

THE ENVIRONMENTAL PROTECTION THROUGH UTILISING  
SUSTAINABLE MATERIAL IN CONSTRUCTION INDUSTRY

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## DEDICATION

*To my beloved father, mother, brother and sister,  
Thanks for supporting and giving me encouragement.*

*Lecturer and staff from Faculty of Civil Engineering,  
Thanks for giving me guidance and educate me.*

*My Dedicated Supervisor,  
Prof. Dr. Muhd. Zaimi Bin Abd. Majid  
Who I will always respect and remembered.*

*And course mates  
Thanks for giving me happiness and sweet memories; let us fight for our bright  
future and good luck in our future undertakings.*

*Thanks for Everything.*

*All books reveal perfection, by what they are or what they are not.  
May you find that which you seek, in these pages or outside them.  
May you find perfection, and know it by name*

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## **ABSTRACT**

The environment impacts from the construction industry activities had lead to a growing realization that there is a need for a more sustainable approach to the construction industry. In Malaysia, the issues of environmental dissatisfaction on construction projects have regularly appeared in newspaper headlines. Hence, this research was carried out in order to investigate the environmental protection through utilising sustainable materials towards achieving sustainable development in construction industry. The implementation of sustainable development is crucial to the need for better environmental protection, economic prosperity, and social well-being. It can be achieved by execution of sustainable construction which can reduce environmental impact of a building over its entire lifetime while optimize economic viability and the comfort and safety of occupants. This research utilised quantitative research methodology where questionnaires were distributed among construction parties. The data collected through questionnaires was analyzed with Microsoft Excel and SPSS 16.0. The findings revealed that construction activities have significant effects on the environment which resulting air pollution, land pollution, noise pollution, water pollution, and waste pollution. Besides, results also shown that the respondents are aware on the sustainable issues in Malaysian construction industry. In short, the aluminum was selected as the most appropriate sustainable building material in the implementation of sustainable development in Malaysian construction industry.

## **ABSTRAK**

Kesan alam sekitar daripada industri pembinaan telah meningkatkan kesedaran bahawa pendekatan yang lebih mampan adalah diperlukan dalam industri pembinaan pada masa ini. Di Malaysia, isu-isu alam sekitar yang berkaitan dengan projek-projek pembinaan selalu disiarkan dalam akhbar. Oleh itu, kajian ini telah dijalankan untuk menyiasat perlindungan alam sekitar melalui penggunaan bahan mampan yang sesuai ke arah mencapai pembangunan mampan dalam industri pembinaan. Pelaksanaan pembangunan mampan adalah penting untuk melindungi alam sekitar, meningkatkan kemakmuran ekonomi dan mencapai kesejahteraan sosial. Ia boleh dicapai dengan pelaksanaan pembinaan mampan yang boleh mengurangkan kesan alam sekitar, dan pada masa yang sama ia boleh manakala mengoptimumkan daya maju ekonomi dan keselesaan dan keselamatan penghuni. Kajian ini menggunakan kaedah penyelidikan kuantitatif di mana soal selidik telah diedarkan di kalangan parti pembinaan. Data yang dikumpulkan telah dianalisis dengan menggunakan Microsoft Excel dan SPSS 16.0. Hasil kajian menunjukkan bahawa aktiviti pembinaan mempunyai kesan ketara ke atas alam sekitar yang mengakibatkan pencemaran udara, pencemaran tanah, pencemaran bunyi, pencemaran air, dan pencemaran sisa. Selain itu, keputusan juga menunjukkan bahawa responden mengetahui atau menyedari tentang isu-isu yang berkaitan dengan kemampan dalam industri pembinaan Malaysia. Pendek kata, aluminium telah dipilih sebagai bahan binaan mampan yang paling sesuai digunakan dalam melaksanakan pembangunan mampan di industri pembinaan Malaysia.

