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**THE CHALLENGE**

**IMPLEMENTATION**

**IN MALAYSIA**

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## ABSTRACT

The construction industry is one of the largest sector responsible for high-energy consumption, solid waste generation, global green house gas emissions, external and internal pollution, environmental damage and resource depletion. In order to overcome this problems, green building is being develop in Malaysia, especially government took drastic actions in promoting and emphasizing green building. This study covers the challenges of green building implementation in Malaysia. The objectives of the studies are to identify level of awareness of parties involved, to determine problems preventing the implementation and to analyzed the effect of green building implementation in Malaysia that conducted at Peninsular Malaysia, Sabah and Sarawak. The methodology of this study involved literature review, data collection by questionnaires and analysis of results using the Average Index Method. Through the literature review the level of awareness, problems preventing growth of green building and effects of green building implementation have been identified. Questionnaires were prepared according to the studies objectives and were sent to developers, contractor, and building professionals around Peninsular Malaysia, Sabah and Sarawak. Based on the study, green building is widely understood by majority industry players in construction, yet the implementation is not being widely carried out. The numbers of green building carried out are relatively small compare to overall project carried out. Although, drastic action and plan have been taken to promote green construction in Malaysia, the issue preventing the implementation and emphasizing of green building have been studied to mitigate the failure. There are several recommendation have been proposed to mitigate the failure and encourage the implementation of green building in Malaysia.

## ABSTRAK

Industri pembinaan merupakan salah satu sektor yang terbesar yang member impak dalam penggunaan tenaga yang tinggi, penjanaaan sisa pepejal, pelepasan gas rumah global hijau, pencemaran dalaman dan luaran, kerosakan alam sekitar dan kesusutan sumber asli. Bagi mengatasi masalah ini, bangunan hijau sedang diperkembangkan di Malaysia, kerajaan terutamanya telah mengambil tindakan yang drastik dalam mempromosi dan memberi penekanan kepada bangunan hijau. Kajian ini meliputi cabaran pelaksanaan bangunan hijau di Malaysia. Objektif kajian adalah untuk mengenalpasti tahap kesedaran pihak yang terlibat dalam industry pembinaan, untuk menentukan masalah yang menghalang pelaksanaan dan untuk menganalisis kesan pelaksanaan bangunan hijau di Malaysia yang dijalankan di Semenanjung Malaysia, Sabah dan Sarawak. Kaedah yang digunakan dalam kajian adalah dengan menganalisis literatur, pengumpulan data melalui soal selidik dan analisis keputusan menggunakan Kaedah Purata Indeks. Melalui kajian literatur tahap kesedaran, masalah yang menghalang pertumbuhan bangunan hijau dan kesan pelaksanaan bangunan hijau telah dikenal pasti. Soal selidik telah disediakan mengikut objektif kajian dan telah dihantar kepada pemaju, kontraktor, dan profesional bangunan di sekitar Semenanjung Malaysia, Sabah dan Sarawak. Berdasarkan kajian ini, bangunan hijau secara meluas difahami oleh pihak industri majoritinya dalam pembinaan, namun pelaksanaan itu tidak meluas dijalankan. Bilangan projek berkonsepkan bangunan hijau dijalankan adalah agak kecil berbanding dengan keseluruhan projek yang dijalankan. Namun tindakan drastik dan pelan perancangan telah disediakan untuk menggalakkan pembinaan bangunan hijau berkembang di Malaysia. Isu yang menghalang pelaksanaan dan menekankan bangunan hijau telah dikaji untuk mengurangkan faktor penyumbang pada kegagalan. Terdapat beberapa cadangan telah dikongsi untuk mengatasi faktor yang menyumbang pada kegagalan dan menggalakkan pelaksanaan bangunan hijau di Malaysia.

