

IMPACT OF SITE ISSUES FOR THE CONSTRUCTION PROJECTS

By

MUHAMMAD SABRI BIN MUSA

15297

Dissertation submitted in partial fulfillment of
The requirements for the Bachelor of Engineering (Hons)
(Civil Engineering)

DECEMBER 2013

Universiti Teknologi PETRONAS

Bandar Seri Iskandar

31750 Tronoh

Perak Darul Ridzuan

CERTIFICATION OF APPROVAL

IMPACT OF SITE ISSUES FOR THE CONSTRUCTION PROJECTS

By

MUHAMMAD SABRI BIN MUSA

A project dissertation submitted to the

Civil Engineering Programme

Universiti Teknologi PETRONAS

In partial fulfillment of the requirement for the

BACHELOR OF ENGINEERING (Hons)

(CIVIL ENGINEERING)

Approved by,

(DR NARAYANAN SAMBU POTTY)

UNIVERSITI TEKNOLOGI PETRONAS

TRONOH, PERAK

DECEMBER 2013

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

MUHAMMAD SABRI BIN MUSA

ABSTRACT

Site issues are found to be a very common issue in construction industry and it has brought negative impacts to each of the participants in a construction project. Therefore, this research study was carried in order to investigate the causes, impacts and solutions related to the site issues in construction industry. A questionnaire survey involving 30 respondents was conducted in order to assess the research objectives based on the perspective of construction issues in Malaysia, the research objectives are to study the impact of site issues on the construction projects. In order to do that, causes of site issues and the impact of site issues to the construction projects are identified. The problem concerning now is site issues at construction sites now give much of an impact to the construction projects. This can affect the progress of the construction work which will cause the project could not be completed on time and increased cost exceeding a predetermined budget. The scope of study under this research project will be focus on site issues in construction projects based on project of particular companies which focus to residential construction, building construction, institutional and commercial construction. The data will be collected by doing questionnaire survey which will be carried out with contractors, consultants and client organization and from the data, and by using Microsoft Office Excel, graph, Relative Important Index and Reliability Test Analysis will be designed to show the results. The methodology of this study was divided into five parts, planning and analysis, identify problems, developed a questionnaire survey, analysis of data and impact to construction projects. At the end of the study, based on the analysis of impact of site issues on the construction project, it is anticipated that impact of site issues will cause an effect to the construction work and progress.

ACKNOWLEDGMENT

First and foremost, the author would like to praise Allah the Almighty for His guidance and blessing, and also express his gratitude to Universiti Teknologi PETRONAS (UTP), author managed to complete the dissertation for this semester.

Endless thanks go to the author's final year project supervisor, Dr Narayanan Sambu Potty for providing the author a lot of information, guidance and assistance valuable support throughout completing this project. Besides, his kind assistance and guidance from beginning to the end of the project really help author in completing the project successfully. During the period of time, it is very tough and challenging for author to complete the project without people behind to give endless support.

Next, the author would like to thank to Final Year Project coordinators and Civil Engineering Department coordinators for their reminder and warm supports that had made this project a memorable and an informative one. Finally, deepest thanks go to all author's fellow colleagues, friends and family. Their support and encouragement will always be a pleasant memory. Thank you.

Thank you.

TABLE OF CONTENTS

IMPACT OF SITE ISSUES FOR THE CONSTRUCTION PROJECTS.....	i
CERTIFICATION OF APPROVAL.....	ii
CERTIFICATION OF ORIGINALITY.....	iii
ABSTRACT	iv
ACKNOWLEDGMENT.....	v
TABLE OF CONTENT	vi
LIST OF FIGURES.....	vii-viii
LIST OF TABLES.....	viii
Chapter 1: Introduction.....	1-5
1.1 Background of Study.....	1-2
1.2 Problem Statement	2-3
1.3 Significance of study	3
1.4 Objectives.....	3
1.5 Scope of Study	4
1.6 Relevancy of the Project	5
1.7 Feasibility of the Project	5
Chapter 2: Literature Review	6-15
2.1 Introduction	6
2.2 Types of construction	6-7
2.3 Review of Construction Issues across the world	8
2.4 Identification of factors and category	8-10
2.5 Site issues on construction project	10
2.6 Studies on causes of site issues	10-12

