



Challenges of Green Office Implementation: A Case Study in Penang, Malaysia

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DOI: <https://doi.org/10.30880/ijscet.2021.12.01.015>

Received 15 September 2020; Accepted 08 December 2020; Available online 18 May 2021

Abstract: This study was conducted in response to the lack of green office buildings in Malaysia, despite the fact that the green concept has been initiated in Malaysia for many years. The Penang State Government has taken the initiative to establish the Penang Green Council (PGC) as the first state in Malaysia, and the implementation of green offices is one of its programme initiatives. Nonetheless, green offices are still in scarcity across Penang. This study identified the challenges faced in implementing green offices. Data were collected from five green building owners using semi-structured interviews and the data were analysed using thematic analysis. The outcomes revealed that the main challenges faced by green office adoption were lack of budget, lack of awareness, lack of expertise, ownership factor, and type of building. This study offers several implications for practitioners and policy makers to improve the adoption of green office in Malaysia. The results may be applied to raise awareness amongst practitioners and office owners regarding green practices in office buildings. The study outcomes may serve as reference to policy makers on enhancing the development of green buildings.

Keywords: Sustainable, green office, challenges, green practice, green building, Malaysia

1. Introduction

The construction industry, as a major industry in Malaysia, has significantly contributed to Malaysia's economy. Based on the Department of Statistics Malaysia, the construction industry contributed 5.9% of the total gross domestic product (GDP) in 2017 (Department of Statistics Malaysia Official Portal, 2018). Nonetheless, the rapid development of the construction industry in Malaysia has raised question pertaining to the adverse environmental impacts on the construction and building sector. The building industry had contributed to the largest share of greenhouse gas emission (Wu & Low, 2010). Increasing energy consumption and energy-related carbon emission has become a growing concern for policy makers and practitioners alike.

Sustainable development has been promoted worldwide in the attempt to solve the issue of sustainability. For instance, the issue of sustainability awareness has been discussed in a number of world events, including the 1992 Rio Earth Summit and the 1997 Kyoto Global Warming Conference. Green building has been introduced in the context of sustainable construction and low-carbon agenda (Mohamad Bohari, Skitmore, Xia, & Zhang, 2016). Green building denotes the practice of designing structures, as well as the use of environmentally responsible and resource-efficient processes throughout the life of a building (Shiva, Ji, 2016). Green building refers to a building that promotes sustainability with good environmental impact (World Green Building Council, 2019).

Sustainable development has witnessed improvement in Malaysia as the government encourages sustainable green building. Nevertheless, the number of green offices is still lagging behind. Many office owners are not optimistic about the concept of green office. Since 2011, the Penang Green Council (PGC) has encouraged the implementation of green

office (PGC, 2020). With the effort of PGC to promote green office, the number of green offices in Penang had escalated to 42 in 2018 (PGC, 2020). Due to the slow pace of green office adoption, it is crucial to understand the challenges faced by owners when adopting the green concept at their office buildings.

Simultaneously, studies pertaining to green office are in scarcity. A search in Scopus indexed journals using the term "green office" as a keyword gathered 168 articles. After filtering "office building" and "English only journal articles", only 32 articles were listed. Most of these articles were related to the engineering field (21 articles) with the main focus on indoor environmental quality (see Elnaklah, Fosas, & Natarajan, 2020; Geng et al., 2019; Lin, Liu, Wang, Pei, & Davies, 2016) and energy consumption (see Geng, Lin, & Zhu, 2020; Yau & Lim, 2016; Zhou, Cai, & Xu, 2020). Screening of abstracts resulted in only five articles related to challenges in green office implementation with three articles focusing on developed countries (see Adomßent, Grahl, & Spira, 2019; Pulaski & Horman, 2005; Uusi-Rauva & Heikkurinen, 2013), while the rest were from China with a narrow focus on green rating (Zuo, Xia, Chen, Pullen, & Skitmore, 2016) and office interior (Gou, 2016). Clearly, more studies are in need to identify the challenges of implementing green office within the context of Malaysia.

