

THE DESIGN OF THE GREEN BUILDING IN CONSTRUCTION

**Mohd Izzat Bin Mat Alim, Prof. Madya. Dr. Nor Hasni Bin Osman,
Encik Azhar Bin Ahmad**

*School of Technology Management and Logistics
Universiti Utara Malaysia, Kedah, Malaysia*

ABSTRACT

LEED aims to improve the environment performance and yield economic gains in building construction. Green building built to protect the environment. It is built on an area of climatic conditions affecting the constructions site buildings. The Green buildings give a more benefits in construction industry and can be categorized in three groups, such as environmental, economic and social. The design of the green building in construction is a very important for building industry. Design phase of the project in construction includes four steps, such as pre-design, concept design, design development and final design. The designer of the project should be expert or have knowledge in a green building concept. This knowledge is very important factor in gaining this quality and accuracy of the existing physical aspects of a project site. Green building design phase is essential for getting features that aid in keeping the surrounding environment. Design phase is an important phase as it affects the structure of the building to meet green building standards or otherwise.

Keywords: LEED, green building, green building benefits, design of green building, project phase, design knowledge

INTRODUCTION

The term green building is a building that is characterized by nature-friendly building technology. In addition to a wide range of energy including save electricity, water, wind and costs, it also provides comfort and a healthy environment for the occupants. This environmentally friendly technology is used in many more as building includes office buildings, shopping malls, schools, homes and more. Building Green or sustainable building is a structure that is designed, built, renovated, operated, or reused in an ecological and multi-purpose to use resources effectively and not waste along the life cycle of the building. Characteristics of green buildings typically designed using natural elements such as plants that are planted in and out of buildings.

Modern construction industry is currently causing environmental impact and limiting the scope of the impact occurring to green building. Taking into account the various environmental impacts is an easy way to identify a building green and then be able to know the negative effects that should be considered to be reduced or eliminated by more effective planning in construction design of the building. Modern buildings are built nowadays have much impact on the environment. In the construction of a green building, there are several phases that need to be focused in order to obtain the characteristics of an effective green building. Among the features that are required in

the selection of materials and resources, energy consumption and air pollution, water use and quality, and the quality of indoor air and site selection.

As of June 15, 2012, a total of 291 buildings were registered in Malaysia under the Green Building Initiative (GBI). Of the total, 67 buildings have received the Design and Evaluation five GBI Certificates End. These 72 projects represent a gross floor area of 2.5 million square meters and it helps the local environment by reducing emissions of carbon dioxide or equivalent to about 110,000 tons per year. Green building is a building construction technology characterized by a warm nature and the increasingly popular concept used in most office buildings and homes. Besides saving various types of energy including electricity, water, wind and costs it also provides comfort and a healthy environment for the occupants. (Kosmo, Ogos 2013).

PROBLEM OF THE STATEMENT

The rapid development of the construction of more buildings and increase residents nowadays have a negative impact on the environment, especially in terms of environmental pollution. To carry out this study, the factors to consider are the problems faced by stakeholders to implement building design based on the concept of green building. This study was conducted to determine the causes or issues faced by those involved in the construction of green buildings.

Although greening of cities in our country have begun to reveal some success, but there are some issues and problems to the modern cities now. Replanting rates are still low compared with the destruction of green areas for development (M. Khor 1996). Replanting trees still less sensitive to the age of the plant to function effectively. Most of the planting of trees in new residential area just emphasize quantity to meet graduation requirements only, rather than planting trees matured and quality (Ismail AM 2000).

LITERATURE REVIEW

Current Building Practices

Green building practices vary between regions and wise choice. Currently there is no universal set of policies and regulations to regulate the practice of green building in all countries. Even so, there are many regional adaptations of green building design standards in the United States, Canada, China and India (Yudelson, 2008). Practitioners of green building design strategies and techniques using various technologies and methods that enable high-performance structure to replace conventional construction techniques. The current practice focuses on the techniques, materials and technologies that are sustainable and locally appropriate.

Criteria For Green Building

Leadership in Energy and Environmental Design (LEED) Rating System has become synonymous with the national standards of green building design. LEED is a third-party certification program based on points that are available for public use in 2000 by the US Green Building Council (USGBC) (Yudelson, 2008, p. 3). USGBC's rating system reflects the dedication to the promotion of sustainable building practices (USGBC, 2008). LEED certification

is dependent on a number of criteria, developed in collaboration with industry professionals and experts in the process based on consensus to establish what determines the structure of high-performance (USGBC, 2008). The criteria set for all categories of certification addresses five key areas for improving human health and the environment. The categories and criteria of the LEED program affect sub-criteria and points might be awarded to high-performance structure.

Green Globes is an evaluation and rating system, less obtrusive, for green buildings. Green Globes depending on questionnaire based approach in line with building owners and developers to provide the information needed for the report to be generated (Globes). This process is declared restructured and flexible for any application. Because it does not require the physical presence of inspectors, there is potential to forge achievement. Online assessments provide a report which outlines the rating received, the list of achievements and recommendations. Green Globe provides a certification for structures in Canada and the United States.