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**LIST OF ABBREVIATIONS**

PAM	=	Pertubuhan Arkitek Malaysia
BCA	=	Building and Construction Authority Singapore
MO	=	Market Obstacles
IBS	=	Industrialized Building System
CREAM	=	Construction Research Institute of Malaysia
GBI	=	Green Building Index
FDI	=	Foreign Direct Investment
EPA	=	Environmental Protection Agency
IEQ	=	Indoor Environmental Quality
AI	=	Average Index Method
PKK	=	Pusat Khidmat Kontraktor

## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 Background Study**

Construction sector is one of the major industries in the world which encourage the development of economy in Malaysia. In Malaysia, construction sector has steadily generated 5% – 10% of total national Gross Domestic Product since 1990s (Khamidi, 2007). While construction sector provide countless of benefits to society and nation, it activities have significant impact to environmental damage through pollution, high energy consumption, soil erosion, lost of wild land and negative impact to human's health. As the negative impact of environment and global due to the construction activities become worst, a new alternative and ways of construction need to be established in minimizing and solve these problems. Due to this matter, green construction are introduced to the world and gaining it momentum nowadays.

Most of constructed building in Malaysia was not implement green technology in their construction. From energy views, current life styles are demanding lots of energy to support a comfort environment to run our daily life. For example, installation of air conditioner in building to counter Malaysia hot weather, light in indoor even day time and filter water for drinking. 95% of energy in Malaysia was generated by non-renewable natural resources such as coal, oil and gas

(8<sup>th</sup> Malaysia Plan, 2005). This situation was danger and harmful to our living environment and created unsecure environment to our next generation. From construction point of view, the building which is not implement sustainable or green material as a construction material is considered improper managerial of waste and land usage.

People nowadays are more concerned about the environment since they know about the effect of pollution to the environment and human's health. Word of green building is still unfamiliar and not synonym to Malaysia's citizen. Green construction is the process of planning and constructing using technologies and concept with more resource efficient, better social economy, less wasted generated and healthier lifestyles (US Green Building Council, 2007). The term of "green" refer to environmentally friendly practices from building design. It also encompasses energy and water usage. The terms of "green" is not just apply to the product but also to the planning, strategies, building design, orientation, landscaping, building operation and maintenance. The less impact a building has on human health and the environment, the more green it is (Zane, 2009).

Environment concern and boost in technologies advances are affecting Malaysian way of live and work. These factors demand to create a new design in construction and operation demand on building or urban facilities and infrastructure which bring benefits to human and environment. In Malaysia there is increasing of public awareness and in how building affects the environment. As a result, people who especially involved in private and public sector beginning to demand buildings that could optimize energy use resource efficiency and improve indoor environment quality.

Green building concept in developing country like Malaysia is still considered new. However, efforts toward developing this green technology comprehensively are underway to ensure the preparation of better quality and affordable for society. Green technology in building construction has been accepted and applied widespread and popular in developing country such United State, United Kingdom and Germany. In Malaysia, the government have providing funds amounting to RM 1.5 billion in an effort to encourage more manufacturers and users

of green technology finance and support various real estate projects (Berita Harian, 2011).

May 21, 2009, it was a new chapter begin in Malaysia construction industry, the launching of Malaysia's Green Building Index (GBI). The GBI rating system evaluate the new building on environment impact based on 6 criteria consist of Energy Efficiency, Sustainable Site and Management, Material and Resource, Indoor Environment Quality, Water Efficiency and Innovation. Chief Minister YAB Lim Guan Eng said, "Penang may impose the Green Building Index accreditation as criterion for several upcoming development projects (The Star, 2009). This was a good start for Malaysian to apply GBI in their living environment.

## **1.2 Problem Statement**

Green building is very new and just launching in Malaysia which many people currently do not aware about the existing of this new technology in construction sector. According to Edge Malaysia, Malaysia's very own green building rating system has been launched on 21<sup>st</sup> May 2009 at Kuala Lumpur Convention Centre by Work of Minister Datuk Shaziman Abu Mansor. The Green Building Index has been developed by Pertubuhan Arkitek Malaysia (PAM) and Association Consulting Engineers Malaysia promote sustainability in build environment and raises awareness among parties involved in construction industry and the public about the environment issues. Since 2005, Malaysia already has its own green building at Jalan Tun Abdul Razak near to KLCC which is known as GTower, Golden Triangle. GTower has been recognized as Green Mark Gold by Building and Construction Authority of Singapore (BCA) not just due to its amazing design of the building but also by the implementation of green technology which stressed on environmental elements inside the building (Tan, 2011).

