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Biophilic Design Strategies Performance in Malaysian GreenRated Office Buildings

Asniza Hamimi Abdul Tharim¹, Siti Nurkamilah Idris¹, Mohamad Haizam Mohamed Saraf¹, Asmalia Che Ahmad¹, Edi Purwanto², Issa Tafriidj³, Rahmah Purisari³ and Teguh Prasetyo²

¹College of Built Environment, Universiti Teknologi MARA Perak Branch, Malaysia,

²Department of Management and Jaya LaunchPad, Universitas Pembangunan Jaya,

Indonesia, ³Department of Architecture and Center for Urban Studies, Universitas Pembangunan Jaya, Indonesia

Corresponding Author's Email: asniz286@uitm.edu.my

Abstract

Biophilic design is a strategy to connect humans with nature in the built environment, such as applying greens, natural light and ventilation, and water elements. Previous studies showed that nature could help in enhancing human well-being and psychology. Maintaining personal psychology is very crucial to improve their work performance. One of the ways to do so is by being closer to nature. However, their work nature limits their interaction with the natural environment. Hence, this is where biophilic design comes to the rescue. Biophilic design has massive impacts on occupants' psychological performance, yet there is a lack of awareness and knowledge of Malaysian biophilic design. This research aims to determine biophilic design strategies' performance in Malaysian green-rated office buildings. The objective was achieved through biophilic design strategies checklist observation and questionnaire survey distributed to the respondents of Malaysia green rated office buildings. A five-point Likert scale questionnaire was distributed using an online platform, and only 167 (60%) were returned. The data obtained from the questionnaire survey were analyzed using SPSS version 24. The occupants' perceived psychological performance findings indicated that they agreed on each item of the questions. Thus, it is hoped that this research can contribute to biophilic design strategies, knowledge, and professionalism.

Introduction

In 2009, Prime Minister Datuk Seri Najib Razak launched The Green Technology Policy (GTP). It is a practical approach that aims to increase the quality of life and create a better environment for the people. Subsequently, all government office buildings were starting to implement the Green Building Policies. Parallel with the 11th Malaysia Plan, which highlighted green growth and economic growth, the scope of this building will be focusing on the government green-rated office building that has been certified by GBI as the government has produced several strategies to improve productivity, especially in the public sector (11th

Malaysia Plan). Hence, this research focuses on the office buildings certified by the Green Building Index (GBI) around Kuala Lumpur, Malaysia. Kuala Lumpur is a capital city in Malaysia and a famous urban city that is a center of economic growth where the town is packed with office buildings. An essential element to determining a successful business and nation's economic growth is the well-being of the occupants (Hui & Bahauddin, 2019). Growing concern to promoting a healthy workspace to enhance occupants' well-being in terms of psychology is the reason for this research to highlight occupants' perceived psychological performance where it will cover perceived productivity, perceived emotions, perceived cognitive function, perceived stress, and perceived well-being. The environment of the office will indicate the occupants' psychology. Moreover, the main agenda of Malaysia Vision 2020 not only calls for full development and economic growth for the country but also highlights the psychological aspect of the people (Saadation, 2011).

Perceived Psychological Performance

Performance psychology is the sub-disciplines of psychology. Performance psychology can be defined as examining the psychological factors that influence human performance and improve and maintain from various psychological perspectives such as emotions, productivity, cognition, action, and perception (Raab et al., 2015). Thus, the factors influencing occupants' performance are motivations, personality, leadership, and work environment (Nair, 2017). Performance psychologists typically apply this technique to high-end performers who want to strive and be the best in their respective fields, for instance, sports, business, and performing arts (Peter, 2008). Nowadays, many psychologists are interested in human reactions toward the environmental factors that might influence business outcomes. Specifically, they are interested in the synergy between individuals and their work environments. This factor may be a crucial element of both employees' success and the happiness of their role in the organization. The office environment is essential in occupants' performance, whether they can produce positive or negative outcomes. An excellent office environment has a significant impact on occupants' performance as it can reduce the number of absenteeism and directly lead to an increase in productivity at the workplace. Moreover, a good office environment could significantly impact occupants' lifestyle, work-life balance, and health fitness (Naharuddin & Sadegi, 2013). Other factors that could carry towards the discomforts of the occupants are lighting, ventilation, and noise. Occupants who constantly complain about their dissatisfaction and despair are the ones who have slow performance. Employees are responsible for comforting their occupants to support their work performance (Naharuddin & Sadegi, 2013). Based on the previous reading on the literature review of working environment, working performance, productivity in organization, occupants' perceived psychology, and job satisfaction, the researcher has concluded that these five (5) items; productivity, emotions, cognitive function, reduce stress, and well-being must be included and covered for this thesis topic on occupants' perceived psychological performance. These items are needed to improve occupants' performance.