In the attempt to bridge the knowledge gap, this study looked into the challenges of green office implementation. The findings contribute to the literature by providing better understanding of the experience of building owners in light of the challenge of implementing a green office. The findings may serve as guidance to policy makers and practitioners on improving the implementation of green offices in Penang, in particular, and in Malaysia in general.

2. Literature Review

2.1 The Concept of Green Building

Green building refers to a design that maximises the efficiency of the resources used, such as water, energy, and materials, in order to reduce the adverse impact of buildings on the environment and human health. In view of the escalating environmental degradation, the research domain and several national agencies have been actively promoting green buildings. Over the years, several definitions have been coined by researchers. For example, a green building is a product of a design that emphasises on the efficiency of the resource used (Pan, Dzung, & Yang, 2011). Deuble and de Dear (2012) defined green building as buildings with natural ventilation capabilities. Table 1 lists the differences between green and non-green buildings.

Table 1 - Comparison between green and non-green buildings

Criteria	Green Buildings	Non-Green Buildings
Energy Consumption	Low	High
Indoor Environmental Quality	Good	Normal
Carbon Emission	Low	High
Waste Management	Efficient	Normal
Building Materials	Environment-friendly	Not Environment-friendly
Project Practices	Complicated	Normal

Adapted from: Samer (2013)

Green buildings are known to be more environment-friendly when compared to non-green buildings. Green buildings minimise the environmental impact of buildings and contribute to more sustainable development in economic, social, and environmental aspects (Durmus-pedini & Ashuri, 2010).

Green building is closely related to the sustainable development movement stipulated in the Brundtland Commission. The concept is described as "Satisfying the needs of the present without compromising future generation's ability to fulfil their own needs" (Shafii, Arman Ali, & Othman, 2006; page C-29). The concept of sustainability in construction aims at introducing physical development to the society while concurrently protecting the environment (Mohamad Bohari, Skitmore, Xia, & Zhang, 2016). Sustainable construction helps to reduce the environmental impact of a building on its lifespan while providing protection and comfort to its occupants, without affecting economic viability.

Green building was introduced under the concept of sustainable construction and low-carbon agenda (Mohamad Bohari et al., 2016). In 1990, the first green building rating system was launched in the United Kingdom, known as Building Research Establishment Environmental Assessment Method (BREEAM), followed by Leadership in Energy and Environmental Design (LEED) in 1998, Australia (Green Star) in 2003, Singapore (Green Mark) in 2005, and Malaysia (Green Building Index) in 2009. Many studies have reported that green office buildings certified by green rating systems yielded positive returns economically, socially, and environmentally (Isa, Rahman, Sipan, & Hwa, 2013).

Green real estate investment in Malaysia began to thrive in early 2007 with the initiation of green concept. The first Malaysia Green Building Rating System refers to the Green Building Index (GBI) launched by the Malaysia Institute of Architecture (PAM) and Association of Consulting Engineers of Malaysia (ACEM) (Isa, Rahman, Sipan, & Hwa, 2013). The GBI has been promoting integrated environment-friendly design, reducing the effect of built environment on both environment and human health, as well as sustaining the existing buildings (GBI, 2011). The GBI refers to a comprehensive criteria-based rating tool that is used to evaluate a green building. It measures the performance of a green building based on the following six criteria: Indoor Environmental Quality, Energy Efficiency, Suitable Site Planning & Measurement, Materials & Resources, Innovation, and Water Efficiency (Usman & Abdullah, 2018). The Green Real Estate (GreenRE) was established by the Real Estate and Housing Developer's Association (REHDA) in 2013. The GreenRE is a sustainability building rating tool developed to suit the tropical climate in Malaysia (GreenRE, 2017). The main aim of GreenRE is to increase the sustainable development in the property industry. The GreenRE is a rating tool with the following criteria: energy efficiency, water efficiency, sustainable management & operation, indoor environmental quality, other green features, and carbon emission of development (Usman & Abdullah, 2018). There is also the Penang Green Office Assessment Tool established by PGC to assess the green offices in Penang, apart from promoting sustainability concept in office buildings. The Penang Green Office Assessment Tool focuses on the daily practices of the office, instead of the design and the construction of an office. It is composed of eight elements, namely purchase of office furniture & stationery – Green Principle, waste management and recycling, energy saving, water conservation, paper use, printer, photocopier, fax & cartridges, indoor air quality, as well as employee and community engagement (Penang Green Council, 2020).