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**LIST OF ABBREVIATIONS**

<b>ABBREVIATIONS</b>		<b>FULL NAME</b>
BO	-	Building Operations
CFCs	-	Chlorofluorocarbon
CO	-	Carbon Monoxide
CO <sub>2</sub>	-	Carbon Dioxide
CSD	-	Commission on Sustainable Development
HCFC	-	Hydro Chlorofluorocarbon
MP	-	Manufacturing Process
SPSS	-	Statistical Package for Social Science
UNCED	-	United Nations Conference on Environment and Development
UVB	-	Ultraviolet-B
WM	-	Waste Management

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## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 Introduction**

Construction industry is a booming industry in the whole world. As a result, there are a lot of construction project carry out in Malaysia. However, the construction parties are not aware the development will cause an irreversible damage to the environment. Hence, causes pollution to the environment. The environment impacts from the construction industry had lead to a growing realization that there is a need for a more sustainable responsible approach to the current construction industry. There are many prevention methods had identify to minimize the impact to the environment, one of the solution is implemented sustainable development in construction industry.

The philosophy of environmental sustainability is to leave the Earth in a good condition and better shape for the next generations. Human activity is only environmentally sustainable when it can be performed or maintained indefinitely without depleting natural resources or degrading the natural environment in the construction industry. These includes resource consumption to be minimal, consumer recycled material without harm to the environment, recycling of waste



streams, minimization of waste and pollution, reduce green house gases' emission reduced impact on human health and etc. (Malik M. 2002). Sustainable concept is often referred to as “green” or “environmentally sound”.

Sustainable development has been defines in various ways with various implications, there are more than hundred definitions of sustainable development have been made and used by different groups of people to suit their own goals. However, the most popular definition of sustainable development is the “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” World Commission on Environment and Development (1987). This means that for an economic activity to be sustainable it must diminish the use natural resources and the serious impacts to the global environment.

The implementation of sustainable development is crucial to the need for better environmental protection, economic prosperity, and social well-being. It can be achieved by execution of sustainable construction which can reduce environmental impact of a building over its entire lifetime while optimize economic viability and the comfort and safety of occupants. Sustainable development is a development that takes the impact on the environment into account and tries to minimize environmental damage during construction stage. This means that for an economic activity to be sustainable it must degrade natural resources or have serious impacts on the global environment inherited by future generations. Therefore, it was greatly affected if the environment is degraded or the resources base is significantly diminished.

Sustainable construction is generally used to describe the application of sustainable development to the construction industry. Sustainable construction is also defined as “Green Construction”. The most common definition of sustainable construction is “the application of sustainable development to the construction industry”. Based on Abidin and Jaapar (2007), sustainable construction can be

defined as green construction as both of them have the aim of achieving the same goal of minimizing the impacts to the environment. Shafii and Othman (2007) stated that “building and construction sector is a key sector for sustainable development”. Sustainable construction act as main key to succeed the sustainable development. It is because sustainable construction is a subset of sustainable development, which encompasses topics such as tendering, site planning and organization, material selection, recycling and waste minimization. Clearly, sustainable construction is one important part of sustainable development, and improving the performance of the construction industry is fundamental to the delivery of sustainable development.

Based on Craig and Grace (2001), sustainable construction is one of the most important themes of sustainable development. Sustainable construction is perhaps best described as a subset of sustainable development. It focuses on three common issues which are procurement, assembly and commissioning and embraces matters such as tendering, site planning and organization, material selection, recycling, and in particular, wastes minimization.

## **1.2 Problem Statement**

Malaysia is fast becoming an industrial country nowadays. As a result, there are a lot of construction project carry out in Malaysia. However, the construction development will cause an irreversible damage to the environment which causes pollution to the environment. The causes of the issues are mainly due to excessive development of construction industry resulting deforestation for industrialism. Construction activity is one of the major contributors to the environmental impacts, which are typically classified air pollution, land pollution, waste pollution, noise pollution, and water pollution. Pollution not only harmful to the environment, but it also can influence human’s health. There are many prevention methods had identify

to minimize the impact to the environment, one of the solution is implemented sustainable development in construction industry.

In Malaysia, the green movement is still at its infancy stage. Sustainable projects are mostly at the pioneer stage (Zainul Abidin, 2008). The factors that will jumpstart sustainable movement are awareness and knowledge. With that, comes interest and demand. Through implementation, the construction parties will learn from experience and start making improvement. It is important for construction parties to understand sustainable construction sufficiently to be able to ensure that their individual actions, and the decisions they make that influence the actions of others, add as little as possible to the total burden on the environment (Parkin, 2000).