Integrated Design System Level

The activities of pre-design is an activity that is set by the owner of the project goals and clear indicators to measure the objective of meeting the various stages of the project life cycle. The activities of pre-design usually involve only the owner or his representative. There are also a number of cases involving architects in helping to achieve the desired goal. If an architect or owner's representative is involved, there should be widespread consultation with the owners to get the goals to be achieved. While this goal has been set, it can still be changed during the project is underway and the goal changes could mean more work to be abortive. If the project involves the commissioning agent, he should be taken at this stage to document the project requirements and objectives to the owner.

After the activities carried out pre-design, preliminary conceptual idea of the project is generated through a graphic illustration of the project either as a whole or just parts. The initial sketch is intended to establish a starting point for further discussion, thought provoking, start discussions and ways to achieve the final design. A series of integrated design Charrettes will be held at this stage to begin the process of communication between interested parties. It depends on the size of the project and the constraints, some interested parties should be appointed at this stage because many of those involved as early as possible. The views of stakeholders made at this point can reduce costly changes and more successful in carrying out this process.

The project moves from concept to detailed design stage, the design scheme that will be generated showing the general site layout, building design, space allocation and rugged construction specifications that require further development. Indicative costing budgets should also be secured. At the stage of design development, the cooperation process integrated directly but rather stakeholders. It should be brought into the process to help with the design development of all aspects of the building. The topics for research, to be held discussion and development remains largely the same, although the scale is under consideration and enlarged. Details will be explored in greater depth and will eventually produce architectural and engineering drawings, specifications of materials or equipment, facilities management manual, user control and user manual.

As the project progresses towards the construction phase, more stakeholders will be brought in. Sub-contractors and suppliers of equipment and materials that are not yet on board should be brought into the process of integrated design. Their understanding of project goals and requirements of the owner and must be ensured. Decisions made before this needs to be explained to them and contract documents should be reviewed by them to ensure compliance with the performance. or alternative solutions proposed changes, this requires extensive consultation with all stakeholders of the project because they can affect building performance parameters. It is therefore important that the process of iterative design approach is being implemented in order to previous decisions constructively challenged in various stages of the project.

Energy Efficiency

Green building is a way to improve the environment. It is beneficial to human beings, society, environment, and profitability builder. It is about tailoring buildings and sites on the local climate, site conditions, culture and society, to reduce the use of resources while improving the quality of life. There is no single view of the green building. Although the characteristics of natural and efficient source can be highlighted in the building, they also can become invisible in any architectural design. Similarly, the green building is not a set of environmental components or piecemeal modifications of already designed, standard building. This approach not only adds to the cost of buildings, but also resulted in savings of marginal at best. Green building really take a holistic approach to programming, planning, design, and construct (or modify) the building and site. It involves issues of mutual interconnect such as climate, orientation and shape of the building, lighting and thermal comfort, materials, and so on, and optimize all aspects.

RESEARCH METHODOLOGY

Introduction

In this chapter will be focus of methodology of design of green building in construction which used to complete in this study. The first part of presents is the conceptual frameworks and research design. The next parts followed by data collection method and then explain about research process.

Conceptual frameworks

In the methodology include the conceptual frameworks. It is, the next step is to build a framework as a guideline of research study. The framework for research is the most important for relationships between independent variables and dependent variable for achieve the overall objective of the study.

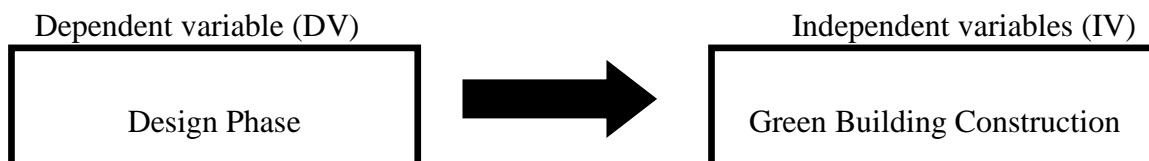


Figure 1: Research framework of design of green building in construction

Research Design

According by Cima & Dip, (2012) the research design defined as to the method taken to link with research question and objectives in data collection, data analysis and interpretation in a logical manner. Basically, the research design, have two categories. The categories are qualitative approach and quantitative approach. In this study, the research design of green building in construction using qualitative approach through interview at construction industry and. Each question for respondent will be related with the study about design of green building in construction.

Data collection method

In this study, each sources of get information known as primary data. Any information have very important to support objective and for to make conclusion based on topic about green kaizen for sustainability.

Primary data

Primary data or main data defined as new or original data will be collected to respondent. It is have two categories such as observation and interview. In this study used interview for data collection.

Interview

Interview is method for conduction to obtain information about design of green building in construction based on objective in this study. The objectives of this study are as follows to come up with a design phase in green building. It is the way to settle a problem exist in design phase of green building construction. The objectives also to identify a integrated design process of green building in Malaysia.. It also to identify a awareness towards a sustainable development. So, the respondent for this research is Manager of company ENCOMAS in Alor Setar, Kedah.