However, implementing green concept in office buildings is not easy for many buildings owners. The following section lists the challenges faced in implementing green building from prior studies.

3. Challenges of Green Building Implementation

Sustainable projects in Malaysia are still at the infancy stage (Zainul Abidin Nazirah, 2010). Although many players in the construction industry are familiar with the concept of sustainability, only a handful of them have translated sustainability into action. Hence, it is crucial to identify the barriers of green building implementation in order to find ways of enhancing green development.

The challenges were categorised into groups and the challenges of sub-groups were identified. Challenges in green building adoption were categorised based on government, financial, market, resource, and social factors.

Government Factor

Prior studies have reported that the government factor has an important role in advancing the development of green building (Masrom, Rahim, Ann, Mohamed, & Goh, 2017; Samari, Godrati, Esmaeilifar, Olfat, & Shafiei, 2013; Shafii, Arman Ali, & Othman, 2006). Government is the main stakeholder in promoting green construction within the construction industry. The correlation between governance system and green building outcomes in terms of institutional framework and policies has been highlighted to innovate and accelerate adaptation (Elforqani & Rahmat, 2010).

The challenges identified are lack of building codes and regulations, as well as lack of incentives. Regulatory enforcement and incentive instruments are the main tools for the government to promote green building development. In the absence of sufficient regulation and policy, the construction industry becomes unmotivated to implement green building practises in the project.

Financial Factor

The financial factor is another major barrier that hinders green building development. This notion is in agreement with a number of studies. For instance, Zainul Abidin Nazirah (2010) revealed that financial constraint was the main challenge that stalled the implementation of green building.

Higher investment costs and upfront costs are the primary reason for holding back the adoption of green buildings in Malaysia (Masrom et al., 2017; Samari et al., 2013). Green building demands higher upfront costs when compared to conventional buildings due to new design, technology, and construction methods. The higher initial costs reflect the import of green materials and technology (Chan, Lee, & Lee, 2014). The construction of a green building may increase up to 25% of the initial cost, when compared to conventional buildings. While higher initial costs may later be balanced in the operation of the building, developers are still reluctant to invest in green buildings, as they believe that operating savings would be passed on to tenants / purchasers, but not to the developers themselves (Wilson & Tagaza, 2006.)

Market Factor

Some studies have reported that intensive market bases are both effective and efficient tools that address market failure and non-market issues to improve the development of green buildings (Dennis, 2006). Market demand is a huge factor that affects the development of green buildings. If there is demand for green building, the construction players are willing to invest and participate in the development of green buildings.

According to Zainul Abidin Nazirah (2010), both market situation and demand displayed a direct impact on the actions of developers. By increasing the demand of green building buyers, the market is stimulated, and the developers are encouraged to invest, as well as improve the development of green buildings.

Resources Factor

Lack of resources derives from the relatively new green building. Resources come in different ways; technology resources and human resources. Lack of technology is a key challenge in the implementation of green buildings in Malaysia (Goh, Goh, & Seow, 2013; Samari et al., 2013). A range of green materials and technology is at no avail in Malaysia. The required technology must be imported from abroad due to absence of adequate technology in Malaysia (Alias, Sin, & Aziz, 2010).

Lack of sustainable industry expertise is another barrier (Adomßent et al., 2019; Goh et al., 2013). Sustainable development demands another area of knowledge for architects and engineers. However, most experts are only experts in conventional construction, but not in green construction. Employers often find it difficult to find a professional to undertake a green project task. Since sustainable technology and practises are changing over time, construction players face difficulty in following up with updated technology.

Another point to consider is the difficulty of receiving credit for green building certification (Gou, 2016; Zuo et al., 2016). In order to obtain green building certification, the building should pass a green building assessment. Some criteria embedded in green building assessment are energy efficiency, indoor environmental quality, and green innovation. A prior study found that it was difficult to achieve credit for some criteria, such as innovation (Zuo et al., 2016). The difficulty of achieving the required credit to pass the assessment hinders green building implementation.

