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CHALLENGING FACTORS OF THE GBI (GREEN BUILDING INDEX) APPLICATION FOR HERITAGE BUILDING

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ABSTRACT

The most effective option for old buildings is "green adaptive reuse," which can improve productivity. The Association of Consulting Engineers Malaysia (ACEM) and PAM (Pertubuhan Arkitek Malaysia/Malaysian Institute of Architects) created the Green Building Index, an environmental evaluation system for structures. The Green Building Index is Malaysia's first in-depth assessment system for evaluating the environmental efficiency and design of Malaysian structures. There are several problems faced in implementing the GBI (Green Building Index) in heritage buildings, such as a lack of awareness among clients, consultants, and contractors, a lack of sustainable materials, techniques, and procedures, and a lack of knowledge and expertise. The research objective is to investigate the most challenging factor of the application GBI (Green Building Index) for heritage buildings and to suggest the most challenging factor of the application GBI (Green Building Index) for heritage buildings. This study uses qualitative method to collect data through interview. Through the findings of the study, out of the 3 main factors asked, all of the factors that are critical are analysed, which are lack of education and knowledge of the GBI (Green Building Index), lack of awareness among clients, consultants, and contractors, and lack of sustainable materials, techniques, and procedures.

Keywords: building, green building index, heritage

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INTRODUCTION

The best choice for historic buildings is "green adaptive reuse," which can help increase operational efficiency. The Malaysia Green Building Index (GBI) does not specifically address any significant environmental factors, including the reuse of historic buildings in Malaysian contexts. (Alauddin, 2022) For evaluating the ecological design and performance of Malaysian buildings, the government has established a methodology known as the "Green Building Index." The Association of Consulting Engineers Malaysia and the Malaysian Institute of Architects together created the GBI rating system (ACEM). The goal of this inventory is to raise awareness of the fundamentals of economic growth among all stakeholders in the development sector. This framework has set up a progression of necessities which are thought to be ecological cordial amid the course of the life cycle of the building development.

The Green Building Index is an environmental rating system for buildings developed by PAM (Pertubuhan Arkitek Malaysia / Malaysian Institute of Architects) and ACEM (the Association of Consulting Engineers Malaysia). It's critical to maintain and manage heritage buildings well. Therefore, it is essential to create a sustainability rating system that would facilitate the upkeep of historic structures like GBI (Green Building Index). This system will also take into account aspects of heritage properties' socioeconomic status.

LITERATURE REVIEW

Green Building Index (GBI)

Firstly, GBI Malaysia (ACEM) was created by Pertubuhan Akitek Malaysia (PAM) and the Association of Consulting Engineers Malaysia. The building and real estate sectors of Malaysia have always supported GBI strongly. Developers, architects, engineers, planners, designers, contractors, and the general public are all intended to benefit from it by encouraging sustainability in the built environment and raising public understanding of environmental issues. In addition, green rating systems were developed to assist architects, designers, builders, government organizations, building owners, developers, and end users in understanding the implications of each design choice and solution. The UK's BREEAM, the USA's LEED, Japan's CASBEE, and Australia's GREENSTAR are a few of the more well-known ones. Apart from the Singapore Government's GREENMARK, the only rating tool for tropical zones will be Malaysia's Green Building Index, or GBI. In 2005, GREENMARK debuted for the first time.

PAM's architects have been developing and working toward a more sustainable and green architecture throughout the years. The requirement for a regional Green Building grading tool increased in 2008, particularly in light of the expanding demand

from building end-users for Green certified buildings that would not significantly and negatively contribute to the destruction of the environment. A building's economic value was decreased and its impact on the environment was negative due to poor design. The neighbourhood and society were unable to utilize the amenities at the same time that they were supposed to. Methods for improving performance in aging structures have been investigated. The Green Building Index (GBI) was used as the benchmark for the analysis of the historical constructions. The assessment criteria for historic buildings are energy efficiency (EE), indoor environment quality (EQ), sustainable conservation & management (SC), materials and resources (MR), water efficiency (WE) and innovation (IN).

