprises of several desired parts to be put together to form an integrated system. The integration of several parts into a whole in biophilic design and architecture can be achieved through the use of successional and sequential liking of spaces, this may also be achieved through the use of clear boundaries in a space, the integration of parts to whole are sometimes enhanced and strengthened through the use of a central point which could be either a functional aspect, aesthetic aspect or even both functional and aesthetic.

3.5 Transitional Spaces

This attribute of biophilic design and architecture is particularly dependent on the success of the implementation of easy navigation of a space through the use of easy and clear transitions within a space. Transitions in a space can be successfully achieved through the utilization of design elements such as thresholds, hallways, doors and gateways which may link some compartments of the space wither from the exterior to the interior or even interior compartments together. Transitional spaces can be used in an effective manner when linking courtyards, patios, porches, colonnades and more of such.

3.6 Mobility and Wayfinding

The wellbeing and comfort of people has been often associated to free movement in a space which is diverse and often regarded as complex. Mobility and wayfinding are attributes of biophilic design and architecture which are critical in fostering and also enhancing the feeling of prospect and refuge, such as the use of points of entries and pathways and their absence may breed the feeling or sense of confusion and anxiety in people within a space.

3.7 Cultural and Ecological Attachment to Place

Over time humans have evolved into as territorial creatures, this have enabled us to enhance our territorial habits of resource control and the ability to enhance our security and safety, and also

the facilitation of convenient mobility and movement. Humans have an affinity towards places and spaces they feel familiar to because of the territorial inclination it gives, and these are enhanced through cultural and ecological means. Designs that are culturally relevant have the tendency of promoting connection between people and place which gives a sense of identity, while ecological connections to a place foster a suitable emotional attachment to place, especially if the ecology is relatable to familiar landscapes. Cultural and ecological attachment to place in the context of biophilic design and architecture can be achieved and enhanced through the utilization of flora and fauna that are indigenous and utilization of meteorological conditions.

CHAPTER 4

CASE STUDIES

4.1 Case Study Selection

This research has been proposed and carried out with the primary objective of studying the effects of biophilic design on sense of place in interior spaces. In line with the aims and objectives and the methodology selected for the proposed study; qualitative analysis, case studies have been selected to be analyzed within the context of the research topic. All selected case studies are restaurants in Jordan.

4.2 Case Study: Ward Restaurant, Amman, Jordan

Ward Restaurant is a prominent restaurant built in the capital city of Jordan; Amman. Ward restaurant has been upheld as a restaurant designed to embody and uphold sublime Arab hospitality which is known for welcoming and spectacularly receiving guests. The restaurant was designed to reflect what the restaurant hopes the customer walks out of the restaurant which is the feeling of great generosity, high end services, exceptional food, and overall comfort within the restaurant which will leave the customer with the feeling of wanting to come back. The name *Ward,* which the restaurant was given is coined from the Arabic word for rose, this name was given to the restaurant in an attempt to mimic a rose garden in the overall design and architecture of the restaurant.

The ward restaurant is designed and built with two separate sitting sections, with the sole purpose of catering to the change in seasons, with one section of the restaurant designed to cater to Summer and Spring seasons, while the other is designed to cater to the winter season.

4.2.1 Prospect and refuge

Prospect and refuge as attributes of biophilic design and architecture are one of the really ambiguous elements in the design and architecture of Ward restaurant. Elements which are synonymous to prospect and refuge in the principles of biophilic design include long views which include vistas to the exterior while being in the interior, the Ward restaurant has a very

elaborate court yard which is equipped with a glass ceiling. The glass ceiling feature provides the court yard the complete compliment in requires to give a feeling of sitting in an outdoor environment, while it functions as a shield of refuge from the harmful elements of the exterior environment without disrupting the functions of the courtyard. Most of the summer and spring season section of the restaurant is contained under the clear glass ceiling of the restaurant which puts people at a very good position in seeing and feeling the beauty of the season's natural atmosphere, another distinct design element in the Ward restaurant which is synonymous to prospect and refuge attribute of biophilic design is the seamless visual connections between the areas of the restaurants, Figure 3.1 below shows the glass ceiling of the Ward restaurant, the glass ceiling does not only provide the refuge and prospect attribute to the interior of the restaurant but also serves as a source for adequate natural lighting to the interior of the restaurant.

Figure 4. 1: Front view of Ward restaurant, Amman (source: www.wardrest.com)

Figure 4. 2: Interior of the Ward restaurant under the glass ceiling (source: www.wardrest.com)

4.2.2 Organized complexity

The Ward restaurant is a complex structure which embodies several attributes of the attributes contained in principles of biophilic design and architecture, perhaps based off a checklist all the attributes of biophilic design within the categories of direct and indirect experience of nature are present in the design of the Ward restaurant. The Ward restaurant embodies several biophilic attributes which have been designed and organized to work harmoniously as a continuous system, the ward restaurant has so many parts but has no feeling of disconnection between the parts or attributes, each and every attribute of biophilia is carefully placed to compliment the next attribute. The organized complexity noticed in the Ward restaurant greatly compliments the attribute of integration of parts to whole, because a properly organized complexity in an interior ensures adequate integration of parts to form a whole system.