Social Factor

Lack of awareness was identified as a challenge in the implementation of green building (Goh et al., 2013; Masrom et al., 2017; Samari et al., 2013; Shafii et al., 2006). Sustainability is still a recent term within the construction sector across developing countries (Shafii et al., 2006). While the green building concept was introduced in Malaysia years ago, the level of development has remained unsatisfactory. Due to the lack of public awareness of the concept of green building, there has been less demand for green building from the community. Enhancing community awareness regarding green building helps to boost the market by increasing demand for green building (Goh et al., 2013)

Individual environmental behaviour is another barrier (Uusi-Rauva & Heikkurinen, 2013). Different individuals have different sets of norms and beliefs, which are bound to affect their environmental behaviour. It is crucial for an organisation to understand individual environmental behaviour and to implement appropriate green practises for employees. Table 2 lists the challenges related to green building implementation.

Table 2 - Challenges in green building implementation

	Challenges	Literature Review
Government Factor	Lack of building codes and regulation	Goh, Goh, & Seow, (2013); Masrom, Rahim, Ann, Mohamed, & Goh, (2017); Samari, Godrati, Esmailifar, Olfat, & Shafiei, (2013); Shafii, Arman Ali, & Othman, (2006)
	Lack of incentives	Omran, Shafie, & Rashid, (2015); Samari et al., (2013)
Financial Factor	Higher investment cost	Goh et al., (2013); Isa, Rahman, Sipan, & Hwa, (2013); Masrom et al., (2017); Samari et al., (2013); Shafii et al., (2006)
	Lack of credit resources to cover front cost/ Higher upfront cost	Masrom et al., (2017); Omran et al., (2015); Samari et al., (2013)
Market Factor	Lack of demand	Goh et al., (2013); Samari et al., (2013)
	Risk of investment	Samari et al., (2013)

Resource Factor	Lack of Expertise	Goh et al., (2013); Masrom et al., (2017); Samari et al., (2013); Adomßent et al., (2019)
	Lack of technology	Goh et al., (2013); Samari et al., (2013)
	Difficulty in acquiring credit for green building certification	Gou, (2016); Zuo et al., (2016)
Social Factor	Lack of public awareness	Goh et al., (2013); Masrom et al., (2017); Omran et al., (2015); Samari et al., (2013); Shafii et al., (2006)
	Individual Environmental Behaviour	(Uusi-Rauva & Heikkurinen, 2013)

4. Research Methodology

The qualitative approach using semi-structured interviews was adopted in this study as it promotes better self-understanding and sheds lights on the present situation (Ospina & Wagner, 2004). Out of the 42 green offices established in Penang, only five green office owners had agreed to participate in this study. It is noteworthy to highlight that the five green offices were government offices. Semi-structured interviews were conducted online as the Movement Control Order (MCO) was enforced in the country due to the Covid-19 pandemic.

Despite the small number of participants, the interviews reached theoretical saturation point; a situation where the interviewees gave the same answers repetitively. In this study, the saturation point was achieved during the fifth interview. This indicated that the information collected was adequate and it was safe to proceed with data analysis.

The interview data were analysed using thematic analysis. All transcripts of the interviews were reviewed prior to data analysis in order to ensure the absence of missing information. Content analysis was carried out after examining the interview transcripts. The first step in the content analysis was to identify the theme. All information was grouped on the basis of common themes and categories.

Next, a matrix was used to link different respondents to a variety of key themes. The findings reflected a crosstab, with cases or individuals down on one side of the table and the main concepts running across the top.

It was essential to examine all the key concepts presented in the data. Similarities between concepts were transformed into common themes. At that point, the researcher had begun interlinking the themes, describing the data, starting to analyse, and explaining the gathered information. The results of the interviews are presented in the following section.