Overview Heritage and Historical

Heritage refers to anything that can be passed down through the generations, protected, or inherited, and has historical or cultural value. (Harrison, 2010) Historic structures are fixed assets that are identified due to specific historic, national, regional, local, religious, or symbolic value; they are usually accessible to the general public, and entrance to the monuments or their vicinity is frequently charged. (Directorate, 2001)

The term "historical building" refers to any construction that has 'historic significance,' meaning that it has some relevance to people in the present due to past events. Some types of historic building are shop houses, administrative building, private building and religious building.

To better understand this topic, research has been done on problematic GBI (Green Building Index) implementation elements for heritage building characteristics using internet publications and databases. The Green Building Index (GBI) description, history, concept, and classification are first covered in this chapter. The discussion then turns to heritage's definition, background, aim, and variety. This chapter concludes by reviewing the critical components of implementing the green building index (GBI) for historic buildings. The three most commonly cited major factors by researchers are the absence of GBI education and expertise (Zainul Abidin, 2010), the lack of client, consultant, and contractor awareness (Mohd Nordin, Halim, & Yunus, 2018), as well as the dearth of sustainable materials, processes, and procedures (Goh et al., 2013).

CRITICAL FACTOR OF LOW ADOPTION GREEN BUILDING INDEX (GBI) FOR HERITAGE BUILDING

Lack of Awareness Among Client, Consultants and Contractors

Although green buildings have many advantages for society, they are not widely adopted in developing countries like Malaysia because of a number of market constraints. The lack of organizational skills and knowledge about green home development is one of the challenges. The low level of awareness and knowledge among employees in their organization can be attributed to the fact that only a small percentage of employees who are participating in projects that contain green design or features are informed about and aware of green practice (Mohd Nordin, Halim, & Yunus, 2018). (Wei and others, 2020)

Lack of Sustainable Materials, Techniques, and Procedures is Another Obstacle to Implementing Sustainable Development in The Industry

Because green buildings are so new, resources are limited. Human and technological resources are two distinct categories of resources. Lack of technology is a significant barrier to the adoption of green buildings in Malaysia (Goh, Goh, Samari et al., 2013; & Seow, 2013). Numerous sustainable practices goods and technology are not available in Malaysia. The required technology must be imported from somewhere else because Malaysia lacks the requisite technology (Alias, Sin, & Aziz, 2010).

Lack of knowledge in the sustainable industry is another barrier (Adomßent et al., 2019; Goh et al., 2013). Sustainable development needs greater expertise in this area for architects and engineers. However, the vast majority of professionals are only familiar with conventional construction. Employers frequently struggle to find a qualified individual to handle a green project task. Construction industry players struggle to keep up with new technology because sustainable practises and technology are constantly evolving.

Higher Upfront and Certification Cost as Estimated

Stakeholders had been encouraged to believe that going green would be costly, yet the actual cost was less than they had anticipated. They might not be aware of the fact that technical innovation has caused green expenses to decrease with time maturity. Additionally, some people had the misguided impression that the expenses of green building rating systems' registration, accreditation, and certification were exorbitant. Registration for GBI category only requires a single, all-inclusive fee that covers certification and site visits. There are comparable payments for each rating level. (Chee, 1970)

Lack of Green Product Supply

Heritage buildings do not often use sustainable construction techniques, materials, or technology. Despite the government of Malaysia's promotion of sustainable

development, some of the sustainable technology and resources required for it not available in Malaysia. 2016 (M. Algburi)

Lack of Education and Knowledge

The majority of experienced building specialists currently employed in the industry had their technical training decades ago, when green development was less crucial. These universities don't offer any courses in sustainability. The current generation studied sustainable development in higher education, but due to a lack of experience, they find it difficult to put their knowledge into practice (Zainul Abidin, 2010).

SUMMARY OF CRITICAL FACTORS LOW GBI ADOPTION FOR HERITAGE BUILDING

Table 1: Summary of Critical Factors Low GBI Adoption for Heritage Building

NO	AUTHOR	A	B	C	D
1	M.Algburi, 2016	√	√		
2	Kubba, 2012				
3	Isa et al., 2013			√	
4	Chee, 1970			√	
5	Chan, Qian and Lam, 2009				√
6	Dimoudi and Tompa, 2008				√
7	Zarith Sufia et al., 1970				
8	Wei et al., 2020	√			
9	Sin et al., 2021		√		
10	Zainul Abidin, 2010	√	√		√
TOTAL		3	3	2	3

A - Lack of awareness among client, consultants and contractors

B - Lack of sustainable materials, techniques, and procedures

C - The projected high initial costs are one of the key barriers preventing stakeholders from implementing green design or using green building grading methods.