4.2.3 Integration of parts to whole

The Ward restaurant has a significant feature, which is its design to have two sections mean for comfortable service delivery to its customers as climatic seasons change in the course of a year. The winter section of the restaurant and the summer and spring section of the Ward restaurant

have been designed and built in such a way that they integrate to one another seamlessly, the winter section of the restaurant have been designed with so much elaboration on biophilic design principles as much as the summer and spring section which has been designed to integrate with the exterior of the restaurant seamlessly. The interior of the restaurant has been well designed where all compartments are connected by successional and sequential links, despite the seamless link between the two sections of the Ward restaurant, they all have a distinct feel to their sectionalism, and hence its adequate implementation of integration of parts to whole as an attribute of biophilic design and architecture. Figure 4.3 below shows a part of the restaurant with a sequential link of the space in the Ward restaurant.

Figure 4. 3: A view of the Ward restaurant showcasing a sequential link between two compartments (source: www.wardrest.com)

4.2.4 Transitional space

Restaurants like all spaces require a great deal of ease of navigation to ensure comfort of people. The use of transitional spaces is a very efficient way to ensure ease of navigation in and around an interior space, according to the transitional spaces attribute of biophilic design the use of doorways, thresholds and gateways are efficient ways of ensuring adequate transitional spaces

in an interior, the Ward restaurant has been adequately and efficiently equipped with very distinct space transition elements, where almost all compartments and sections of the restaurants have doorways and or thresholds to transition into the next space compartment and section. These include transition even within the internal compartments, where the upper floors of the restaurant have been equipped with thresholds and large windows to have a view of the central glass ceiling covered courtyard. Figure 4.4 below shows a view depicting some of the transitional spaces of the Ward restaurant.

Figure 4. 4: Interior view of Ward restaurants and some of its transitional spaces (source: www.wardrest.com)

4.2.5 Mobility and wayfinding

The Ward restaurant has enormous interior pathways which allow for comfortable movement within and around the restaurant without having to discomfort anyone sitting and enjoying their meal and other service. This significantly enhances the mobility and wayfinding attribute of the

biophilic design and architecture principles, the pathways meant for use in mobility and way finding have been properly defined through their design and construction.

4.2.6 Cultural and ecological attachment to place

The Ward restaurants use and implementation of cultural and ecological attachment to place as an attribute of biophilic design and architecture has been elaborately implemented. The cultural and ecological attachment to place attribute of the Ward restaurant begins with the name of the restaurants before even visiting and entering the restaurant, its name signifies a garden, which is a very important part of the Jordanian architecture, gardens play critical roles in the Jordanian architecture, and using such a name delivers an expectation of a garden on an intending visitor. On entrance into the Ward restaurant; one is greeted by the plant and fauna in the restaurant, while an ambiguous fountain plays a significant role as a center piece in the restaurant. Plants and flowers used in the design of the Ward restaurant interior and exterior were al carefully selected and ensured they are indigenous to the region. Other cultural aspects of the Ward restaurants interior design include the use of subtle traditional Jordanian architecture and design to compliment the overall contemporary design and architecture of the restaurant, these include the interior windows and threshold designs, use of locally sourced marbles and sandstone. Figure 4.5 shows a view an aerial view of the restaurant's interior showcasing the water fountain and interior plants/flowers.

Table 4.1 shows the outlined implemented features and their corresponding attributes in the biophilic design principles category of experience of space and place.