Old or current construction which using traditional method had cause lots of negative impacts to the environment such as pollution, lost of wild land, erosion, global warming, and high energy consumption. Malaysia's annual deforestation is

accelerating faster than any other tropical country in the world, increasing almost 86 percent between the 1999 to 2000 period and 2000 to 2005 (UNFAO, 2010). Building itself contribute in a significant way to green house gas emissions and thus to global warming. Green buildings consume less energy and resources. The Malaysia government had announced that it will stop production, import and sales of traditional incandescent light bulbs by 2014 in order to reduce the carbon dioxide emission and also reduce total energy usage in the country by 1% (The Star, 2010).

According to Green Building Congress Malaysia 2010, with lower operating costs in using the non-renewable energy sources such as electricity, water, fuel, coal and diesel, it provide opportunity for the investors in these sector gain better return on investment with conservation practices. There is growing confidence that investment in Green Building and sustainable construction technologies not only make environmental sense but economic sense too. Malaysians are the highest fuel consumers in ASEAN, at more than 400 litres per capita annually in 2007 (The Stars, 2010).

Besides impact to earth, human health also have becomes an issue to the world. The construction and use of buildings consumes billions of tons of raw materials, generates significant waste, consumes a tremendous amount of energy and contributes toxic emissions to the air. There are significant opportunities to improve environmental quality and human health through the green planning, design and construction of health care facilities. For example, Brigham and Women's Hospital's Shapiro Cardiovascular Centre has implemented numerous green initiatives. 75% of the building interior is exposed to natural light, air filtration is very efficient, neutral cleanser are used on the floors, latex gloves has been eliminated, medical waste minimized and even the debris are recycled (Rick Bass, 2011).

Green buildings need to be promoted in order to increase the rate of implementation and setup a good impression in construction sector. Realizing this early, Malaysia had launched the Green Building Mission in past three years ago. The objectives of this mission are to raise awareness and promote sustainable building and construction in the country. Plus, the launch of the Green Building Index early this year provides an opportunity to measure, rate and certify "greenness"

in buildings. It is imperative that the industry responds to these initiatives. With rising awareness and government intervention, this industry is set to change course into greener and energy efficient buildings. Five hotels in Malaysia have been chosen as new recipients of ASEAN Green Hotel Award 2010, bringing the total number of such hotels in country to ten. A total of 155 hotels from ten ASEAN countries received the award in 2010 (The Stars, 2010).

Skill workers are needed in order to implement this technology in Malaysia. Limited sources of worker that are fully trained to build green building have become an obstacle to implement this new technology. The need for employment is not only high in construction industry but also in other economic sector. Although the industry is facing shortage in local workers, the problem has been minimized by the employment of foreign labour from another country. Apart shortage in labour, the industry also has a problem regarding to the development of skilled labour.

Construction industry in Malaysia is lower compare to developed country such as United State, Japan and Britain especially in technology, machinery, skilled worker and knowledge. Usage of high technologies in machineries and robot ensure the quality and productivity in construction sector. Some of the weaknesses and negative assumptions that have been identified in Malaysian's construction sector are the low quality and productivity of the product, delay in construction process, lack of information and shortage of skilled worker. As a result, it brings the negative image to our construction industry (Mohamad Faiz, 2009).

### **1.3 Objective**

This study is attempted to achieve the goals which satisfy the title of this thesis Effect of Green Building Implementation in Malaysia. To achieve this goal, numbers of objective need to be recognized and identified. The objectives of the study are:

- i. To identify level of awareness among the parties involved regarding green building implementation in Malaysia.
- ii. To determine problems in implementing the green building in Malaysia.
- iii. To analyze the effect of green building implementation in Malaysia.

