

SUSTAINABLE BUILDING DESIGN CONCEPT AT HOTEL BUILDING IN IPOH

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ABSTRACT

Sustainable building or green building is an outcome of a design philosophy which focuses on increasing the efficiency of resource use energy, water, and materials. Other than that, reducing building impacts on human health and the environment during the building's lifecycle, through better siting, design, construction, operation, maintenance, and removal. This study aimed to investigate the design building components as well as energy and environmental system for hotel building at Ipoh. Data collection were done using qualitative approach whereby an observation and interviewed session was conducted with the supervisor of the building. The finding obtained from this study shows that this building are not fully sustainable according to Green Building Index criteria. Due to that, a few suggestion were discussed for future sustainable building design.

Key Words: *Sustainable Building, Efficiency, Green Building Index*

1.0 INTRODUCTION

As the world's fast moving industrial activity, construction faces a huge challenge in pursuit of sustainability (Suliman.& Abdelnaser, 2009). Construction industry are accountable of contributing up to 40% of all resources consumption and produces about 40% of all waste including greenhouse gas emissions (Suliman.& Abdelnaser, 2009). Due to that factors, sustainable development were introduced in nowadays environmental and economics literature. The idea of sustainable development has become progressively popular in the contemporary world. Nurhazwani et. al. (2012) and Mohmed et. al. (2015) stated that the goals of sustainability are to enable peoples to meet their basic needs and improve their quality of life, while ensuring that the

natural and resources are maintained and enhanced for both their benefit and that of future generations.

The green building construction seem to be the answer for the changes that are needed to make our society sustain. Building needs to be construct aligned with sustainable development agenda and able to cope with dwindling and increasingly expensive energy supplies. All development and designers need to rally all building professionals to the concept of low energy building. There are six fundamental principles of sustainable building design such as 1) resource efficiency; 2) indoor air quality (IAQ); 3) energy efficiency; 4) water conservation and 5) affordability. Green buildings can contribute substantially to reducing current and future energy demands. To achieve that important goal, regulations must be in place to promote, encourage, and enforce the construction of every building as a green building.

Over the past decade, there has been varieties of building evaluation tools, programs, systems and standards focused on sustainable building and product development. Buildings certification varies from region to region due to varying nature of climatic condition. Most countries developed their own building certification system which is in the United State, Green Building Council's Leadership in Energy and Environmental Design (LEED), in the UK Building Research Establishment Environmental Assessment Method (BREEAM), and in Singapore the Building and Construction Authority Green Mark (BCA GREEN MARK is used for rating buildings.

The government of Malaysia has realized the prominence of saving the environment through sustainable building development especially toward reducing carbon emission and resources use (Nurhazwani et. al., 2012; Isa et al, 2014; Md Darus et al, 2009; Zainul Abidin, 2009). Malaysia has developed its own local rating system known as Green Building Index (GBI) for evaluating the environmental design and performance of Malaysian buildings. The GBI rating system was developed jointly by the Association of Consulting Engineers Malaysia (ACEM) and the Malaysian Institute of Architects (CBRE). This GBI Rating System proposed to promote sustainability in the built environment and raise awareness among construction players and also public so that the Malaysian property industry becoming more environmental friendly (Nurhazwani et. al., 2012). The objective of GBI is to save energy, resources, recycle materials and adapt buildings to the Malaysia climate, culture and environment. The usage of Sustainable Building Rating System aid the increment of building performance and life span among the stakeholders and the public in the Malaysian building industry (Mohmed et. al., 2015). Therefore the aim of this study was to investigate the design building components as well as energy and environmental system and to access the criteria Green Building Index (GBI) at hotel building in Ipoh.

2.0 METHODOLOGY

This section describes the methodology that will be used during the study. It is essential to choose the appropriate method because it will assist a smooth running

of the study. The method will be explained and elaborated in detail. The importance of describing the method is that it can be a guide in conducting the study. Thus, it will ensure that all the information and data collected are reliable and not diverted from the study's objectives. The case study adopted in this research can help to focus and study more in detail on a specific construction site. Methods for collecting data and information of the case study are site visit and open interviews.

Data collection were done using qualitative approached whereby an observation and interviewed session was conducted with the supervisor of the building. Qualitative research is use to gain an understanding of underlying reasons, opinions, and motivations. It provides an understandings into the problem or helps to develop ideas for potential quantitative research. It is also used to uncover trends in thought and opinions, and dive deeper into the problem. Qualitative data collection methods vary using unstructured or semi-structured techniques. Some common methods include in-depth interviews with individuals, group discussions, diary and journal exercises, and in-context observations. Sessions may be conducted in person, by telephone, via videoconferencing and via the Internet. The sample size is typically small, and respondents are selected to fulfil a given quota.

For this study the observation was done on the building and photo were taken. After that semi structure interview were conducted to gain more information on the building regarding sustainable design. All data gathered was analysed manually using thematic analyses and coding. Later all analysed data were been compared with GBI requirement.