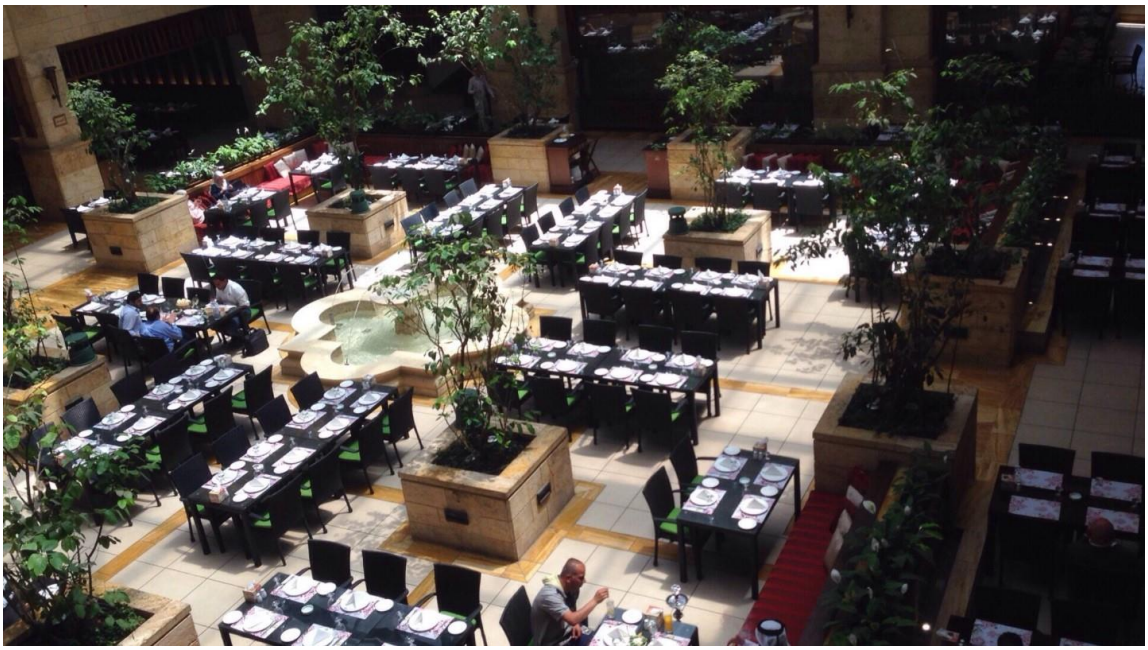

Figure 4. 5: Internal aerial view of the Ward restaurant courtyard (source: www.wardrest.com)

Table 4. 1: Ward restaurant experience of space and place attributes and their implemented features

Experience of Space and Place Attribute	Features
Prospect and refuge	Long views, vistas to exterior, very large glass ceiling.
Organized complexity	Several elements of biophilic design adequately put together to work as one.
Integration of parts to wholes	Two distinct sections of the restaurants seamlessly connected as one through successional links.
Transitional spaces	Adequate thresholds and doorways throughout the large interior space.
Mobility and wayfinding	Adequate and properly defined comfortable pathways.
Cultural and ecological attachment to place.	Indigenous plants and fauna, central water fountain, locally sourced materials, subtle Arabic architectural elements.

4.3 Case Study: Lucca Steak House, Amman, Jordan

Lucca Steak house is a restaurant in Amman the capital city of Jordan which is a part of the Lucca Steakhouse franchise, which has numerous steakhouse restaurants in other cities of the world with the same name. The restaurant was designed by Engineer Basemah Abdulkarim and built in 2014, designed with contemporary architecture and ambiguous biophilic features. Lucca steak house is located in the heart of an urban city but the design of the restaurant was made to ensure the feeling of a remote farm setting is achieved on the customers coming to eat. The restaurant is furnished with lots of wood features and plant fauna features which are ideal to ensure the feeling of a farm.

The Lucca steakhouse also has some really vibrant steak themes, this steak theme can be seen from the logo of the restaurant which is a cattle head, this theme is seen all through the restaurant in so many variations.

Figure 4. 6: Entrance of Lucca Steak house (source: www.livinginjordanexpat.com)

4.3.1 Prospect and refuge

This attribute of biophilic design has been well implemented in the Lucca streak house, the restaurant has been designed with a feature which exhibits prospect and refuge according to the requirements of the biophilic attribute in a very thoughtful design which serves multiple functions. The Steakhouse has a section of the restaurant which serves as both exterior and interior of the restaurant, with a retractable roof and glass walls this section of the restaurant successfully achieves the objective of giving both prospect and refuge to people sitting inside, where the favorable climate and weather can be enjoyed through retracting the roof, and the unfavorable climate can also be avoided by closing the roofs, the glass walls of this section ensure a visual connection to the outside world even when the roof has been closed off, and this elaborate glass walls also serve as a source of adequate natural lighting into the restaurant. Figure 4.7 shows the retractable roof and the glass walls of a section of the Steak house restaurant which confirm to the prospect and refuge attributes of biophilic design and architecture.

Figure 4. 7: A view of the retractable roof and glass wall of Lucca steak house (source: www.livinginjordanexpat.com)

4.3.2 Organized complexity

Organized complexity as one of the key elements of biophilic design and architecture has been fairly implemented in the Lucca steak house restaurant. This restaurant has been successfully designed to provide both direct and indirect experiences of nature, where the theme of the restaurant's design is based on mimicking a farm house setting experience this has been successfully achieved through the use of well thought out wooden furniture, indoor plants, and even the use of life-sized cattle statues to provide the farm feeling to the users of the space. The several elements used in the interior of the Lucca steak house have been carefully designed and organized to achieve the organized complexity feature of biophilic design and architecture. Figure 4.8 shows one of the outdoor experience features which were carefully placed in the interior of the Lucca steak house restaurant.

Figure 4. 8: Design features in Lucca steakhouse giving an outdoor experience indoor (source: www.livinginjordanexpat.com)

4.3.3 Integration of parts to whole

The Lucca steak house by design has two compartments which have been design and built to integrate seamlessly together. One section of the restaurant has the effect of fully submersing customers into an interior environment, while the other section of the restaurant gives the effect of been in both the interior and the exterior, depending on the feature manipulation choses; retractable roof and glass walls. Lucca steak house has very well-designed successional links between sections and sequential links, with both sections having their distinct feeling projection but both sections work together as one with the careful execution of the integration of parts to whole biophilic design and architecture attribute.