Methodology

The research design is quantitative by conducting observation and distributing questionnaires for selected respondents to determine occupants' perceived psychological performance in green-rated office buildings. Hence, the previous Prime Minister of Malaysia, Tan Sri Muhyiddin Yassin, declared Movement Control Order (MCO) in March 2020. Unfortunately, due to this situation, the distribution of questionnaires cannot be done face

to face. All the questionnaires were created using Google Form. During the pilot study and actual data, the collection phase was 100% distributed via online platforms such as emails and WhatsApp. The distribution of the questionnaire was delayed so many times. Besides, 80% of government employees during that time were working from home (WFH), which makes it more complicated to collect the data and to achieve the specific number of respondents for this research. A five-point Likert scale questionnaire was distributed using an online platform, and only 167 (60%) were returned. The data obtained from the questionnaire survey were analyzed using SPSS version 24.



Analysis and Discussion

The observation of biophilic design strategies was conducted for the direct experience of nature, the indirect experience of nature, and the experience of space and place. The observation procedure was carried in weekdays for the duration of three (3) hours. All the checklist score was tabulated using Microsoft Excel and to compare each strategy and element for two (2) zones of the floor. Two (2) government offices that have a green-rated score by GBI were given permission to the researcher to conduct the observation at their respective offices. For this observation method, the score point was adapted from the GBI assessment criteria for Non-Residential New Construction (NRNC) (Green Building Index, n.d.). Table 2 summarizes the biophilic design strategies: direct experience of nature, the indirect experience of nature, and the experience of space and place of the selected case study in Malaysia green rated office building. The researcher was using GBI index classification: platinum, gold, silver, and certified for the findings as the researcher was adopting the assessment criteria to measure the index or score point of biophilic design in the Malaysia green-rated office building. This is because Malaysia does not have the proper tools and modules to measure or assess the biophilic design strategies. Table 1 shows the reference of index classification.

Table 1
GBI Index Classification

Points	GBI Rating
86 to 100 points	Platinum
76 to 85 points	Gold
66 to 75 points	Silver
50 to 65 points	Certified

Table 2
Biophilic Design Strategies in Case Study Buildings

Strategies	Building A		Building B	
				
	GBI Rating: Platinum		GBI Rating: Platinum	
	Lower Zone(points)	Upper Zone(points)	Lower Zone(points)	Upper Zone(points)
Direct Experience of Nature	33	25	47	40
Indirect Experience of Nature	22	17	19	19
Experience of Space and Place	19	19	13	13
Total Score	74%	61%	79%	72%
Findings	Silver	Certified	Gold	Silver

Based on the table above, Building B has the highest overall score points for biophilic design strategies for both zones compare to Building A. For the direct experience of nature, Building B managed to achieve 47 points for the lower zone and 40 points for the upper zone. Building A only managed to get 33 points for the lower zone and 25 points for the upper zone. For the indirect experience of nature, Building B achieved 19 points for both zones. Meanwhile, Building A achieved 22 points for the lower zone and 17 points for the upper zone. Next, for the experience of space and place, Building B was able to score 13 points for both zones and Building A able to score 19 points for both zones. Table 3 indicates the overall questionnaire analysis findings of this study.

Table 3

Analysis of the Occupants' perceived psychological performance in Malaysia green-rated office building towards biophilic design.

	Item	Mean	Rank
Emotions	01 I feel that a harmonious environment can stabilize my emotions while doing my work	4.1538	1
	02 I feel that a calm environment in an office building can develop positive emotion	3.8521	2
	03 I've been feeling relaxed in my office environment	3.5148	4
	04 The space of my office building makes me feel energetic	3.3787	6
	05 The decoration and colors of my office buildings make me feel cheerful	3.4556	5
	06 I can control my emotions while working because my office building has a calm environment.	3.7160	3
Well-being	07 I feel that the presence of a water feature inside the office building can maintain my well-being	3.84507	2
	08 I feel that my working environment can improve my state of well-being	3.9586	1
	09 I am satisfied with my mental well-being when working in this office building	3.6213	3
	10 I feel it is worth working in this office building for my well-being.	3.6213	3
Cognitive Function	11 I feel that elements of nature, such as plants and water, can increase my creativity	4.2249	1
	12 I feel that the connection with the natural environment can improve my concentration	4.0710	3
	13 I've been feeling optimistic while doing my work inside the office building	3.5621	5
	14 I can stay focused while doing my work because my office building has sufficient lights.	3.9349	4
	15 I rarely take my day off due to health reasons	4.0769	2
Productivity	16 I feel that the source of natural lighting inside the office building can increase my productivity	3.9467	2
	17 I feel that the application of natural elements inside office building (plants/water/air/light) can increase my productivity	4.0592	1