2.7 Studies on impact of site issues	13-14
2.8 Summary.....	15
Chapter 3: Methodology/Project Work	16-24
3.1 Research Methodology	16
3.2Project Activities	17-21
3.2.1 Area of the study	17
3.2.2 Survey questionnaire	17
3.2.3 Questionnaire Design	18-21
3.3Analysis Data.....	21-23
3.3.1 Data analysis method.....	22
3.3.2 Descriptive statistic method	22
3.3.3 Cronbach’s Alpha Coefficient.....	22
3.3.4 Relative Importance Index	23
3.4 Key Milestone	24
Chapter 4: Results and Discussions	25
4.1 Introduction	25
4.2 Respondent’s Demographics	25-29
4.3 Reliability Test Analysis	30
4.4 Relative Importance Index Analysis	31-32
Chapter 5: Conclusion and Recommendations	33
References	34-36

LIST OF FIGURES

Figure 1: Section A	18
Figure 2: Section B.....	19
Figure 3: Section B	20

Figure 4: Section C.....21

Figure 5: Types of organization.....26

Figure 6: Types of profession.....27

Figure 7: Years of working experiences.....28

Figure 8: Types of projects.....29

LIST OF TABLES

Tables 1: Types of effect studied.....10

Table 2 : Reliability Test Result.....30

Table 3 : Ranking of causes31

Table 4 : Ranking of impact32

CHAPTER 1

INTRODUCTION

1.1 Background of Study

The site issues problem at the construction site is a fact that occurs mostly in construction industry of Malaysia. Site issues are always measured as expensive to all parties concerned in the projects and very often it will result in clash, claims, total desertion and much difficult for the feasibility and it will impact the construction project progress which also delay the project. The problem of delays in the construction industry is a global phenomenon. In Saudi Arabia, it found that only 30% of construction projects were completed within the scheduled completion dates and that the average time overrun as between 10% and 30%. (Assaf & Al-Hejji, 2006).

(Chan & Kumaraswamy, 1997) studied delays in Hong Kong construction industry. They emphasized that timely delivery of projects within budget and to the level of quality standard specified by the client is an index of successful project delivery. Failure to achieve targeted time, budgeted cost and specified quality result in various unexpected negative effects on the projects. Normally, when the projects are delayed because of site issues, they are either extended or accelerated and therefore, incur additional cost.

There are several parties who are directly involved in the construction industry, such as client, consultant, contractor, supplier and local authorities. Most of the construction project greatly dependent with the contractor's involvement. Since the contractor is the most important party in construction project, they can cause a problem to the construction project itself. The successful of the construction project is mostly depends

on the ability and efficiency of the contractor in managing the construction work on site. This is because, the weaknesses of the management will cause problems to the contractor. Success of a construction project depends on the contractor's efficiency to manage all the aspect of construction works. The weak project management can cause a problem to contractor. Aspect of management is like source of material management, cost, labour, time and machinery. (Rafsyamir, 2004).

In this research, the author identified major causes of site issues which is: (1) contractor's improper planning, (2) contractor's poor site management, (3) inadequate contractor experience, (4) client's finance and payments for completed work. (5) problems with subcontractors, (6) shortage in material, (7) labor supply, (8) equipment availability and failure, and (9) mistakes during the construction stage. The author also identified major impact of site issues as: time overrun, cost overrun, dispute, arbitration, litigation, and total abandonment. Identification of causes and effects alone does not help the project managers to take appropriate remedial or preventive steps. This paper is organized as follows. Chapter 2 deals with the literature review. Section 3 explains the methodology of research. Section 4 discusses the results and discussion. Section 5 discusses conclusion and recommendation.

1.2 Problem Statement

The construction industry is currently being recognized as a major economic force in Malaysia. The contribution of the construction industry in the development of the economy is very large, such as residential areas, the skyscrapers buildings, the highways and others. For the construction projects in Malaysia, every construction projects certainly will not get away from the site issues at the construction site that will affect progress for the projects.