4.3.4 Transitional space

Transitional spaces are a very essential attribute to biophilic design, Lucca steak house design has been equipped with very adequate transitional spaces which give a clear and concise margin to each and every section of the restaurant. Lucca steak house has very few doors integrated to its design, the only doors are those doors leading to the exterior and the restrooms, the entirety of the interior of the Lucca steak house is designed with windows and thresholds. The elaborate transitional spaces of the Lucca steak house enable easy and comfortable navigation in and around the restaurant, some of the transitional spaces can be seen in Figure 4.9 below.

4.3.5 Mobility and wayfinding

The Lucca steak house has adequate interior pathways and space. However, contrary to the function of giving proper mobility and wayfinding by these pathways and adequate space, there is a challenge in mobility and wayfinding within the restaurant. Most of the challenges faced by the restaurant's interior and wayfinding can be primarily associated with the furniture placements of the restaurant, where it is obvious that when sits are not pushed under the tables then there is no adequate space to walk between some aisles without discomforting somebody else. Figure 4.10 shows some of the tight aisles between tables in the Lucca steak house restaurant.

Figure 4. 9: A view of a transitional space from the interior to exterior in Lucca steak house (source: www.livinginjordanexpat.com)

Figure 4. 10: A view showing closely arranged tables with narrow walking aisles (source: www.livinginjordanexpat.com)

4.3.6 Cultural and ecological attachment to place

The use of cultural and ecological elements which are associated with the environment on a built space plays a significant role in exhibiting and projecting sense of place on people, hence its role as an attribute of biophilic design and architecture. Lucca steak house uses some ecological attributes of Jordan, these includes the use of Banana plants and Dracaena plants within the interior space, this is however polarized by the overall theme of the restaurants which is designed based on a western farm house style rather than a middle eastern or Jordanian styled farm house theme. The overall style of the restaurant's design is heavily influenced by a foreign culture which dominates the indigenous cultural elements found within the restaurant, and hence could not deliver on the cultural and ecological attachment to place attribute of biophilic design and architecture.

Table 4.2 shows the outlined implemented features and their corresponding attributes in the biophilic design principles category of space and place in Lucca steak house restaurant.

Table 4. 2: Lucca steak house experience of space and place attributes and their implemented features

Experience of Space and Place Attribute	Features
Prospect and refuge	Retractable roofing and glass walls
Organized complexity	Several elements of biophilic design, with both interior and exterior experience within the interior space.
Integration of parts to wholes	Seamless successional links between spaces, and harmony of connection between sections.
Transitional spaces	Adequate thresholds and windows in the interior space, giving good transitions between spaces.
Mobility and wayfinding	Inadequate spacing between sitting aisles.
Cultural and ecological attachment to place.	Inadequate cultural and ecological features which have attachment to place

4.4 Case Study: Romero restaurant, Amman, Jordan

Romero restaurant is an Italian restaurant situated in the heart of Amman, the capital of Jordan. Romero restaurant in Amman is part of a chain of multiple restaurants which started in 1979. The chosen Romero restaurant was built in 2014 designed and built by Nabil Goussous Architects, the restaurant was designed from the theme of an Italian country villa, which was chosen to match the Italian menu cuisine in its services. The restaurant was built with the sole purpose of having “a small piece of Italy” in the heart of Jordan. Romero restaurant has an enchanting ambience to it which compliments its enticing and indulging cuisine.

Figure 4. 11: Entrance of Romero restaurant (source: www.romero-jordan.com)

4.4.1 Prospect and refuge

The Romero restaurant as described in its introduction is designed and built as an Italian countryside villa in an attempt to ensure the total experience of the Italian cuisine when customers enjoy their meals. Being that the restaurant is situated in the urban city of Amman, to ensure the restaurant gives the feel of a countryside, it was adorned with lots and loads of plants flowers around it, the plant and fauna gives the restaurant a complete feel of a countryside untamed nature. The interior of the restaurant has a complete visual experience of the natural

scenery around the built exterior thanks to its massive glass windows which ensure stunning visual of the exterior, while providing the comfort of refuge from the natural scenery as described in the theory of prospect and refuge. This attribute of prospect and refuge of the biophilic design and architecture has been optimally checked by the massive window feature of the restaurant. Figure 4.12 below shows a view of the restaurant's exterior from the interior using the glass windows. The parts of the restaurant which have these massive glass facades are called the "The sunny corners".