#### **1.4 Scope of Study**

The study will be conducted at Peninsular Malaysia as the area of the study to obtain the required information. The reason of choosing Peninsular Malaysia as the area of study is to get maximum respondents and feedback from the construction company. Besides that, the study also will be conducted at Sabah and Sarawak. The study will be conducted by questionnaire, interview and attend seminar. The targeted respondents are mainly from construction background such as contractor, quantity surveyor, architect, consultant and academician. Besides that, the questionnaires also will be distributed to the public.

#### **1.5 Methodology**

Methodology of study consists of several procedures or methods which can be a guideline in collect and analyse the data during the study period as shown in the Figure 1.1. The stages of the method are arranged in sequence to ensure the quality, productivity and the objective of the study can be achieved. Plus, methodology crucial to ensure smoothness of the work progress and could avoid careless and simple mistake during the study.



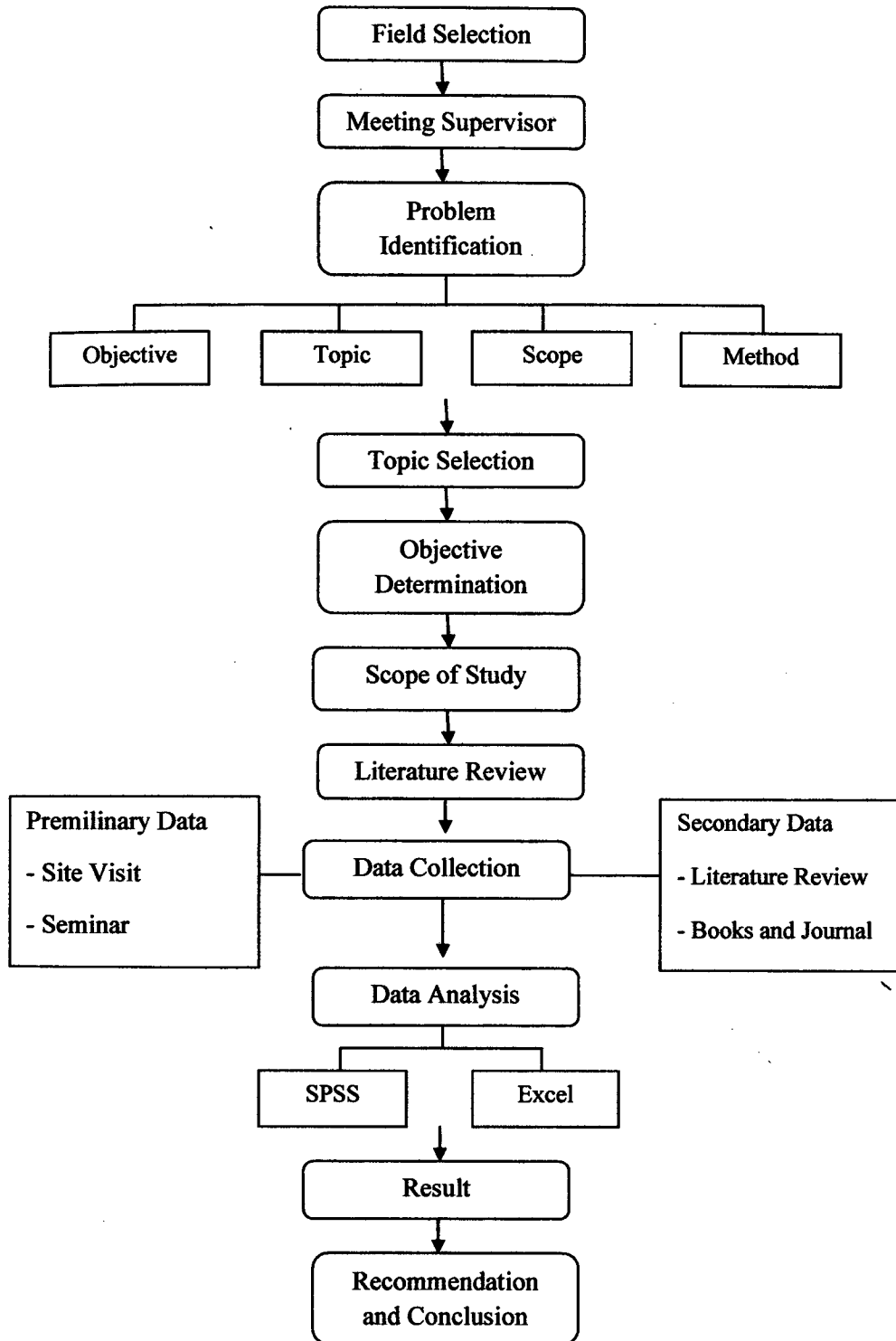


Figure 1.1: Flowchart of Methodology

## **1.6 Significance of Study**

This study is significant in order to increase the awareness of Malaysia's construction industry and public to the green building aspects and our responsibility to the earth and environment. By using this green technology, it supposedly helps Malaysia's construction industry to produce and develop integrated building design and at the same times reduce the negative impact to the environment. With new implementation of green building in Malaysia, it is important to determine and identify any problems arise during the implementation of this environment friendly technology.

## **1.7 Expected Result**

- i. Parties involved in construction sector and public level of awareness regarding implementation of green building in Malaysia will be identified.
- ii. Problems preventing respondents toward implementation of green building in Malaysia can be determined.
- iii. Effect of green building implementation to environment will be analyzed.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

