FACTORS AFFECTING THE BIOPHILIA APPLICATION AT WORKPLACES OF IIUM'S GOMBAK CAMPUS

BY

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ABSTRACT

The concept of biophilia in the workplace has many advantages for employees, such as increased productivity, creativity, and well-being. The key research issue of this study is identifying the current application for biophilia in the selected workplaces (IIUM) and the type of biophilic pattern. Understanding and stimulating the relationship between human beings and nature are essential to protecting the earth. Connecting humans to nature is important in protecting biodiversity and ecosystems because biophilic elements connect human beings to nature in their modern urbanized societies. The existence of biophilia in living spaces has a redeeming psychological impact and a sense of well-being among individuals. This study evaluates the factors (awareness, preference, and experience) that influence biophilia in the workplace and focuses on two elements of biophilia (plants and water). It weighs on the biophilic patterns such as nature in architecture. It also investigates the lack of biophilic elements in the workplace and the awareness of biophilia among employees while identifying the factors that influence biophilia in the workplace. A mixed methodological approach is employed, utilizing an exploratory sequential design that involves observations and questionnaire surveys. The results show that awareness and preference have a positive and significant relationship with biophilia application, while work experience has an insignificant effect. The observations reveal two types of patterns: visual connection with the plant at some offices and material connection with nature.

خلاصة البحث

إن مفهوم البيوفيليا داخل مكان العمل له العديد من الفوائد للموظفين، مثل زيادة الإنتاجية والإبداع والرفاهية. تكمن المشكلة الرئيسة في تحديد التطبيقات الموجودة في مكان العمل داخل الجامعة الاسلامية العالمية ماليزيا وما نوع النمط البيوفيلي الموجود في مكان الدراسة. إن فهم وتحفيز العلاقة بين البشر والطبيعة أمر أساسي للحفاظ علي البيئة. أكد العديد من الباحثين أن ربط البشر بالطبيعة خطوة أساسية لحماية التنوع البيولوجي والنظام البيئي. عناصر البيوفيليا تربط بين البشر والطبيعة في المناطق الحضرية الحديثة ووجود البيوفيليا داخل البيئة المبنية له تأثير نفسي إيجابي بين الأفراد. يقوم هذا البحث بتقييم العوامل)الوعي والتفضيل والتجربة(التي تؤثر علي تطبيق البيوفيليا في مكان العمل .وينصب التركيز علي عنصريين من عناصر البيوفيليا) النباتات والماء(، ويقييم البحث في البيوفيليا داخل مكان العمل على أساس النمط البيوفيلي والمتمثل في الطبيعة في الفضاء .كما أنه يبحث في نقص العناصر البيوفيلية في مكان العمل والوعي بالبيوفيليا بين الموظفين مع تحديد العوامل التي تؤثر على البيوفيليا في مكان العمل. يتم استخدام نهج منهجي مختلط ،باستخدام تصميم تسلسلي استكشافي يتضمن الملاحظات واستطلاعات الاستبيان. تظهر النتائج أن الوعي والتفضيل لهما علاقة إيجابية وهامة مع تطبيق البيوفيليا، بينما خبرة العمل لها تأثير ضئيل على تطبيق البيوفيليا. تكشف الملاحظات عن نوعين من الأنماط ،الاتصال المرئي مع النبات في بعض المكاتب والاتصال المادي بالطبيعة.

APPROVAL PAGE

I certify that I have supervised and read this study and that in my opinion, it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a thesis for the degree of Master of Science (Built Environment).

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DECLARATION

I hereby declare that this thesis is the result of my own investigations, except where otherwise stated. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at IIUM or other institutions.

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Signature..... Date.....28 December 2021

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

This study evaluates biophilia's application at indoor workplaces and primarily focuses on the plant and water elements. In addition, factors that influence the awareness level of the application of biophilia, positive experience and preferences of employees at the workplace were considered in the study.

Factually, architecture was associated with nature. Since the ancient civilizations, humans established their civilization near natural elements, especially rivers, such as the ancient Egyptian civilization (Sarathi, 2015). Architecture is distinguished in the past because it is driven by biophilia, where access to Nature was easy and constructed by using engineering lessons from Nature (Salingaros, 2019).