5. Results and Discussion

5.1 Overview of Case Study

Five green offices were selected for the case study in this research work. For confidentiality purpose, the study subjects are labelled Buildings I until V. Further details are listed in Table 3:

Table 3 - Buildings and respondents profile

Office	Description of the building	Respondent's Position & Years of Experience
Building I	Located in Lebuh Pantai, George Town, Penang Situated in two-storey centralised heritage building Approximate office size: 265 m ²	Executive Assistant, 27 years
Building II	Located in Lebuh Pantai, George Town, Penang Situated in two-storey centralised heritage building Approximate office size: 585 m ²	Executive Assistant, 2 years
Building III	Located in Lebuh Aceh, George Town, Penang	Built Environment and Monitoring Manager; Conservation Architect, 5 years

	A two-storey block	
	Approximate office size: 1216 m ²	
Building IV	Located in Lebu Tek Soon, George Town, Penang	Programme & Project Executive, 2.5 years
	Situated in high-rise centralised building	
	Approximate office size: 346 m ²	
Building V	Located in Lebu Tek Soon, George Town, Penang	Executive Officer, 8 years
	Situated in high-rise centralised building	
	Approximate office size: 366 m ²	

5.2 Challenges of Green Office Implementation

The importance of the implementation of green office is stated in the introduction of this paper. Penang has launched a number of initiatives to encourage the adoption of green offices. However, the results of green office implementation appeared to be unsatisfactory.

The study outcomes revealed five main challenges that emerged from the experience of the office owners in implementing green offices. Table 4 presents the challenges identified by the respondents.

Table 4 - Challenges in implementing green office

Challenges	R1	R2	R3	R4	R5
Lack of budget (Financial Factor)		√	√	√	√
Lack of awareness (Social Factor)		√		√	√
Lack of Expertise (Resource Factor)	√	√			
Rented office (Ownership Factor)	√			√	
Type of building (Building Type Factor)	√		√		

The challenges identified by the respondents are listed in Table 4 and organised from the highest to the lowest rank. The challenges identified by the interviewees were comprised of the following: lack of budget, lack of awareness, lack of expertise, rented office, and building type.

5.2.1 Lack of Budget

The greatest challenge mentioned referred to lack of a budget. The respondents claimed that lack of budget was a major obstacle to the implementation of green practises in office buildings. They were mainly concerned about the expenditure and budget.

“green elements are less and most of them are pricey...” (R2)

“Green technology is very expensive, so it increases the upfront cost...” (R4)

The respondents asserted that green materials and green technology are more expensive than conventional materials or technology. The results of environmental compliance measure, thus, cannot be appropriate for cost optimisation. The findings are in line with those reported by Masrom (2017) and Samari (2013).

The buildings involved in this study were all government-owned offices, wherein the government only allocated a small amount of budget for the managers to execute green practises in their office. The budget was mainly allocated for other purposes that focused on public benefits. The government placed its priorities on enhancing its service delivery to the public, instead of investing in environmental sustainability. It is not surprising if the budget allocated to execute

green practices was insufficient due to the higher cost of green materials and technology, when compared to conventional materials. This hindered the implementation of green practises at the office.

5.2.2 Lack of Awareness

Lack of awareness emerged as the second highest-ranking challenge for green office adoption. Respondents 2, 4, and 5 supported this point.

“The first I think is lack of awareness due to lack of education; people in the office lack awareness; building owner is also not aware of the recycling programme...” (R2)

“Green concept is a new norm in Malaysia. It is quite normal for other counties, but it is still new in Malaysia...” (R4)

“Employee cooperation... Employees are not aware of green concept; hence it is difficult to ask them to embrace green practices...” (R5)

The respondents opined that people were unaware of the green concept. Similar scenario was noted in studies performed by Goh (2013), Masrom (2017), Samari (2013), and Shafii (2006). Apparently, the green concept is still new to the Malaysian society, while employees and building owners were unaware of the green concept. With the absence of cooperation between employees and building owners, green office becomes more difficult for implementation.

Lack of awareness had dampened the development of green offices. The interview results revealed that executing green offices demands a great deal of support from employees and the building management body. Green practises, such as 3R, should be incorporated into the day-to-day activities of the office. However, the respondents found that the workers and the management body were unaware of the idea of being green and how they could practise green. Most employees and management body appeared to be illiterate in green practices. This hinders the adoption of green offices.