3.0 FINDINGS

The information got through from interviews and observations at hotel building was categorized as Non-Residential Existing Building (NREB). All the information been compared with Green Building Index (GBI) category which divided into six criteria.

Assessment Criteria for Non-Residential Existing Building (NREB)

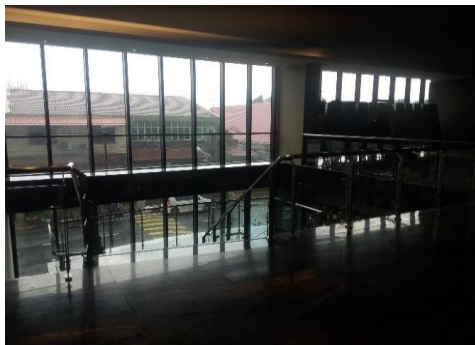
- a) Energy efficiency (EE)
- b) Indoor environmental quality (EQ)
- c) Sustainable site planning & management (SM)
- d) Materials & resources (MR)
- e) Water efficiency (WE)
- f) Innovation (IN)

a) Energy Efficiency (EE)

Item	Green Building Index (GBI)	Yes	No
Minimum Performance	To get minimum energy efficiency (EE) to reduce energy that used in buildings, thus reducing CO2 emissions to the atmosphere	✓	
Renewable Energy	Use a renewable energy systems to offset the cost of energy consumption and promote green energy consumption		✓
Sustainable Maintenance	Buildings with common management, building maintenance offices are provided with facilities and inventory storage		✓

The building has used the optimal sized glass and performance glasses such as low-glass or optically-selected glass to get more natural light. Besides that, the roof with appropriate insulation material to prevent heat rise to the occupied space also used in this building. There is no renewable energy system for the building. All maintenance worker understands the design of the building and provides a maintenance program to get a good maintenance for building. Respondent 1 said that ;

“I’m not sure this building has a renewable energy”.



a) Stair to lobby



b) Glass at function

Figure 1 : The glass windows and wall that use in the building

b) Indoor environmental quality (EQ)

Item	Green Building Index (GBI)	Yes	No
Minimum IAQ Performance	Ensure a fresh air is supplied to indoor space to maintain good air quality in occupied space		✓
Thermal Comfort: Design & controllability of Systems	Good thermal system control by particular occupants or buildings in providing a wide range of comfort space to building occupants	✓	
Daylighting	Design and ensure good lighting in the building	✓	
Daylight Glare Control	Using a daytime lighting system with a good glare control to get the light of daylight	✓	
Sound Insulation	Ensure the building uses a wall and floor system specially designed to absorb sound sufficiently to maintain good quality for the neighbourhood	✓	

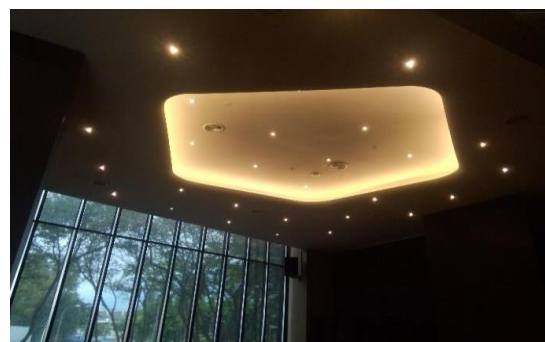
The Buildings has using large windows, windows with light machining tools (eg. tinted or curtains), ceiling lights, building foyer and uses a lot of energy-saving and non-glare bulbs. Walls and floors the building are thick and can reduce the noise between the walls and the rooms. This also supported by the respondent saying that;

“This building not get enough fresh air for certain space but the conditions in every room is comfortable except outside the room is quite a bit because there is no air conditioning system”.

“this building use a large windows and many wall from glass and get more lighting”.



a) Large windows in room



b) Use energy-saving and non-glare bulbs

Figure 2 : Day lighting in the buildings

c) Sustainable site planning & management (SM)

Item	Green Building Index (GBI)	Yes	No
Site Selection and Planning	Reducing development that does not comply with the Local Plan or Structure Plan for the area and exceeds the available or planned and inappropriate infrastructure	✓	
Parking Capacity	Reduce parking capacity. It is to encourage the use of public transport and thus reducing pollution and traffic congestion	✓	
Public Transportation Access	Reduce pollution and impacts from automobile use	✓	
Community Services & Connectivity	Community facilities near the building or residential area can facilitate the occupants and reduce the impact of vehicles	✓	
Open Spaces, Landscaping & Heat Island Effect	Preserve or conserve habitat and maintain ecological diversity with native plants	✓	
Construction System & Site Management	Using the IBS system to reduce wastage of material and the impact of pollution during construction	✓	
Storm Water Management	Surface water is managed to reduce pollution and encourage to rainwater recycling	✓	
Re-development of Existing Site & Brownfield Sites	Sites that have never been developed or developed and sites that already have buildings, roads, existing car parks	✓	

