

**THE APPLICATION OF MAPINFO IN MANAGING MATERIAL  
AND WASTE AT CONSTRUCTION SITES**

**DESMOND YIP TECK WING**

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**Dedicated to Jesus Christ,  
My personal Lord and Savior,  
And  
To my beloved parents and family.**

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## ABSTRACT

Many countries nowadays have serious problems concerning site layout for locating the construction materials and waste. Construction materials and waste should be managed properly especially for high rise buildings. As such, Geographic Information System (GIS) has been applied in the construction management. GIS is a software-based technology that is now thriving in Malaysia. It has been implemented in many agencies and department for various applications such as military, hydrological modeling and environmental monitoring. Managing the materials data that is needed at construction site by using conventional method is a laborious task. The implementation of GIS in construction management may improve the traditional method in the preparation of the geographic information. MapInfo was chosen as a software to develop a database system for construction materials and waste. Tools available within MapInfo were utilized to produce a system which can help the project manager to make decision to locate the materials and waste in the construction site. However, the software is limited to simple analysis but nonetheless is able to provide a data storage system that is needed in construction management. In this study, two construction sites have been chosen, which are, MPJBT and KIPark. Construction site plan were taken from the project manager and digitalize using AutoCAD. The digitized site plan were then input into MapInfo. The software is able to produce analysis according to the requirements and conditions given by the project manager. The requirements given by the project manager usually is based on their experience, safety purposes and suitability of the construction site. Project managers can use the functions within MapInfo to allocate the suitable location to place the materials and waste on their construction site. So MapInfo is a suitable tool in managing materials and waste at construction sites.

## ABSTRAK

Industri pembinaan manghadapi masalah untuk menyediakan susunan tapak pembinaan yang sistematik untuk meletakkan bahan pembinaan dan bahan buangan di tapak pembinaan. Bahan pembinaan dan bahan buangan dalam tapak pembinaan perlu diuruskan dengan baik untuk mengelakkan sebarang kejadian berlaku dan mengurangkan kos pembinaan serta masa pembinaan. *Geographic Information System (GIS)* digunakan untuk menguruskan industri pembinaan. *GIS* adalah satu perisian komputer yang luas digunakan di Malaysia dalam bidang pertahanan, hidrologi dan persekitaran. Pengendalian data untuk bahan pembinaan secara manual adalah satu tugas yang menyusahkan mamandangkan data yang terlalu banyak untuk diselesaikan. Dengan menggunakan *GIS*, ia dapat menyelesaikan masalah menyediakan satu sistem informasi yang lengkap untuk sesuatu tapak pembinaan. Dalam kajian ini, perisian komputer *MapInfo* digunakan untuk menyediakan satu sistem maklumat untuk bahan pembinaan and bahan buangan di tapak pembinaan. Ia boleh membantu pengarah projek mencari tempat yang paling sesuai untuk meletakkan bahan pembinaan dan bahan buangan di dalam tapak pembinaan. Dalam kajian ini, dua tapak pembinaan dipilih iaitu tapak pembinaan MPJBT dan tapak pembinaan KIPark. Dengan menggunakan perisian komputer *AutoCAD*, pelan pembinaan ditukar ke bentuk digital untuk digunakan dalam *MapInfo*. *MapInfo* akan membuat analisis mengikut syarat yang ditetapkan oleh pengarah projek untuk memilih lokasi yang paling sesuai meletakkan bahan pembinaan dan bahan buangan. Syarat yang diberikan oleh pengarah projek berdasarkan pengalaman, keselamatan dan kesesuaian bahan tersebut diletakkan di tempat tertentu. Dengan menggunakan *MapInfo*, pengarah projek dapat membuat keputusan untuk meletakkan bahan pembinaan dan bahan buangan dalam tapak pembinaan dengan lebih tepat. Oleh itu, *MapInfo* boleh digunakan dalam pengurusan bahan pembinaan dan bahan buangan.