5.2.3 Lack of Expertise

Lack of expertise was ranked the third highest. The respondents pointed out that expertise in the green sector is still very limited, thus disabling the implementation of green practises as there is no one to consult.

“we also don’t have expertise in office... very less green consultancy in Penang...” (R1)

“I think it is lack of expertise. You can see that green technology and green consultancy are still lacking in Malaysia...” (R2)

The respondents claimed that there was still limited green consultancy in Malaysia. This finding is similar with that depicted in Esa (2011) and Goh (2013). It turned into a barrier to green office practitioners when they needed someone to consult on the green concept. When compared to traditional buildings; the green concept of office building is more complex as it demands modern technologies and a comprehensive framework.

The practice of green office is still at its infancy stage in Malaysia. It needs the support of green consultant to help the management understand the implementation of green concept. Unfortunately, green consultancy is in scarcity across Penang. Professionals in the construction field were reluctant to equip themselves with new knowledge and skills related to green construction and green building due to high training and education costs. This limited the number of expertise in green construction and building. This had prevented the implementation of green practises in offices.

5.2.4 Rented Office

Another concern referred to rented office and not owned by the organisation. Respondents 1 and 4 had raised this concern.

“I think one of the main challenges is because the building is not owned by us. So, what we can do is really very limited...” (R1)

“Office is rented... there is not much we can do, and we need to apply if we want to install anything or do any renovation...” (R4)

Plenty is restricted in a rented office. Since they did not own the building, they could not renovate it. If they intend to renovate or do something relevant to the building structure, they must apply and obtain permission from the owner of the building.

Most of the offices were located in a centralised building or a shared building. The offices shared similar amenities in a single office building, such as bathroom and common area. The facilities were managed by the building management body. Therefore, green office practitioners had limited authority in managing the facilities, such as the HVAC (Heating, ventilation, and air conditioning) system and the water system.

5.2.5 Type of Building

Another challenge raised by the respondents was the type of building. In the words of the respondents, this challenge was related to the office space located in the heritage building.

“Besides, it is a heritage building. We cannot renovate it...” (R1)

“heritage sensitive methodologies towards implementation of green concept in the building...” (R3)

The UNESCO had reckoned plenty of buildings in Penang as heritage site. Some people have rented heritage building space as their office. There are a lot of guidelines to adhere to when it comes to occupying heritage buildings. If the occupants wish to renovate the building, they must follow the guidelines and obtain approval from the authorities, including the local council.

Work on heritage buildings in UNESCO areas is of concern. In order to renovate heritage buildings to adopt green practices, the work must comply with the guidelines to ensure that the buildings are properly preserved. Heritage-sensitive methodologies for implementing the green concept in office building made the renovation work difficult. Any renovation needs to obtain approval from relevant authorities. The complicated process had caused the office owners reluctant to implement green practices.