The global warming is now approaching towards dangerous levels. The world over is now into sustainable development and as far as energy is consumed many countries are looking towards for sustainable materials as alternatives (Souheil, 2008). The concept of sustainable in construction has initially focused on issues of limited resources and how to reduce impacts on the environment with emphasis on design concepts, construction technologies and material. The selection of environmentally sustainable building materials is the first step for architects to begin incorporating sustainable design principles in construction industry.

### **1.3 Aim and Objectives of Research**

The aim of this research is to investigate the environmental protection through utilising sustainable materials towards achieving sustainable development in construction industry.

There are 3 objectives that have been established as follows:

- i. To identify the effects of construction activities on the environment.
- ii. To determine the knowledge of construction parties on sustainability in Malaysian construction industry.
- iii. To identify the appropriate sustainable building material towards the implementation of sustainable development in construction industry.

### **1.4 Scope of Research**

Scope of research was essential to be determined before starting any work in the research. It is important to limit the scope of research before taking any action, because the scope of research will help to define the research boundaries. The scope of this research is geared towards the construction parties in Malaysia. It is important to collect the opinion of the respondents who come from different construction backgrounds to provide an accurate result. Therefore they are the appropriate respondents for this research in order to achieve the objectives which are to identify the effects of construction activities on the environment, to determine the knowledge of construction parties on sustainability in Malaysia construction industry and to identify the appropriate building material towards the implementation of sustainable development in construction industry.

## **1.5 Significance of Research**

Sustainable development is widely used in global construction industry. However, the current construction method and material used in Malaysian construction industry had contribute a lot to environment degradation and pollution. Through this research, it shows the momentous of implement sustainable development concept and the construction parties have to consider the environmental conservation, economic progress, and suitable material to be used in every construction project in order to minimize the environmental impacts. As a result, the implementation of sustainable development in construction industry will provide a better quality of life for our next generation. In short, this research is significant to all the construction professions. The result of this research will be benefits not only to the construction parties, but also to our country and the social as sustainable development in construction industry will minimize the environmental impacts.

## **1.6 Research Methodology**

This section discusses the methodology of the research. The research methodology consists of the following stages: Desk Search, Preparation and Development of Questionnaire, Data Collection and Data Analysis.

In desk search, it is mainly involve a lot of theoretical readings. Most of the information gathered here is for the purpose of decide, select and support the title of research and information for future presentation and study. The initial stage of the research was devoted to an extensive search for relevant literature. Desk search is a way which can be achieved through the construction references books, journals, articles, magazines, newspapers, conference papers, internet sources, government's reports and relevant reading materials. All the related data and information will be