Buildings contribute in a significant way to green house gas emissions and thus to global warming. The increasing focus on sustainability and climate change is now transforming the building and construction industry. With rising awareness and government intervention, this industry is set to change course into greener and energy efficient buildings.

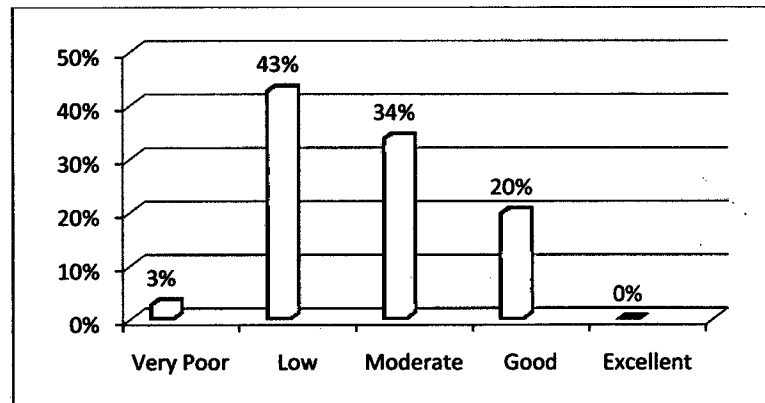
Green building is a practice of creating structure that was environmental responsive and resources efficient throughout building's life cycle start from design, construct, operate, maintenance, renovation and end with deconstruction. Construction sector is one of the major industries in the world which encourage the development of economy in Malaysia. In Malaysia, construction sector has steadily generated 5% – 10% of total national Gross Domestic Product since 1990s (Khamidi, 2007).

Green building concepts is being designed, construct and operate based on renewable energy resources and energy efficient, healthy indoor and outdoor environment, non-toxic content, minimize volatile organic compound or waste reduction, efficient in consuming resources and sustainable building material. Green

building save money, increase comfort, create healthier environment, improve indoor air quality, natural daylight and thermal comfort and also earn benefits on environmental, economic and social aspect.

## 2.2 Issues Preventing the Implementation of Green Construction in Malaysia

There are many benefits that could be obtained from green construction implementation. But it becomes a question why it is still not widely implemented in our country despite of knowing the benefits of green technology in construction. Although green construction is new market, it is important to understand and identify the obstacles that hinder the application and implementation of green technology in construction in order to help us find ways to promote green construction in Malaysia. The identified strategies and recommendation may also serve as a source of references for Malaysia especially for countries which are new in promoting green construction. The level of development or implementation of green construction is still in low level as shown in figure 2.1 below.



**Figure 2.1:** Implementation Level of Sustainability Practice by Construction Developers in Malaysia (N. Zainul Abidin, 2010).