Figure 4. 12: A sunny corner in Romero restaurant (source: www.romero-jordan.com)

4.4.2 Organized complexity

The Romero restaurant has a well thought out design where several design components have been carefully put together harmoniously to work as a single system. The entirety of the restaurant beats the odds of an urban location with a very conducive and countryside looking and feeling atmosphere, these is as a result of the putting together of several complex elements to work as one. Where the elaborate plants and flowers surrounding the building are ensured to

be adequately experienced by the people inside the restaurants, careful selection of furniture to compliment the architectural style of the restaurant. It is safe to say the intended objective of bringing a piece of Italy has been achieved through the organization of the elements and features of the restaurant. Figure 4.13 shows an image of Romero restaurant with a view of its elaborate and beautiful interior.

Figure 4. 13: A view of Romero restaurant's beautiful interior (source: www.romero-jordan.com)

4.4.3 Integration of parts to whole

Romero restaurant can be described as restaurant with many sections and compartments it. It has several porches and courtyards which are around the vicinity of the main restaurant building, all of the features of the restaurant have been carefully designed to integrate into a whole system to work together, there is no part of the restaurant which feels isolated from the other parts of the restaurants, yet they all serve their distinct and peculiar functions in the restaurant. Figure

4.14 below shows a porch on the exterior of the restaurant which has a seamless integration with the restaurant's interior section.

Figure 4. 14: A view of a porch at the Romero restaurant (source: www.romero-jordan.com)

4.4.4 Transitional spaces

The Romero restaurants has been equipped with several windows as part of its "The sunny corners" concept design around the restaurant which give adequate view of the exterior of the restaurant. However, within the context of transitional spaces which requires thresholds, doors and gateways as transitional spaces, the Romero restaurant is not significantly equipped with such features to satisfy the transitional space attribute of biophilic design and architecture.

4.4.5 Mobility and wayfinding

Mobility and wayfinding within the interior of Romero restaurant is fairly adequate. The vast interior of the restaurant is successively segmented with thresholds in between, the adequate lighting especially through the use of natural lighting ensures the way finding and mobility of

the restaurant's interior is better. The furniture in the restaurant is carefully set out to ensure comfortable movement for staff and customers.

Figure 4. 15: A view interior transitional space in Romero restaurant (source: www.romero-jordan.com)

4.4.6 Cultural and ecological attachment to place

Within the context of the attribute of cultural and ecological attachment to place, the Romero restaurant would have been a perfect restaurant if it was set out somewhere in Italy, because it is an efficient execution of the Italian theme it was intended for. However, as efficient as the theme of the restaurant is, it does not check the cultural and ecological attachment to place and the people of the indigenous people of Jordan. Even the plants and flowers in the vicinity of the restaurant were carefully selected to project the ecological attachment of Tuscany, which is a town in Italy. The restaurant particularly has a welcome sign at the entrance of the restaurant which reads "Welcome to Tuscany" as that is the primary objective of the Romero restaurant

with regard to cultural and ecological attachment of place. Figure 4.16 below shows an image of the welcome sign at the entrance of Romero restaurant.

Table 4.3 shows the outlined implemented features and their corresponding attributes in the biophilic design principles category of space and place in Romero restaurant.

Figure 4. 16: A welcome to Tuscany sign in the premises of Romero restaurant (source: www.romero-jordan.com)

Table 4. 3: Romero restaurant experience of space and place attributes and their implemented features

Experience of Space and Place Attribute	Features
Prospect and refuge	Massive glass windows around the restaurant.
Organized complexity	A careful recreation of the Italian atmosphere through several architectural and ecological elements.
Integration of parts to wholes	Porches, courtyards and the interior connected in harmony.
Transitional spaces	Inadequate transitional spaces from the interior to the exterior.
Mobility and wayfinding	Adequate mobility due to adequate lighting and comfortable successions between sections
Cultural and ecological attachment to place.	The complete cultural and ecological attachment to place of the restaurant connects to a different region.

4.5 Case Study: Bun-Bun Donuts and Coffee, Amman, Jordan

Bun-Bun is a modern coffee house built situated in Amman, Jordan. It was designed by the Jenan Albaw, following biophilic design principles to make use of relatively small space to achieve an optimal space utilization and achieving a good sense of place for people sitting in the café. Of all the chosen case studies Bun-Bun coffee house is relatively the smallest of all the case studies, and obviously the one which was executed with the least budget. Bun-Bun coffee house is also the newest of the case studies. Figure 4.17 shows the entrance to the Bun-Bun coffee house.

Figure 4. 17: Entrance of Bun-Bun coffee house (source: www.bunbunjordan.business.site)

4.5.1 Prospect and refuge

The Bun-Bun coffee house has limited space to use and deliver the attribute of prospect and refuge as the other case studies have done. Within the literal four walls of the coffee shop, it has only one wall exposed to the exterior as the other three walls are between other shops and buildings. The one wall exposed to the exterior has been well utilized by the design of Bun-Bun coffee house, as it is designed and built with mostly glass windows and a glass door, which ensure a comfortable vista to the exterior and allow the penetration of natural light. This adequate use of the only wall exposed to the exterior has managed to provide the coffee house with the attribute of prospect and refuge in biophilic design and architecture principles, giving the coffee shop both aesthetic and functional pleasing characteristics.