In this interview, will be prepared the formal question based on interview protocol and based on objective of the study to the respondent. The question divided into two sections. The first section about background of respondent and second section focus to design of green building in construction. The total question around 20 questions.

FINDING AND RESULTS

Integrated green building design

An integrated design approach

A successful integrated design approach always begins with acquiring an early in-depth understanding of how various building systems and the environment relate to, interact with and affect each other in a holistic manner to ultimately contribute to the end performance of the building. This ensures that the performance and cost of one building system or environment is not optimized at the expense of another building system.

An integrated team design

This design approach brings all stakeholders together to look at project objectives, materials, systems and assemblies from many different perspectives. This essentially moves away from traditional planning and design process where specialists work in their respective specialties

somewhat isolated from each other and address problems with each other only when they arise. The whole team is encouraged to contribute towards the output design by sharing their experiences, knowledge and expertise.

Table 1: Explains the key differences moving from traditional planning and design process to the integrated green building design approach

Traditional planning and design approach	Integrated green building design approach
Involvement of the project members is limited to their trade and specialization.	Project members are included right from start of project to draw inputs that will help to shape the design and planning process.
Project gets more intensive as it progresses. Less time is spent at the early stages.	Project starts off intensively with time spent on meetings, charrettes and discussions.
Decisions are made typically by a few stakeholders such as owners, architects and contractors.	Decisions are made by the team. Brainstorming sessions, research and iterative discussions are held among as many stakeholders as possible before decisions are made
A linear process is adopted.	A whole system thinking approach is adopted.
The focus is to reduce up-front capital costs.	The project team aims towards reducing long term operation and maintenance costs by using highly efficient systems
Systems are considered in isolation and often result in over-designing / over-sizing.	Total building performance is used to assess how each system affects one another to deliver the optimum design.
Project members undertake limited responsibilities.	All team members share equal responsibilities and work together to solve problems.
The linear process ends when construction of the project is completed.	This design approach emphasizes on the long term performance of the building and users' satisfaction through commissioning, Post Occupancy Evaluation (POE) surveys and energy audits.

Iterative processes

It is not a one-off design session but continuous processes consisting of reviews and workshops / charrettes until the best solutions, under the project circumstances are identified. Such iterative processes can ultimately lead to downsizing or elimination of systems altogether.

Design analysis

Design analysis tools such as energy modeling, daylight simulations, natural ventilation simulations, etc are commonly performed to assist in evaluating design options. Using such tools

does not necessarily mean higher capital investment costs but instead may lead to cost savings when building performance is optimized and design options are scientifically tested.

CONCLUSIONS

This knowledge is very important factor in gaining this quality and accuracy of the existing physical aspects of a project site. Green building design phase is essential for getting features that aid in keeping the surrounding environment. Design phase is an important phase as it affects the structure of the building to meet green building standards or otherwise.

As a conclusion, researcher make a conclusion after gone through with the overall progress in this study where in design phase is the important phase to monitoring and managing the green building to get success based on demand of customer.

Started from chapter one, the research objective are very important things. This is because it must be have a relationship in overall of what we want to research. For this study, the main research objective was to investigate in detail the design phases in green building. From that, this research was research about the activities in design phase, integrated design process in green building and the issues faced on design phase. Hence, qualitative method has been used in this study to obtain the relevant data from Development Company. The solution for the problem were come out with the analyze data from interview and do some research from previous research about design of green building.

Lastly, in the opinion researcher, the implementation of these activities in the design phase are important things to all company because it not only can give an increase in production design their buildings, but also can give some knowledge to the company.

REFERENCES

- Binggeli, C. (2010). *Building systems for interior designers* (2nd ed.). New Jersey: John Wiley & Sons, Inc.
- Clark, Peter. 2003. *An Evaluation of the Integrated Design Process – Lessons Learned from Whistler*. Whistler BC: British Columbia Buildings Corporation.
- Golany, G. S. (1995). *Ethics and Urban Design: Culture, form, and enviroments*. New York: John wiley & Sons, Inc.
- Jones, L. (2008). *Environmentally responsible design*. Hoboken, NJ: John Wiley & Sons.
- Larsson, Nils. 2003. *The Integrated Design Process – An Overview*. Ottawa: International Initiative for a Sustainable Built Environment (iisbe), Available at www.iisbe.org.
- Pearl, Danny, 2004. "An Integrated Design Process." *Canadian Architect*, June.
- Paladino, Tom. 2005. *Green Building Value/Integrated Design Vision/Maximizing Value with LEED/The Triple Top Line Vision*. Power Point Presentation. Seattle, WA: Paladino & Company, Inc.
- Reed, William. 2000. *Whole-System Integration*. PowerPoint presentation. Berkeley CA: Natural Logic, Inc.

Sustainable Building Design: Principles, Practices, and Systems. 2003. Vancouver BC: Greater Vancouver Regional District. www.gvrd.bc.ca/buildsmart/designpractices.

Todd, Joel Ann, and Gail Lindsey. 2006. Planning and Conducting Integrated Design Charrettes. Washington DC: WBDG/National Institute of Building Sciences. Available online: www.wbdg.org/design/charrettes.php?print=1