The researchers summarize Biophilia's meaning as "*to love life and living things*" in a single word. The combination of two root words, "bio" and "philia", entails the positive feelings, which people have for their living spaces within the natural environment. It develops a sense of positivity against the fears of human beings. The practices of human beings can justify such a premise in their day-to-day activities. It is prevalent to have decorative plants in living places and gardens, taking care of pets, visiting parks, gardens, and trips to the zoo; all these are pleasing to the human behaviour while preserving nature's aesthetic beauty (Kurnia, 2017). The core biophilic concepts are based on human nature to love; researchers believe the comprehensive meanings of "Bio" as "alive or to live" and "philia" relates to the positive emotions and attractions in which human beings feel towards their environment. It can also be compared to fear or phobia, which is the opposite feeling of "philia". Fear or phobia can

be categorized as deep fears that humans can feel for a living space, objects, other beings in the surrounding environment, or their actions (Kayıhan, 2017).

Biophilia has received attention in recent years due to its positive effect on humans in the built environment. Meanwhile, the increasing migration of people to live in the urban environment made them isolated from nature (Bean, 2020). Biophilia provides people with healthy and healing spaces to live; biophilia showed a significant effect on employees' mental and physical health, well-being, and performance (Gray & Birrell, 2014). According to Wilson (1984), biophilia signifies human desire and inclination towards nature (Kellert, 1993). The biophilia theory supports maintaining the natural environment and connecting with nature (Krčmářová, 2009) as well as psychology and sociology theories which are studying the human and how to maintain nature, for human survival and limit the harm that may cause to the environment (Akintunde, 2017). Besides, biophilia focuses on addressing these shortages of contemporary building and landscape practice by creating a new framework for the satisfying experience of nature in the built environment (Kellert et al., 2011; Browning et al., 2014). The biophilic design embodies the various components from the environment, the components such as vegetation, air, light, colour, space, materials, and shapes affect the physiology and psychology of human beings. Such information can be transformed into knowledge by the architects, designers, and developers while modelling structures used as occupancy for humans and improving their healthy lifestyle (Grazuleviciute-Vileniske et al., 2020).

There are three ways to connect with biophilia in a built environment, i) Direct Experience of Nature, ii) Indirect Experience of Nature, iii) Experience of Space and Place; based on the elements of biophilia, such as plants, light, water, air, animal, fire, etc. (Kellert & Calabrese, 2015). Biophilic elements have a positive effect

on the employees at the workplace. Human space reports have confirmed biophilia elements to an increased level of well-being by 15%, level of productivity by 6%, and creativity level by 15% at the workplace (Cooper & Browning, 2015). Several studies have examined the benefits of biophilia on employees regarding performance, productivity, psychological comfort, and well-being.

Biophilia design within the built environment can be achieved in various ways. Firstly, by having close contact with nature and living organisms. This part reflects the therapeutic effect of nature (Othman et al., 2018; Bratman et al., 2019). Secondly, artificial creativity follows engineering rules to simulate natural organisms and influence them by repeating positive therapeutic observations (Bratman et al., 2019). Also, there are no strict design rules for biophilia. Many factors affect the selection of biophilia based on the applications' choice; some of them are as follows: project conditions and landscape used, varying economic, logistical, and regulatory factors, and cultural and ecological conditions (Kellert & Calabrese, 2015).

The workplace environment has an essential role in employees' health, performance, production, and satisfaction (Veitch & Gifford, 1996). There are two types of points of view in the workplace environment according to the influence of employees; i) lean workplace, which is a workplace without nature; ii) green office, which is a workplace with nature. In the 1970s, employees' complaints began from the working environment; the solutions started with workplace design, but the design solution was not enough to improve the workplace and employees' comfort and well- being (Bergs, 2002). The complaints were about air quality, thermal comfort, lack of green space, and sunlight (Cooper & Browning, 2015). NASA said that the materials used in construction, finishing materials, and devices have a role in air pollution (Stutte et al., 2012).

The workplace's natural environment issues have a substantial interest in the researchers, organizations, institutions, and companies. Recently, there is a need for the workplace's role in environmental protection to become more prominent; companies need to be more responsible towards the environment (Wassmer et al., 2014). In today's uncertain world, organizations support their employees to be active and enable them to progress more effectively. Organizations require personnel who are active regardless of their position in the organizational hierarchy. Corresponding to the awareness that employee engagement in a greening workplace is crucial to organizational environmental stewardship and performance, scholars have increasingly studied pro-environmental behaviour at work (Afsar et al., 2016).