4.5.2 Organized complexity

Organized complexity attribute of biophilic design and architecture in Bun-Bun coffee house has been implemented in very simple forms, which is partly due to the relatively small size of the coffee house. The coffee house is adorned with artificial plants and flowers to give it a feeling of experience with nature, these artificial natural features are carefully place at the center of the coffee house which makes it properly visible to everyone to ensure the intended experience is felt. The coffee house has managed to mimic an exterior environment in the interior of the building through its design by carefully placing several elements, the coffee house is visibly a coming together of complex elements in its interior design, yet it embodies the feeling of connected variability and coherence. Figure 4.18 shows a view of the central artificial plants and flower features placed in the coffee house.

4.5.3 Integration of parts to whole

Bun-Bun coffee house despite being a relatively small space, has utilized the small space efficiently in its design. The small coffee house has two distinct floors, which is the ground floor and a top floor which is accessible using a staircase which goes round a central lighting chandelier hanging down from the top floor down to the ground floor, this provides an integration of the two parts seamlessly. This central chandelier has formed a focal point for the entire coffee house where it is visible from all angles of the coffee house which helps it achieve the integration of parts to whole in the coffee house. Figure 4.19 below shows how the central chandelier hangs from the top floor down to the ground floor.

Figure 4. 18: Bun-Bun coffee house central artificial plants and flower features (source: www.bunbunjordan.business.site)

Figure 4. 19: Bun-Bun central chandelier hangs from the top floor down to the ground floor (source: www.bunbunjordan.business.site)

4.5.4 Transitional spaces

The Bun-Bun coffee house is equipped with a single transitional space which connects it from the interior space to the exterior space, and that is the primary and only entrance into the coffee house. The singularity of the transitional space is very much justified due to the relatively small size of the coffee house as there are no other opportunities to create more transitional spaces. The design of the coffee house has used mirror placements in the interior to achieve a feeling of transitions in its relatively small space, mirrors are carefully placed along the stairwell and the sitting areas of the top floor to provide a transitional effect in the interior space. Figure 4.20 shows a view of the top floor with carefully placed mirrors to give a transitional effect.

4.5.5 Mobility and wayfinding

Bun-Bun coffee house has a very peculiar sense of comfort with regards to mobility and wayfinding. The coffee house is not made uncomfortable by its small size for people inside, as the space has been adequately executed and made comfortable for way finding, as everything is within sight and every component of the coffee house is placed not to interfere with the wayfinding within the interior of the coffee house.

Figure 4. 20: Bun-Bun coffee house top floor with carefully placed mirrors to give a transitional effect (source: www.bunbunjordan.business.site)

4.5.6 Cultural and ecological attachment to place

The Bun-Bun coffee house is contemporary styled coffee house. The coffee house is not furnished or equipped with traditional or cultural features which attach it to its place, and same goes to the ecological features placed in the coffee house, the artificial plants place in the interior of the coffee house are not mimicking the natural plants and fauna found in Amman; Jordan.

Table 4.4 shows the outlined implemented features and their corresponding attributes in the biophilic design principles category of space and place in Bun-Bun coffee house.

Table 4. 4: Bun-Bun coffee house experience of space and place attributes and their implemented features

Experience of Space and Place Attribute	Features
Prospect and refuge	Massive glass entrance and glass façade make up the only exterior wall of the coffee house.
Organized complexity	Several complex elements, such as artificial plants and flowers mimicking an exterior natural environment.
Integration of parts to wholes	Central chandelier lighting spanning from top floor to ground floor.
Transitional spaces	Single transitional space but adequate for the size of the coffee house.
Mobility and wayfinding	Comfortable mobility and way finding around the coffee house with carefully placed interior elements such as furniture.
Cultural and ecological attachment to place.	Inadequate cultural and ecological attachment to place.

CHAPTER 5

FINDINGS AND DISCUSSION

Sense of place being defined as the emotional relationship between places and people have been indicated by research literature to have some attributes associated to it. These attributes include physical attributes, activities and some other meanings associated with places which enhance the sense of place of a place. The tangible and non-tangible elements in a place are the attributes and characteristics of a place which come together to contribute to the creation of the meaning of a place. While every place is built for a specific purpose, the overall experience of the place is inevitably influenced by the psychological and perceptual aspects of the place, where the experiences by people influence the perception of the people of the place, and these experiences include personality, knowledge, and culture.

Places have different levels of perceived sense of place, and literature as shown in Kellert and Calabrese (2015) have identified the attributes which influence and affect the perceived sense of place with regards to biophilic principles of design and architecture. Where under the category of experience of space and place of biophilic principles, the following attributes were identified as factors influencing and affecting sense of place: prospect and refuge, organized complexity, integration of parts to whole, mobility and wayfinding, transitional spaces and cultural. Ecological attachment to place. These factors were used to analyze the chosen case studies of this research and the following findings were reported.