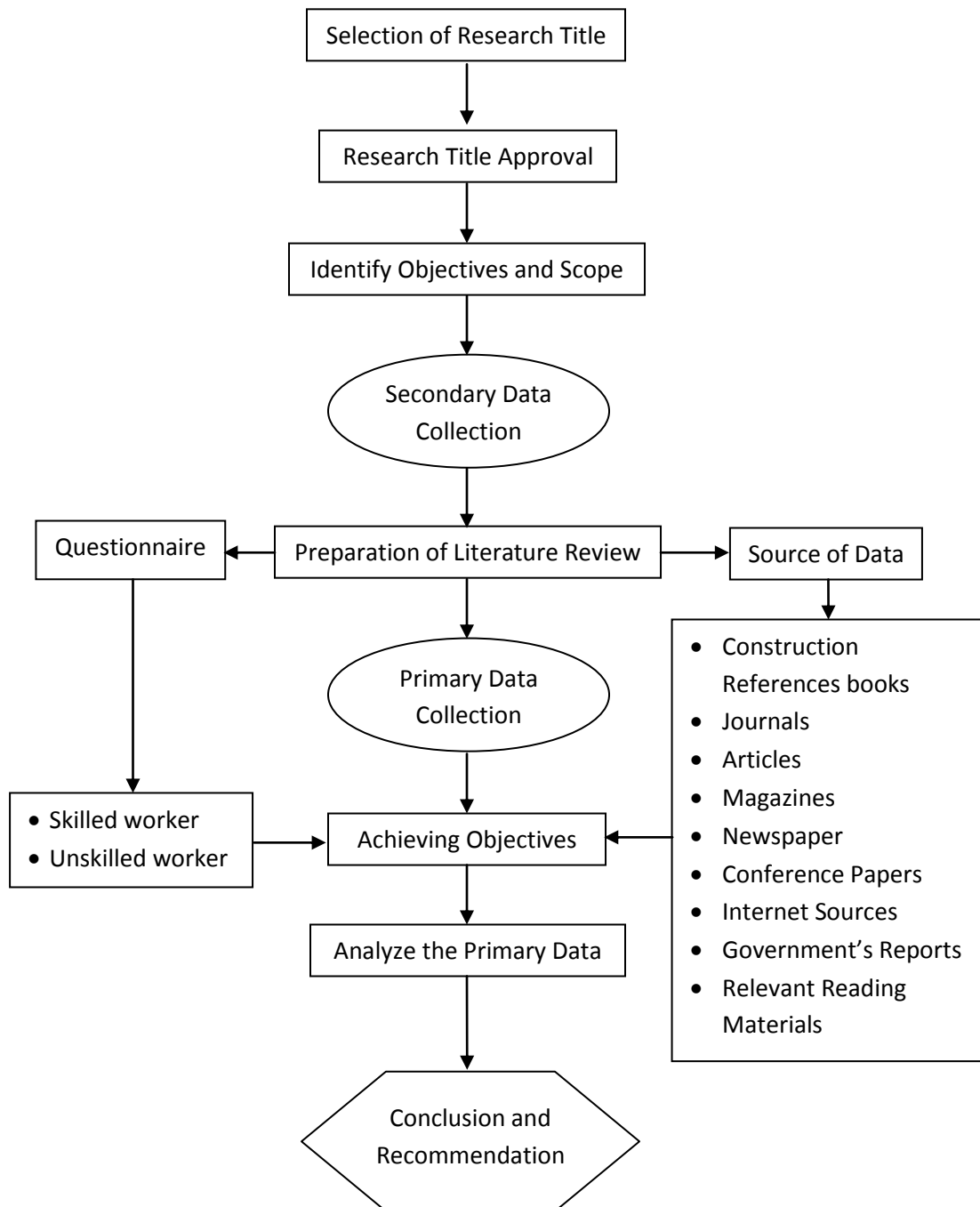
collected as the fundamental for this research. The main objective is to collect and receive as much as possible the data concerning the sustainable development in current construction industry. This is a very important process that must go through as the research produced possesses certain standard of quality and relevant to the scopes of research.

In order to carry out this research in an effective way, this research utilizes quantitative research methodology to obtain the data and information required. This is the stage where start to approaches the real world to get some realistic information. The method used is questionnaire survey. To obtain a higher accuracy level of response, some considerations should be taken in the preparation stage such as:

- i. Well preparation of the questionnaire to minimise variable within each of the answer.
- ii. The words and grammar used must be clear to avoid ambiguity.
- iii. Prefer for using multiple choice answering questions.
- iv. Time taken for the answering the question should be short and straight to the point.

In this research, fieldwork research will be carried out using questionnaire surveys. Data are collected by set up the form of the related questionnaires. The questions are centered to the research objectives. It is important to obtain the data in an accurate way. For the questionnaire surveys, the questions had asked about the sustainable development issues in Malaysia construction industry in order to get some data and information to support the objectives. Questionnaire surveys need to be carried out to the construction sites in Malaysia construction industry. Data from the research will be collected through the questionnaire from the construction parties who come from different construction backgrounds to provide a reasonable result. Once all the data have been collected, the result will be analysed to determine the direction of the research.

All the collected information, figures and data were reviewed and analyzed. The data analysis will be based on secondary data from desk research and the primary data from questionnaires. Figure 1.1 shows the flow of the research methodology which will be carried out in this research



**Figure 1.1:** Research Methodology

## **1.7 Summary**

In Malaysia, the issues of environmental dissatisfaction on construction projects have regularly appeared in newspaper headlines. Hence, this research is carried out in order to investigate the environmental protection through utilising sustainable materials towards achieving sustainable development in construction industry.



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