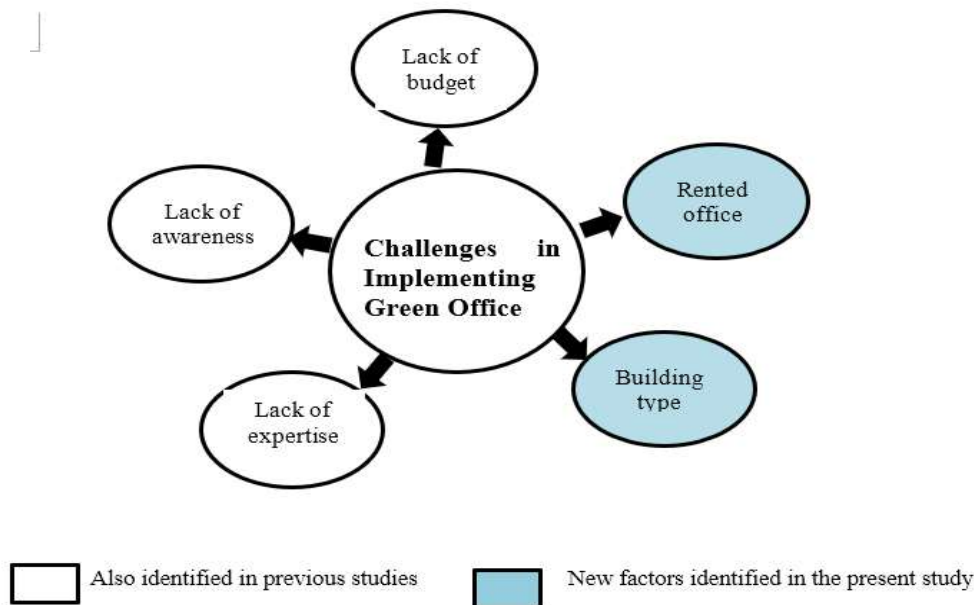


Fig. 1 - Challenges of green office implementation

Figure 1 illustrates the challenges of implementing a green office, including lack of budget, lack of awareness, lack of expertise, rented office, and building type. Rented office and building type are the new factors identified in this study.

6. Conclusion

This study was carried out to identify the challenges faced by green offices in Penang, Malaysia. The study identified five main challenges in implementing green practices in office building, namely lack of budget, lack of awareness, lack of expertise, rented office, and building type. While lack of budget, lack of awareness, and lack of expertise challenges are in agreement with prior studies (see Esa, 2011; Goh, 2013; Masrom, 2017; Samari, 2013; Shafii, 2006; Uusi-Rauva & Heikkurinen, 2013), this study contributes to the literature by identifying rented office and building type factors as new challenges according to the experience of building owners. Therefore, the findings provide new insights regarding the challenges of implementing a green office in Penang.

Several solutions and strategies are proposed to overcome the challenges and improve the implementation of the current green offices in Penang, Malaysia. These include increased employee and public awareness about the green concept, provision of clear guidance by the relevant authorities, and provision of financial incentives. The results imply that it is important for the top management to prepare clear implementation plan for employees to follow. This study showed that employees did not have any clue on how to implement green concept in their daily operation. Hence, a clear implementation plan is crucial to serve as guidance to employees. The employees should have some knowledge

about the green concept, including how to practice it in their daily working tasks. The positive impacts of green office from economic, environment, and social stances should be emphasised to generate better understanding about the importance of green office. In addition, a clear guideline should be provided to encourage building owners to implement green office. As observed in the study, most of the building owners only used PGC as guidance in implementing green practices at their office building. It should be noted that the PGC evaluation only focuses on the offices' operation and management. Adopting the green concept in office building demands proper implementation plan throughout the building lifecycle and support from the stakeholders. It is important for the relevant authorities, such as government agencies and PGC, to provide clear guidelines for the top management to implement green practices in office buildings. The study outcomes imply that government incentives play an important role in encouraging organisations to execute green office. Government incentives, such as subsidy and discount for green energy consumption, should be established and implemented. Such incentives help to reduce the financial burden of implementing green office and subsequently motivate them to implement green practices in their office and daily operation. Last but not least, the five challenges identified in this study that hinder the implementation of green office can help raise awareness among practitioners and the public about the execution of green concept. All relevant stakeholders should work together to overcome the challenges and improve the involvement of office buildings in the pursuit of broader sustainability objectives.

This research has achieved its initial objectives. However, some limitations need to be considered before replicating this study in future. This present study looked into the challenges faced in adopting green practices in office buildings. As the scope of this study is based solely on Penang, Malaysia, further work may focus on the other states in Malaysia, so that the industry can understand how well green offices have been practiced throughout the country and make the necessary improvements. This study focused on the office owners who occupied or used the office space. Future studies may seek opinions from other perspectives, such as consultants and contractors, on the adoption of green offices in Malaysia. Finally, the study employed the qualitative approach using the interview method to collect data. Therefore, the findings could not be generalised to a wider population. Embarking into the quantitative approach using structured questionnaire survey, perhaps to investigate the impact of the five challenges, may add value to our understanding on the challenges in implementing green practices in office buildings.

Acknowledgement

The authors would like to thank the respondents who participated in the data collection, as well as those who had contributed to the progress of the research by providing valuable information and research suggestions.

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