This study evaluates the factors that affect the use of biophilia at the workplace by evaluating the factors of i) awareness, ii) experience and iii) preference that affects biophilia application and then evaluating the level of understanding of biophilia at the workplaces and identifying which types of biophilia application used in workplaces.

1.2 PROBLEM STATEMENT

Most of the world's city population are isolated from the natural environment (Kayıhan, 2017). The emergence of sick building syndrome (SBS) in the 1970s has affected people who spend long periods inside a building (Abdul-Wahab 2011). Many employees also complain about occupational stress and sick building syndrome at the workplace. NASA has shown that there are many volatile gases harmful to human health resulting from the finishing materials of buildings and electrical appliances within the built environment (Stutte et al., 2012).

Furthermore, the physical environment is an aspect of the workplace environment that directly impacts human health and can impose slow changes in interpersonal

interactions and thus productivity and performance (Edem et al., 2017). Many factors can affect the workplace environment and one of these factors is green space. The term lean office describes the deprivation of plants and all green manifestations in the workplace (Haberkorn, 2005). Nieuwenhuis and Haslam (2014) conclude that employees who work in a green office feel great and are more satisfied than the employees working without any green spaces. In the human space report, almost 47% of workplaces worldwide still lack natural light and 58% lack any green spaces (Cooper & Browning, 2015).

The workplace environment affects people significantly as they spend about 90% of their time indoors (RCF group, 2018). It can cause many diseases including mental health and occupational stress (Hui & Aye, 2018). The percentage of mental illness among employees is 54%. In the United Kingdom, the proportion of employees with mental health is one-third of all employees (Mental Health at Work Report, 2020). In Canada, the rate of mental illness due to stress at work was about 34% (Howatt et al., 2018).

According to the AIA Malaysia Survey, the percentage of stress and depression among employees was 50.2% and the number of days lost due to absence related to staff illness rose to 73.1 days per employee annually in 2018. Also, 98% of Malaysian employees are at risk of bed trauma and long-term mental health (AIA HWP, 2019).

There are some studies on biophilia and the effect of biophilia on humans. Biophilia at the workplace has positive effects on staff productivity, wellbeing, and creativity (Cooper & Browning, 2015; Huyh & Torquati, 2019; Clements et al., 2019; Alker et al., 2014; Gilchrist et al., 2015; Knight & Haslam, 2010; Gray, 2017; Gillis & Gatersleben, 2015; Craig, et al., 2010). The positive impact of biophilia on human mental and physical health (An et al., 2016; Stutte et al., 2012; Lohr,

2009; Gallery, 2018; Stanley et al., 2014; Gray & Birrell, 2014; Al-horr et al., 2016). Other studies in Malaysia on the workplace talk about the quality of the internal environment represented by degrees of temperature and performance (Mahbo et al., 2011) and another study on quality of indoor air (Syazwan. et al., 2009) and another on lighting and noise in the workplace (Mydin et al., 2017). It is believed that to accomplish "inner sustainability", then biophilic designs are used. These biophilic designs aim to build a higher perception by restoring nature's elements for human beings. Ecologists and environmental psychologists address such issues in recent times. A lot of buildings with "Nature deficit design disorder" and designers want to help building engineers bring occupants closer to the regenerative power of nature (Berto & Barbiero, 2017). There is an affirmed belief that sustainable architecture's triumph is associated more with conscious user behaviours than the intelligent systems which the building has. Certainly, understanding users' behaviour in the desired direction is possible with the users' sense of belief, acceptance, and satisfaction. Eventually, the biophilic phenomenon within architectural engineering and built environment draw attention towards the spaces, which is thought into greater details in recent times (Kayıhan, 2017). The social dimension of people's behaviour, mainly studied by environmental psychology, should be considered in biophilic strategies (Hidalgo, 2014).

Many studies mentioned above show the positive impact of biophilic on human health and employees' well-being. Cooper and Browning (2015) tried to fill this gap between the concept of biophilia and its application of it in the built environment by using the biophilic design pattern. Based on the literature review, the following problem/gaps can be identified:

1. Employees spend a lot of their daytime in the built environment without nature, which causes an increase in mental health at the workplace (RCF group, 2018).
2. The literature review focuses on the benefits of biophilia at the workplace, which opens the search for other aspects (Cooper & Browning, 2015; Huyh & Torquati, 2019).
3. Less information about the employees' roles to have natural elements at their workplace in which there are many studies about the employees' green behaviour.
4. Less information about the factors that affect used biophilia which there are many studies about the factors that affect preserving the environment and natural elements.