5.1 Ward Restaurant, Amman, Jordan

The Ward restaurant as our first case study, has been a well-rounded thematic case study. Ward restaurant has checked all the boxes of the biophilic attributes of the experience of space and place. The restaurant has in its architecture and design been equipped with features of biophilic design in line with the requirements of biophilic architectural principles. Ward restaurant has long views which extend from the interior of the building to the exterior environment which is a very good implementation of the attribute of prospect and refuge according to biophilic design, also the restaurant has been well furnished with elements which speak to the ecology and the

culture of the locals of Amman. With elements such as indigenous and locally found plants and fauna elaborately adorning the design of the restaurant, this provides one of the important experiences of sense of place, as people feel more connected to their local environment and culture. The interior space of the Ward restaurant has been adequately designed with doorways and thresholds which check the box of having transitional spaces as an attribute of experience of space and place, well designed and comfortable pathways in the interior design of the restaurant exhibit the perceived experience of mobility and wayfinding in the restaurant.

Ward restaurant is a building which has been carefully and well designed to achieve a proper experience of space and place. The restaurant has successfully achieved the integration of several complex part to form a whole system which successfully gives a good and adequate experience of sense of place to people vising the restaurant.

5.2 Lucca Steak House, Amman, Jordan.

The Lucca steak house is the second case study which that was visited and analyzed for the purpose of our study. Lucca steak house has been found to be a particularly interesting case study, it is also a thematic restaurant like most of the case studies, however its successful implementation of a country farm setting in a restaurant which is situated in an urban location is highly commendable. Lucca steak house is well furnished with elaborate biophilic elements which stay true to the intended theme of the restaurant.

Lucca steak house has design attributes which check almost every box for the experience of space and place. Lucca steak house has a retractable roofing with glass walls in one of its sections which conform to the prospect and refuge attributes of experience od space and place, it also very elaborate successional links between its interior spaces which gives off a harmonious connection between the spaces to check the box of transitional space in the restaurant. However, there are two attributes which Lucca steak house has unfortunately not particularly implemented well with regards to attributes of experience of space and place, these are the attributes of mobility and wayfinding, and the cultural and ecological attachment to place. Lucca steak house has inadequate spacing between the aisles of the sitting arrangement, and the theme of the restaurant despite being elaborately successful, it is not a country farm theme which conforms

to the culture of the people of Jordan, rather it is a country farm theme of an Italian cattle farm, and this has disconnected the restaurant from having an indigenous cultural and ecological attachment to place with respect to principles of biophilic design and architecture.

5.3 Romero Restaurant, Amman, Jordan

Romero restaurant is part of a franchise chain of restaurant which are designed to deliver a specific theme to several parts of the world; a small piece of Italy. The Romero restaurant in Amman which studied for our research is designed according to the franchise requirement of their restaurants. This restaurant is very specific to its theme of design which is to ensure the delivery of an Italian country side villa experience, this experience is rooted in both the architecture and cuisine of the restaurant. Romero restaurant has been designed and built to mimic the prospect and refuge which is possible in a country villa, prospect and refuge as an attribute in Romero restaurant has been achieved through the provision of vistas from the interior to an exterior which has been carefully designed to mimic a country side natural environment with carefully designed gardens and courtyards.

Romero restaurant has successfully achieved the delivery of the Italian countryside villa to the urban city of Amman. While ensuring the success of the overall experience of the Italian culture and the connection to the local ecology of an Italian town, this restaurant has deliberately done so at the expense of the cultural and ecological attachment to place which is required in the experience of space and place attributes of biophilic design and architecture. The complete cultural and ecological attachment experience of the Romero restaurant is an experience which is designed and intended to connect to Tuscany in Italy. It is clearly written at the entrance of the restaurant "*welcome to Tuscany*", and this is the significant setback of the Romero restaurant with regards to a total experience of space and place attributes of biophilic design and architecture.

5.4 Bun-Bun Donuts and Coffee, Amman, Jordan

Bun-Bun coffee house is relatively the smallest case study which was analyzed in this research. However, it is notable to report that Bun-Bun has a very good use of its relatively small space to achieve considerable experience of space and place attributes implementation. Bun-Bun

coffee house has been furnished with attributes of space and place experience which are required in the design principles of biophilic design and architecture. The interior of Bun-Bun coffee house has utilized its exposed wall to the exterior environment in providing a vista view to the exterior by the use of a glass façade at its entrance, this feature has checked off the box of prospect and refuge for the coffee house. Other features which exhibit mobility and wayfinding, organized complexity, transitional spaces, and integration of parts to whole have been well implemented in the coffee house and can be seen in the analysis section of the coffee house.

However, with regards to the attribute of cultural and ecological attachment to place, Bun-Bun coffee house has inadequate features to make it conform to the attribute with respect to the requirements of biophilic design and architecture. The contemporary design of the Bun-Bun coffee house can be attributed to the deficiency of the coffee house to this regard. Where the entirety of the design is contemporary, and the choices of the artificial plants and flowers used in the interior design are not of indigenous species of plants and flowers found in Jordan.