D - Lack of knowledge and expertise

METHODOLOGY

A direct conversation was used to collect the information. This approach combines direct contact with the target person with indirect communication using written or technological means, such as an internet survey. The methods used for the background research and literature of this study include reading and writing with citations of all the data readings that are linked to the research studies in order to support the justification of the validity of the research studies. Secondary data has been gathered through academic output, journal articles, websites, and research papers, among other places. Each of the aforementioned data sources is accessible via the internet.

The systematic gathering and examination of information that enables one to response to the particular research questions for the study is known as data collection. This study used interviews in addition to qualitative methods to collect data. Interviews have been performed with selected experts who have a direct connection to the study's topic. Before going on to the next target respondent, the inquiry is designed to focus on the four variables and the sub factors in order to validate the validity of each one. In-depth investigation of the subject's concepts and experiences is made possible by the qualitative method.

The methodological framework's first phase describes the qualitative data collection strategy used in this research study. In order to get qualitative data, interviews were conducted. The interview is divided into the following three parts: Section A (Respondent's Demographic Information) B Section The following are crucial aspects of the GBI (Green Building Index) application for heritage buildings: Lack of client, consultant, and contractor awareness; Lack of education and knowledge of GBI; Lack of sustainable products, methods, and practices In Part C, the critical component of the GBI (Green Building Index) application for historic buildings is discussed.

Table 2: Demographic Data of Respondent

RESPONDENT 1 (R1)	
Respondent's Age	42 years old
Respondent's Qualification	PhD in Building conservation
Respondent's Position	Academician
Respondent's Experience	9 years
RESPONDENT 2 (R2)	
Respondent's Age	48 years old
Respondent's Qualification	Master in Architecture

Respondent's Position	Conservator in National Heritage Department (JWN)
Respondent's Experience	5 years

Table 3: Section B of Challenging Factors of the Application GBI for Heritage Building

CRITICAL FACTOR OF THE APPLICATION GBI (GREEN BUILDING INDEX) FOR HERITAGE BUILDING	
F1: Lack of education and knowledge of GBI (Green Building Index)	
F1 (a)	Do you agree that lack of education about GBI is one of the critical factors in its application to heritage buildings?
F1 (b)	In your opinion, does the lack of education about the GBI (Green Building Index) make it harder to obtain information on green developments?
F1 (c)	Do lack of education and knowledge of the GBI (Green Building Index) also hinder the green movement as stakeholders are used to traditional construction methods?
F2: Lack of awareness among client, consultants and contractors	
F2 (a)	Do you agree that lack of awareness among clients, consultants, and contractors is one of the critical factors in the application of the GBI (Green Building Index) for heritage buildings?
F2 (b)	In your opinion, do you agree that lack of awareness among clients, consultants, and contractors will contribute to the cost of construction because they lack expertise in sustainable building design?
F2 (c)	Do shortages of professionals and tradespeople with appropriate qualifications, experiences, and skills qualify as additional reasons for implementing sustainable development?
F3: Lack of sustainable materials, techniques, and procedures	
F1 (a)	Do you agree that the lack of sustainable materials in the GBI is one of the critical factors in its application to heritage buildings?
F2 (b)	In your opinion, do you agree that the lack of GBI techniques in heritage buildings is also a critical factor in the application of the GBI (Green Building Index) to these buildings?
F3 (c)	Do the absence of GBI procedures in heritage buildings contribute to critical factors in their application?

Table 4: Section C of Opinion toward critical factor of the Application GBI for heritage building

OPINION TOWARD CRITICAL FACTOR OF THE APPLICATION GBI (GREEN BUILDING INDEX) FOR HERITAGE BUILDING	
C	What other crucial elements affect the use of the GBI (Green Building Index) for historic buildings, besides those already mentioned?

FINDING AND RESULT

All of the sub factors listed below were agreed upon by the respondents based on the responses from two respondents in the structured interview. The chosen responses may attest to their status as authorities on both heritage buildings and the Green Building Index (GBI). Consequently, the results of the structured interview with the responders be given consideration.