1.3 RESEARCH QUESTIONS

This study addresses the following research questions, which were formulated based on the research gaps identified. (note that RQ1 is for RO1, RQ2 is for RO2…)

1. RQ1. What are the types of biophilia applications?
2. RQ2. What is the level of biophilia understanding at the workplace?
3. RQ3. What is the influence of awareness, preference, and experience on the biophilia application?

1.4 RESEARCH OBJECTIVES

Assessing the implication of biophilia elements at the workplace can be achieved through the following objectives.

1. **RO1**. To identify types of biophilia applications

2. **RO2**. To evaluate the level of biophilia understanding at the workplace.
3. **RO3**. To assess the factors (awareness, preference, and experience) that affect biophilia application.

1.5 SCOPE OF RESEARCH

Biophilia theory focuses on natural elements such as light, air, water, plants etc. The human experience with nature within the built environment is explained by Kellert in three categories: i) Direct Experience of Nature; ii) Indirect Experience of Nature; & iii) Experience of Space and Place. This study focuses on indoor workplaces which choose the workplace at the International Islamic University Malaysia located at the Gombak campus. The researcher chose IIUM because is considered an institution and contains many offices. There are many different offices, but this study selected specific types of offices i) Academic office (KAED, KOE, KOED, AILKOL, KENMS, KICT, KIRKHS, and EDC) ii) Services office (HEALTH WELLNESS, POSTOFFICE, RSD, AND FINANCE). The employees who work in these offices such as the administrative staff were identified as the respondents. The administrative worker spends around 9 to 10 hours at their office. This study focuses on four variables that affect the presence of biophilia at the workplace, i) employees' awareness ii) employees' experience and iii) employees' preference iv) biophilia application. These four variables are elicited by the researcher from different hypotheses similar to biophilia. This research study was performed in various phases between 2019 and 2021. Figure 1.1 explains the scope of the study.