### **2.2.1 Human Capital Development and Knowledge**

In process of adapting green technology in the construction industry, the traditional practice and technique may be outdated and it requires new skill, ability and knowledge. Therefore, it is crucial for the construction industry workers to update with skill, knowledge, competencies and capabilities that are required in implementing and adapting green construction. Lack of knowledge been cited as a major barrier in implementing green building in construction (Carlisle & Shafii, 2005). The contractors and design professionals need to be equipped with the current knowledge on green construction method, techniques and product used in construction.

Even policy maker has produced strict on green construction, it is expected that there will be failure in implementation due to lack of understanding and knowledge. The problem faced by green building contractors, owner and design professional is fail to recognize the differences between a normal construction and green construction project (J.R Steele, 2007).

Research done by E.H.W Chan also indicates that lack of knowledge is one of the main obstacles towards the implementation of green building. In the research survey, the questionnaire distributed covering building designers in Hong Kong and Singapore as the cities are more pioneer in adapting green technologies. From the survey, the designers agreed that higher costs are the undeniable factor, followed by lack of knowledge. It is observed that lack of knowledge in these 2 cities showed highest percentage. The same pattern of obstacle could be seen in Malaysia construction sector in adopting green construction. Therefore this factor was included in this research's questionnaire carried out and come up with recommendations to promote green construction in Malaysia.

Figure 2.2 below shows the market obstacles toward the green building where MO1 is represented the perceived higher upfront costs, MO2 is represented the lack of knowledge, MO3 is represented the lack of awareness, MO5 is represented no coordination and consistency in rating tools and standards, MO6 is represented unrecognized eco labelling for product and material, MO7 is represented no fiscal

incentives from government and MO8 represented the lack of research and case studies

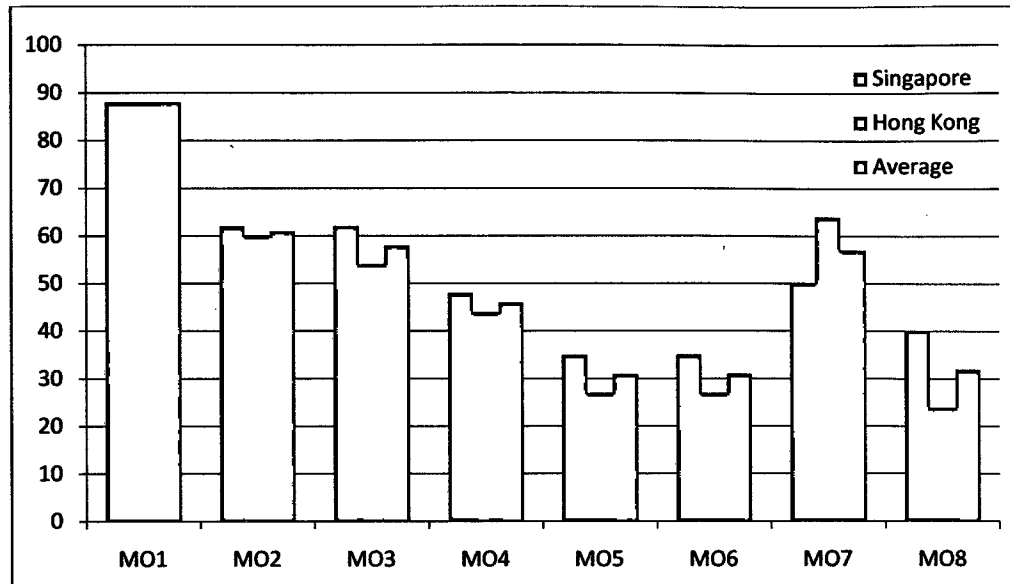
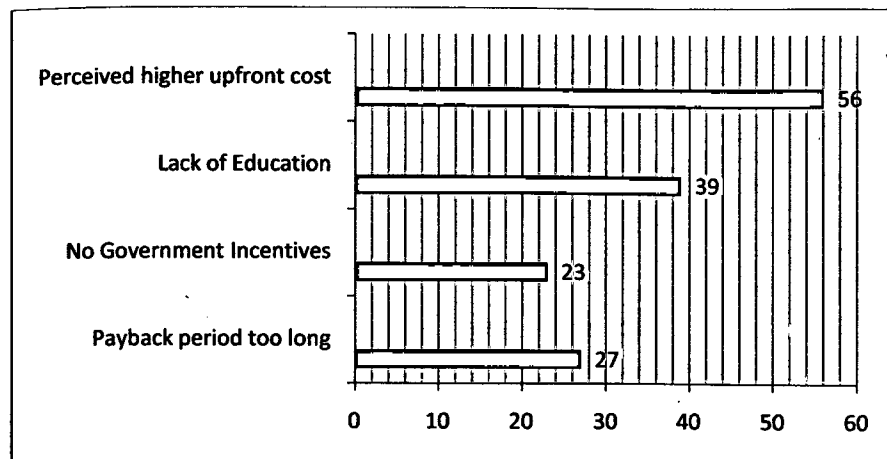