Table 4: Structure Interview Findings

RESPONDENT	F1			F2			F3		
	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)
Respondent 1	√	√	√	√	√	√	√	√	√
Respondent 2	√	√	√	√	√	√	√	√	×

Factor 1: Lack of education and knowledge of GBI (Green Building Index)

F1 (a): Do you agree that lack of education about GBI is one of the critical factors in its application to heritage buildings?

Both respondents concur that the question regarding the lack of knowledge about GBI is one of the crucial factors in its application to heritage buildings. According to R1 and R2, this sub factor frequently occurs and should be treated seriously because some engineers or conservators did not even know about the GBI (Green Building Index). Even more, R2 mentioned a situation in which an engineer claimed that GBI is a modern solution for historic buildings.

F1 (b): In your opinion, does the lack of education about the GBI (Green Building Index) make it harder to obtain information on green developments?

Both responders agreed that this important sub factor was important. This sub factor can demonstrate how it is more difficult to find information about green developments due to a lack of knowledge about the GBI (Green Building Index). R1 claims that in some instances, some conservators were not fully informed about GBI for heritage buildings.

F1 (c): Do lack of education and knowledge of the GBI (Green Building Index) also hinder the green movement as stakeholders are used to traditional construction methods?

R1 and R2 agreed on this sub factor. This sub factor needs to be considered carefully because stakeholders are accustomed to conventional construction techniques, which makes it difficult for them to understand the GBI (Green Building Index). This component may also be a cutting-edge remedy for a historic structure.

Factor 2: Lack of awareness among client, consultants, and contractors

F2 (a): Do you agree that lack of awareness among clients, consultants, and contractors is one of the critical factors in the application of the GBI (Green Building Index) for heritage buildings?

Both R1 and R2 respondents, who are respondents, concurred on the sub factor. For instance, according to R2, the idea of a sustainable building process is fresh in developing nations like Malaysia.

F2 (b): In your opinion, do you agree that lack of awareness among clients, consultants, and contractors will contribute to the cost of construction because they lack expertise in sustainable building design?

On this component, both responders agreed. R2 emphasised that two of the ten primary barriers to sustainable construction are the high cost of sustainable practises and the high initial cost of investment. This illustrates how important this sub factor is.

F2 (c): Do shortages of professionals and tradespeople with appropriate qualifications, experiences, and skills qualify as additional reasons for implementing sustainable development?

Both responders agreed on this sub factor. R2 highlighted that lack of proper training in sustainable construction concepts among the industry's specialists.

Factor 3: Lack of sustainable materials, techniques, and procedures

F3 (a): Do you agree that the lack of sustainable materials in the GBI is one of the critical factors in its application to heritage buildings?

The sub factor was agreed upon by both respondents. This is due to the material's clear statement that it is a crucial topic before beginning any task.

F3 (b): In your opinion, do you agree that the lack of GBI techniques in heritage buildings is also a critical factor in the application of the GBI (Green Building Index) to these buildings?

Both respondents concurred on this aspect. According to R2, the absence of appropriate tools for quantifying sustainable construction is one of the ten main obstacles to it.

F3 (c): Do the absence of GBI procedures in heritage buildings contribute to critical factors in their application?

For this statement, R1 agrees but R2 disagrees. This subfactor regularly arises, according to R1, and it needs to be taken seriously because some engineers or conservators were not even aware of the procedures. R2 cited an instance in which an engineer claimed to be aware of GBI's sustainable technology.

Other Critical Factors

Both respondents concurred with each of the previously identified important aspects when referring to them. More importantly, the knowledge of the Green Building Index for historic buildings serves to avoid any unfortunate events or construction project delays.

CONCLUSION

This study attempted to examine the difficult aspects of applying the GBI (Green Building Index) to historic structures. Three essential variables were chosen for technique analysis after a comprehensive review of the literature. The final step is the development of the selected three factors into three related sub-factors. These nine sub-factors are being used in the distribution of interview to determine the most effective factors for attaining the second goal of this study. All nine factors under consideration were found to be effective, with no criteria found to be ineffective. The study was carried out using a qualitative case study, and both Whatsapp and Google Meet were utilized to schedule interviews. Three different questions are posed to each pair of interviewees. Each component of the interview question was examined to ensure that it matched and was consistent with the interviewees' current position. The study was not complete or perfect, among additional limitations. Future research should define the best strategies for encouraging the use of the GBI (Green Building Index) methodology for historical buildings.

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