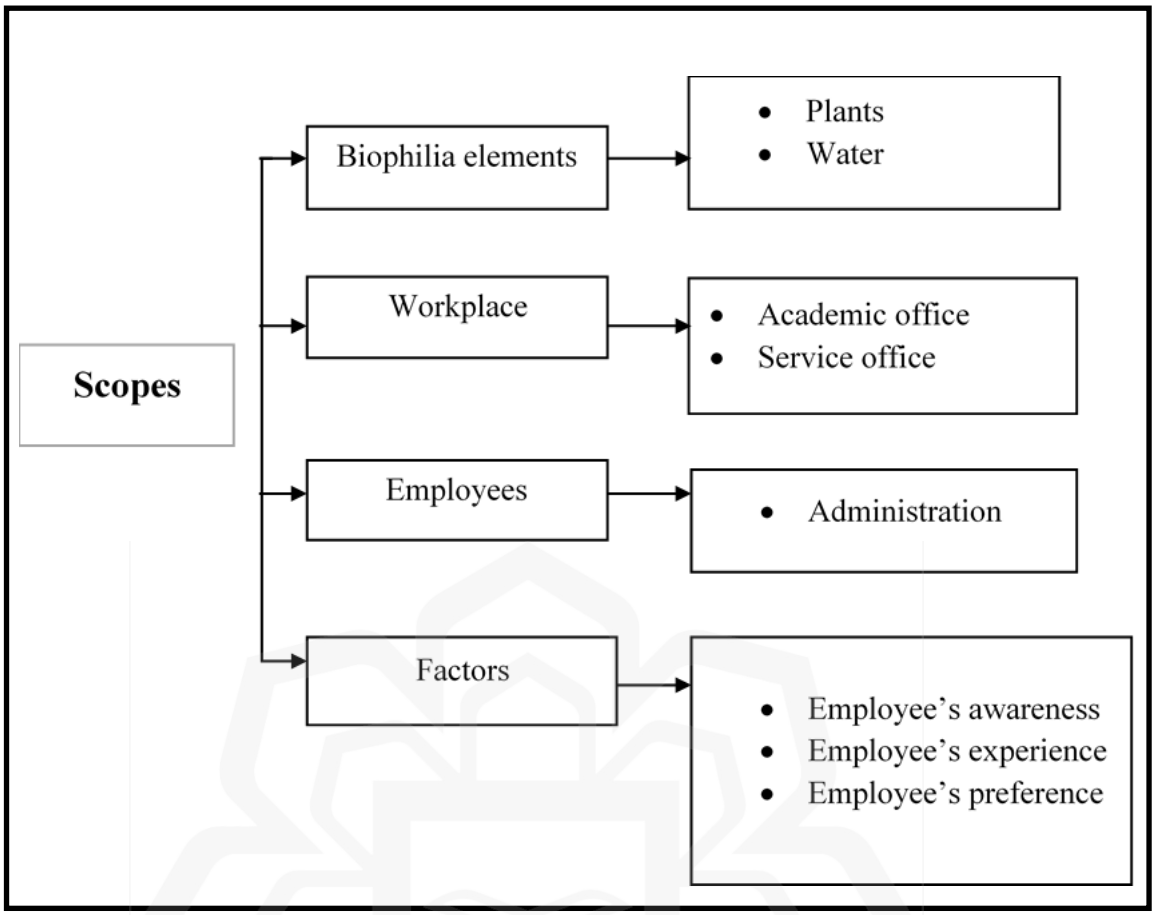

Figure 1.1 Scope of Research

1.6 RESEARCH SIGNIFICANCE

This study's significance is that it provides up-to-date literature on biophilia at the workplace that helps the employer and employees understand the positive benefits of biophilia, such as mental and physical health, productivity, and creativity, and well-being. This study aims to understand the factors that affect biophilia application in the workplace, which help companies and designers address the obstacles of lack of biophilia at the workplace and increase their work efficiency while maintaining a harmonious environment. This study examines some factors related to employees' personality, such as employees' awareness, experience, and preference to give evidence in this factor's positive or adverse effects, which unveils avenues for future researchers to study other factors that are not present in the current and previous studies.

1.7 STRUCTURE OF RESEARCH

This research is presented in five chapters. Each chapter deals with a specific aspect of the research. The chapter and contents are described below:

Chapter one: has recently outlined the background of the study, problem statements, research questions, research objectives, research scope and limitation, and research significance.

Chapter two: emphasizes the literature review—this chapter show an overview background of the biophilia concept, biophilia elements, and benefits of biophilia. Then, employees' issues in the workplace and the benefits of biophilia in employees' mental and physical health. This chapter elaborates on the biophilic theory and other theories related to nature and its elements at the workplace and the employees' perception of the biophilic environment and its existing elements.

Chapter Three: provides details about the suggested method that is to be applied by the research. It elaborates the mixed methodology research design by exploring the factors that affect biophilia application in the workplace, e.g., explaining research population, sampling procedure and sample size, types of research instrument, and instrument reliability data collection and data analysis.

Chapter four: this chapter presents the result of quantitative and qualitative analyses of the study. The data harvested objectives were analysed using SPSS and Excel software and presented using both descriptive and correlation analysis.

Chapter five: Conclusion and Recommendation. This chapter summarizes the research findings and discusses the results of the survey. This chapter also concludes the research by stating its implication, limitations, and recommendations for the workplace at International Islamic University Malaysia and recommendations for further research.

1.8 OPERATIONAL NOMENCLATURE

The following terms are used to describe the study on biophilia at the workplace.

Concept of Biophilia

The studies conducted in the past discuss the association of nature and its elements towards human beings. Humans find tranquillity in a natural setting and develop a sense of affection among one another and their surroundings. Biophilia is more like an inborn affinity among humans-beings towards another form of life (Cambridge Dictionary, 2020). In the early years of 1963, the term biophilia was first coined in the book titled "The Human Heart" which was written by psychologist Erich Fromm. The author defines biophilia as a word concerning a hopeful person, a person who can grow, change, and believe in positive thoughts for the future. In other words, Eric's termed biophilia as the love of life, which is opposite to the word necrophilia, which means escape from life or death (Braune, 2011).

In 1984, the term biophilia was commercialized by E.O. Wilson, an American biologist, in his book 'Biophilia', he reflected his distinctive feeling towards the system and process that have the natural elements of nature. Kellert (1993) and Wilson (1993) report that biophilia is part of the human desire to be in proximity with nature and its elements and identified a link between natural environment and place. Elaborating the biophilic design into the built environment, i.e., embedding nature and its elements within the interiors of architectural spaces (Kellert et al., 2011). In the year 2006, at a conference in Rhode Island, US. The academicians from different sectors such as industrial, government, civil engineering, financial sectors debated over the theory of biophilia, and weighed their opinions about its practice within the built environment. In 2008, a book was authored by Been, about biophilia designs, where he explained the