18	I feel productive with the interior design of my office building	3.4024	5
19	I feel productive with the decoration of my workstation	3.4438	4
20	I feel psychologically productive when working in this office building.	3.5621	3
21	I feel that having an outside view of nature can reduce my stress level	4.3609	1
22	I feel that the appearance of plants and good color selection inside the office building can reduce my stress	4.2604	3
23	I feel that the application of natural materials (wood/stone) inside the office building can reduce my stress level	4.1183	5
24	I feel that an adequate of lights inside the office building can reduce my stress level	4.2012	4
25	I feel that the sufficient ventilation and air inside the office building can reduce my stress level	4.3254	2

Emotion

The highest mean for emotions is 4.1538 for Item 01, in which respondents feel that a harmonious environment can stabilize their feelings while doing their work. On the other hand, the lowest mean is 3.3787 for Item 04, in which the office building space makes them feel energetic. For emotion, respondents agree that a harmonious environment can stabilize their feelings while doing the work. The second highest mean is 3.8521, where the respondents agree that a calm environment can develop positive emotions. Respondents feel neutral that their office makes them feel energetic, and the office building's decoration and color make them feel cheerful. Mainly, the questions about emotions covered their perception of feelings towards their office surroundings. Overall, respondents have an agreed perception of emotions.

Well-being

The highest mean score for well-being is 3.9586 for Item 08, in which respondents feel their working environment can improve their state of well-being. Meanwhile, the lowest mean is for Item 09 and Item 10, which respectively get 3.6213, in which respondents are satisfied with mental well-being and feel it is worth working in this office building. Respondents agree their working environment can improve their state of well-being. Nevertheless, respondents also agree that they are satisfied with their mental well-being when working in the office building and that working in it is worth it. Respondents have agreed on perceptions of well-being.

Cognitive Function

The highest mean for cognitive function is 4.2249 for Item 11, in which respondents feel that elements of nature such as plants and water can increase their creativity. Meanwhile, the lowest mean is 3.5621 for Item 13, in which respondents feel optimistic while working inside the office building. Respondents agreed that elements of nature, such as plants and water,

can increase their creativity, and the respondents rarely take days off due to health reasons. Hence, respondents feel neutral and optimistic while working inside the office building. Overall, respondents have an agreed perception of cognitive function.

Productivity

The highest mean for productivity is 4.0592 for Item 17, in which respondents feel applying natural elements inside office buildings can increase productivity. The lowest mean is 3.4024 for Item 18, in which respondents feel productive with the interior design of office buildings. The respondents agree that applying natural elements and the source of natural lighting can increase their productivity. However, they feel neutral with the feeling of being productive with the interior design of their office building and decoration of their workstation.

Reduce Stress

As shown in the table above, the highest mean for reducing stress is 4.3609 for Item 21, in which respondents feel that having an outside view of nature can reduce stress. Then, the lowest mean is 4.1183 for Item 23, wherein respondents feel that applying natural material can reduce stress. After lowering pressure, respondents agree that having an outside view of nature can reduce stress. Besides, respondents also agree that sufficient ventilation and air inside the office building can reduce stress. Thus, respondents feel that applying natural materials inside the office building can reduce stress levels. After all, respondents agreed on the perception of reducing stress.

Conclusion

As the overall observation conclusion, for Building A, the total biophilic percentage for the lower zone is 74% which equals to Silver score of the GBI rating. On the other side, the upper zone managed to score only 61% which is equivalent to certification for the GBI Rating. Meanwhile, for Building A, the total biophilic design strategies for the lower zone is 79% indicate as gold in GBI rating. Hence the upper zone managed to score 72%, which is par as silver certification for GBI rating. From the finding, both office building for the lower zone has the highest score compared to the upper zone. However, the application of biophilic design strategies is more dominant in the Building B office building. Thus, for the survey analysis, perception level towards their perceived psychological performance is solely based on respondents' experiences and feelings. It is not an objective and firm question; each parameter has a different and mixed perception of the questions. This is due to other types, and design of their office, and knowledge about the benefits of biophilic design strategies. Thereby, from 167 collected questionnaire data, the analysis shows respondents agreed with the perception of each question. Hence, researchers believe that knowing how respondents perceive information about these parameters can significantly enhance occupants' psychological performance. The respondents agree with the analysis of these parameters. In conclusion, it is believed that implementing biophilic design strategies can give comfort and pleasure to indoor surroundings. Thus, occupants can be aware that biophilic design strategies are essential to maintain their perceived psychological performance in their office buildings. Hence, the significant contribution of the study is to enable occupants in increasing their knowledge of the benefits of biophilic design and the most suitable biophilic design strategies to apply in their office buildings. Apart from that, the implementation of biophilic design strategies is able to give comfort and pleasure to the

indoor surrounding as well as can enhance occupants' perceived psychological performance so that it can reduce absenteeism and increase productivity.

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