CHAPTER 6

CONCLUSION

The variability of the levels of perceived sense of place in different places is subject to the individual attributes which each place has implemented in its design. Places which have been associated with high perceived sense of place have been associated with encouraging people to feel more comfortable and also encouraging them to dwell longer in such spaces. Places which have a high level of sense of place perception do not only encourage the increase in the time spent in them and revisiting them, they also contribute to the human wellbeing as stated in several literatures that have researched that aspect of biophilic design and architectural principles.

This study has exposed us to a comprehensive understanding of the subject of sense of place with regards to the principles of biophilic design and architecture and how it influences and contributes to it. Where the sense of place of a built space has been seen to incorporate several attributes which include sociocultural dimensions, perceptual dimensions, and psychological dimensions. One of our case studies; Ward restaurant, has been found to have checked all the boxes of the required attributes of the experience of space and place, and the notable edge it has over most of the other case studies is the attribute of the cultural and ecological attachment to place. Two of the analyzed case studies; Romero and Lucca, lacked the attribute of cultural and ecological attachment to place, and this is because of the intended design themes of the restaurant. Lucca and Romero restaurants are designed to deliver experiences which are not indigenous to Jordan, hence the compromise to the overall experience of sense of place as suggested by the attributes of biophilic design and architecture.

Places and the meaning attached to them clearly influence the perception of sense of place. With factors such as modernity and globalization playing a significant role in defining places and contributing to place lessness. The subject of sense of place perception in a built space has to factor in the full experience as perceived by the people who visit and experiences-built spaces. Even though attributes which are have been found to influence and affect sense of place have

been clearly defined by the principles of biophilic design, the measurement of sense of place still remains a challenging concept. However subjective it is to perceive sense of place, the recommended methods to harness the feeling of sense of place in a built environment as recommend by the attributes of experience of space and place are clearly objective ways to improve the feeling of sense of place in a built environment.

This analysis of the case studies has shown the efficiency of adhering to the attributes of experience of space and place in the design of built spaces to enhance sense of place. When these attributes are carefully implemented, they ensure the implementation of elements which are associated to boost perceived sense of place, despite location, budget, or size of the built space. Bun-Bun coffee house as a case study has shown the efficiency of the attributes of experience of space and place according to biophilic design principles, Bun-Bun coffee house has impressive sense of place attributes which were optimally implemented in its relatively small space and relatively low budget, a sense of place which by the standards of biophilic design principles is only lacking in cultural and ecological attachment to place. Also, case studies such as the Romero restaurant have been analyzed to compromise on the possible implementation of the complete attributes of experience of space and place.

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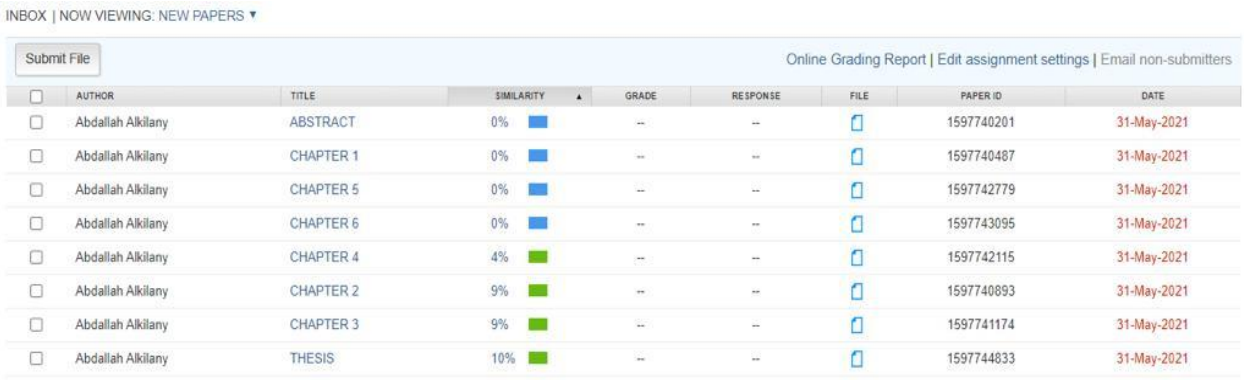
APPENDICES

Appendix 1: Similarity Report



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Appendix 2: Ethical Approval Document

YAKIN DOĞU ÜNİVERSİTESİ

ETHICAL APROVAL DOCUMENT

Date: 10/06/2020

To the **Graduate School of Applied Sciences**

The thesis titled "Sense of Place in Biophilic Interior Spaces: A Case Study of Jordan'' has been evaluated. Since the researcher will not collect primary data from humans, animals, plants or earth, this project does not need to go through the ethics committee.

Name Surname: Prof. Dr. Zeynep Onur

Signature:

Role in the Thesis: Supervisor