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## LIST OF SYMBOLS

ASEAN	-	Association of Southeast Asian Nation
CTFT	-	Centre Technique Forestier Tropical
DBMS	-	Database Management System
DCDB	-	Digital Cadastral Database
EPA	-	Environmental Protection Agency
ESRI	-	Environmental Systems Research Institute
FEMA	-	Federal Emergency Management Agency
FGDC	-	Federal Geographic Data Committee
GBF-DIME	-	Geographic Base File, Dual Independent Map Encoding
GIS	-	Geographic Information System
GPS	-	Global Positioning System
LVL	-	Laminated veneer lumber
MoEPP	-	Ministry of Environment and Physical Planning
MPJBT	-	Majlis Perbandaran Johor Bahru Tengah
NaLIS	-	National Infrastructure for Land Information System
OECD	-	Organisation for Economic Co-operation and Development
UNDP	-	United Nations Development Program
3D	-	Three Dimensional
%	-	Percent

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# CHAPTER I

## INTRODUCTION

### 1.1 Introduction

Construction is one of the important sectors which influence the economy of our country. This sector creates many work opportunities to the citizen and involves several parties such as contractors, consultants and architects. It brings benefit to the parties who are involved in the process of construction. Nevertheless, this target can only be realized if the construction process is managed effectively. Construction management is an important element which can affect the profit and the project's completion time.

The management of construction waste is a problem suffered worldwide (Adam, 2004). In developing countries, waste management is becoming an acute problem as urbanization and economic development increase which have led to larger quantities of waste materials requiring management in these countries. In Asia, the management of construction waste requires immediate attention especially in countries such as China, South Korea and Malaysia, which have been categorized, as emerging industrialized countries.

Malaysia, like most of the developing countries, is facing an increase in the generation and disposal of waste. According to Grant (2001) five states (Kuala



Lumpur, Selangor, Pahang, Terengganu and Kelantan) represent 70 % of the total amount of waste in the country. One can observe that 64 % of the waste is domestic waste. The share of industrial waste stands at 15 %, followed by commercial waste and construction and institution waste.

One of the approaches that can be applied in managing construction site is Geographical Information Systems (GIS). Geographical Information Systems (GIS) is an industry that is popular in the western countries and now is thriving in Malaysia. GIS has been implemented in many departments in Malaysia for application such as military, hydrological modeling and environmental monitoring. GIS is actually a combination of element designed to store, retrieve, manipulate, process and display geographical data. The geographical data are computerized information about people, place and environment.

The term GIS is always associated with both computer hardware and software. These will provide the means for data input, storage, manipulation, analysis and finally output. The use of GIS in construction management studies can be very useful in planning the suitable place to locate materials and waste at the site. Therefore, GIS is the best tool to solve problem in construction fields.

## **1.2 Problem Statement**

Construction sector, the world over, is considered to be a basic industry on which the development of the country depends to a great extent, the growth of a country and its development status, is generally determined by the quality of its construction companies and their capabilities. It is treated as an important sector, not only in the developing countries but also the developed ones where separate ministries have been created to look after the housing problems of the people.

But unfortunately, most of the construction companies concentrate in gaining maximum profit thus failing to adopt effective site layout on materials and ideally

managed the construction waste. Thus, a significant strategy for minimizing construction waste on site does not exist.

The proper management of the construction materials and waste is neglected by the contractor which can be presumed as a way to reduce an expense. Managing data by conventional method is a laborious task for the project. Therefore, applying GIS in monitoring construction site may improve the conventional method in the preparation of geographical information.

In the conventional method, technicians are confronted with restrictions and limitations when there is too much material to be used in a big project. There is no systematic system that helps to properly decide where the material and waste ideally located. Thus the application of GIS in managing construction site is seen as an alternative approach.

### **1.3 Research Objectives**

The objectives of this study are as follow:

- i. To implement the Geographical Information System (GIS) in developing a database system for construction materials and waste.
- ii. To investigate its capability as a management decision making tool for depositing the construction materials and waste on construction site.

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

The scopes of study can be outlined as follow:

- i. To collect data and create a user-friendly spatial database system that reflects the construction waste and materials on construction sites.
- ii. To develop a construction materials and waste management system using GIS application system.

- iii. To use the management system as a tool to analyse construction materials and waste so as to do prediction and recommendation on construction site.

### **1.5 Expectation**

- i. It is expected that the implementation of GIS can help to improve the management of the construction materials and waste on site because the conventional method is take much time in the process of restore, retrieve and analyze the data.

### **1.6 Hypothesis**

Geographical Information Systems (GIS) is able to manage the construction materials and waste.

### **1.7 Limitation**

The limitations of the study are:

- i. The software used in this research is MapInfo as it is the software available in the faculty.
- ii. The materials analyse in the study are fine aggregate, steel bar and steel formwork.
- iii. The study is conducted at selected certain areas.

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