The site of the building complies with the existing *Local Plans and Structure Plans* for the area and also has an existing planned infrastructure such as roads, trenches, water supply, sewerage systems, electricity supply and telecommunication systems. However, the building area does not have many parking spaces but have a pedestrian and bus stops in the immediate vicinity of the building. Near the area also has a mini market, playground, coffee shop, restaurant and grocery shop. Most of the original trees on the building are maintained and there is a landscaped area with green plants in the lobby area.



a) Green plant in lobby



b) Plant at stairs

Figure 3: Landscaped area with green plants

d) Materials and Resources (MR)

Item	Green Building Index (GBI)	Yes	No
Storage & Collection of Recyclables	Reducing construction waste and disposal at landfills and recycling		✓
Materials Re-Use and Selection	Reuse building materials to reduce waste. This can help reduce the environmental impact. choose recyclable and durable materials		✓
			✓
Storage, Collection Disposal of Recyclables	Reducing waste generation during construction and during occupied buildings facilitate waste transported and disposed of to landfill.		

The building has no any criteria for materials and resources according to the Green Building Index.

e) Water Efficiency (WE)

Item	Green Building Index (GBI)	Yes	No
Rainwater Harvesting	Collection of rainwater or runoff from the roof for residential and irrigation use		✓
Water Recycling	Recycle water for building use and reduce water discharge to external refinement, designing buildings that can reduce the flow of water to treatment plant		✓
Water Efficiency Landscaping	Reduction of water use for landscape irrigation. It can be done through the use of native plants inside and outside the building		✓
Water Efficient Fittings	Reducing the use of clean water using efficient devices		✓

The building has no a separate water storage tank system and additive equipment for channelling rainwater for other uses and not use of water treatment technology and system that can treat water and then water is applied to irrigation. The landscapes designed with water efficiently such as choosing a green or natural plant that needs water, eliminating and reducing the use of clean water for landscape irrigation systems also not use in the building. However the building uses wash hand basin and urinals flush sensors that make it easy for users. Respondent said;

“ only has a sensor at men toilet and has no water recycling”.



Figure 4 : Sensor at toilet

f) Innovation (IN)

Item	Green Building Index (GBI)	Yes	No
Innovation In Design & Environmental Design Initiatives	Provide design opportunity to get innovation and initiative reward performance above the requirements set by GBI		✓
Green Building Index Facilitator (GBIF)	To promote and provide green technology services to support the design required for Green Building Index rated buildings		✓

The buildings has no designated and incorporated some elements of innovation and ideas into the building. But the building also is in direction required to obtain recognition from the Green Building Index. Respondent said;

“ not sure this hotel in direction to get award from GBI”.

4.0 DISCUSSION

The finding obtained from this study shows that this building are not fully sustainable according to Green Building Index criteria but it showed that the building

was safe for environment and to the people. Here are some suggestions that can be implement in order to ensure this building more sustainable :

- i. Use non – toxic material for interior and exterior usage. For example, non toxic paint.
- ii. Use solar photovoltaics (PV) to help reduce green house emissions by absorbing carbon dioxide because it clean and renewable source of energy.
- iii. Build rain water harvesting for collected rainwater that can be used to flush toilets or water landscaped areas. Using rainwater minimises mains water use, reduces flood risks, and saves on energy costs required to pump water into building.
- iv. Use passive heating and cooling, insulate using materials with good thermal mass properties to reduce energy used for heating and cooling.
- v. Controls for heating and cooling bring significant savings.
- vi. User interfaces such as screens showing occupants how much energy the building is using, can rise awareness and influence positive behaviour.

5.0 CONCLUSION

In conclusion, green building is a financially, health, and most importantly environmentally responsible idea that more people need to adopt. The Malaysia Green Building Council develops Green Building Index (GBI) in order to help customers, designers, and builders to work together to create buildings with the minimal impact on the environment possible. Many building materials are renewable energy sources exists to lessen one's impact upon the environment. Through educating, making environmentally products more readily accessible and reliable, and by providing government incentives it is possible to encourage more people to adopt green building and all of the benefits that come along with it. Besides, sustainable construction is about much more than the fabric of the built environment. Buildings and the social, commercial and transport infrastructures around them must be constructed in ways that are sustainable in environmental and economic terms.

The objectives of this study are to investigate the design building component, as well as energy and environmental systems suitable for different categories of high – performance building and to access the criteria Green Building Index in the hotel were achieved. All sectors of the property life-cycle can make a contribution in achieving progress in all strands of sustainable development. There are many issues and challenges posed for all those involved. This include financial and regulatory measures, education and training, research and development. Above all, buildings must be affordable and constructed at an economic cost which people are prepared to pay. Sustainable development is absolutely vital, but must be balanced against longer-term economics issues.

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