Figure 2.2: Market obstacles (MO) toward the green building (E.H.W Chan, 2009).

### 2.2.2 Cost of Green Construction Development

The most challenging problems in green building construction are the cost of the construction works. In quantifying costs of green construction there 2 factors that need to be considered which are the initial capital outlay for the building and the payback period, the time takes to pay back the additional sustainability features of the building (Langston, 2001).

One (1) survey that analyze on major issue restraining green building implementation in Malaysia has been held and it indicates that higher upfront cost is the major barriers that hinder the growth or implementation of green technology in construction (Frost & Sullivan, 2010). Figure 2.3 shows the survey result on major issue that restraining green building implementation in Malaysia.



**Figure 2.3:** Survey result on major issue restraining green building implementation in Malaysia (Frost & Sullivan, 2010).

Main factor that hinder the implementation of green concept in Malaysian construction industry is financial constraint. Green construction is believed by many people to be economically. Sustainable practices increases project cost because higher capital upfront needed. If sustainability construction was being approached in projects, technically the cost will be transferred to the buyers or end users. This is phenomenon definitely something that most project owner try to avoid in project (Zainal Abidin, 2010).

Cost of constructing the first green building in Malaysia, GTower is considered marginally higher which 15% was more if compare to be constructed conventionally (Colin Ng, 2010). Current available information and studies on how major is high costing hinder the implementing on green construction industry is not well known. Therefore, it is necessary to undertake survey to identify the major issue to overcome the problem and successfully implement it in Malaysia construction industry as how being practice in well developed country.

The initial cost can be minimized and significant saving on operation and maintenance can be realized over the life of a building if strategies on green building construction are well designed (Tendler, 1999). Industrialized Building System (IBS) is a method enable construction to be cost saving by reduction of labour intensity,

offers minimal wastage, cleaner and neater environment which reduce the negative environmental impact throughout the project cycle.

### **2.2.3 Difficulties in Achieving Economic Scale**

The main problem and obstacle preventing the implementation of green construction is the cost of the construction is too high and expensive. In quantifying the cost of green construction, 2 factors need to be considered which are the initial capital outlay for the building and the payback period, the time it takes to pay back the additional sustainability features of the building (Langston, 2001).

The financial constraint factor also contributes to the factor that prevents the implementation of green building in Malaysian construction industry. Green construction is believed by many people to be economic. Sustainable practices increases project cost because higher capital upfront needed in construction. Technically the cost will be transferred to the buyers if sustainability construction was being approached in projects. This is definitely something that most project owners try to avoid in the project (N. Zainul Abidin, 2010).

Survey conducted by Construction Research Institute of Malaysia (CREAM), CIDB Malaysia and University Technology PETRONAS indicate that the most significant factors preventing the use of IBS among contractors were considered to be higher construction cost 14.3%, high capital investment 11.5%, difficulties in achieving economies of scale 9.3%. This combination of three factors basically represents higher cost in construction of IBS.

Current available information and studies on how major is high costing hinder the implementing of green construction industry is not well known. Initial cost of constructing the first green building in Malaysia GTower is considered 15% higher if compare to be constructed in conventional method (Collin Ng, 2010).