Site issues at construction sites now give much of an impact to the construction projects. This can cause problems as the project could not be completed on time and increased cost exceeding a predetermined budget. Research from articles and internet

stated that the site issues in the constructions industry is a global phenomena. In 2005, about 17.5% (of government contract projects in Malaysia) were considered sick (more than 3 month of delay or abandoned) because of site issue problems. (Sambasivan & Soon, 2005). Thus, this study will help to find the causes and impacts of site issues to the construction project.

1.3 Significance of Study

This study has been conducted in order to identify factors of site issues and the impact of site issues in construction project. Throughout this study, various information regarding the site issues and impacts had been found and obtained based on the data collected from the construction project.

Besides that, from this study, all the factor of site issues occurs during construction project can be identified and the impact of site issues can be determined in order to find the solution for the problems.

1.4 Objective

The goal of this study to be conducted is to analyze the impact of site issues for the construction projects in Malaysian construction industry. To achieve the goal, few objectives have been set up which are:

- i) To identify the types of site issues faced during construction project.
- ii) To identify impact of site issues in construction project.
- iii) To find the solutions on how to reduce the site issues problem.

1.5. Scope of study

The study will be focus on site issues in construction projects based on project of particular companies which focus to residential construction, building construction, institutional and commercial construction. The data will be collected by doing questionnaire survey which will be carried out with contractors, consultants and client organization and from the data, graph, Relative Important Index, and Reliability Test Analysis will be designed to show the results.

1.6 The relevancy of the project

During construction work, there is a potential for various problems at the site such as design error, construction error, product mistake, human error and oversight (something missed) by the architect, the general contractor, and a supplier which lead an effects the construction work progress. Using the below information to identify the factor of site issues:

- Location of the project site
- Cost of the project
- Implementation of the work
- Machinery and work equipment used
- Construction project management
- Fault analysis

If the site issues will impact the construction progress based on the above information, then the solution for this problem need to find. Thus, this project should be done due to this problem. The study will cover two semesters starting from June to December 2013 which is sufficient to collect data and analyze the result.

1.7 Feasibility of the project

This project also related with construction project management which the management during construction projects need to be concerns. The focus is on main parties involved with the construction project such as main contractors, clients, consultants, architects, and etc. This project required a lot of research and data to work on it so that it will be finish within the time frame.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Construction is a process whereby designers' plans and specifications are converted into physical structures and facilities. It involves the organization and coordination of all the resources for the project labour, construction equipment, permanent and temporary materials, supplies and utilities, money, technology and methods, and time to complete the project on schedule, within budget, and according to the standards of quality and performance specified in the contract documents. The contractors and subcontractors play the key roles at this stage. There are also some considerable inputs for inspection and interpretation from the architect or engineer. Supporting roles are played by suppliers of materials and equipment, consultants, shipping organizations etc. The construction project shall be done perfectly and wisely in order to achieve the final result, quality product, confined completion period and minimum cost. But problems always exist along construction process (Abdul Rahman & Janidah, 2006).

2.2 Types of construction

Construction is defined as "a process that consists of the building or assembling of infrastructure." On the other hand, a Construction Project "includes all material and work necessary for the construction of a finished structure for occupancy by End Customer. This includes site preparation, foundations, mechanical, electrical work, and any other work necessary to complete the project. There are different types of construction projects.

Firstly, the residential construction projects which include houses, townhouses, apartments, condominiums, cottages, single unit dwellings and subdivisions. The

housing designs are generally done by architects and engineers and the construction is executed by builders who hire subcontractors for structural, electrical, mechanical and other specialty work. This type of project must conform to local building authority regulations and codes of practice. Many new builders are attracted to residential projects because of its ease of entry in the real estate market. This makes it a highly competitive market with potentially high risks as well as high rewards.

Secondly is the building construction which the most popular type of construction project. It is the process of adding structure to real property. Most of the projects are room additions and small renovations. Most new building construction projects are construction of sheltered enclosures with walk-in access for the purpose of housing people, equipment, machinery or supplies. It includes installation of utilities and equipment.

Next is the institutional and commercial building construction which covers a great variety of project types and sizes such as hospitals and clinics, schools and universities, sports facilities and stadiums, large shopping centre and retail chain stores, light manufacturing plants and warehouses and skyscrapers for offices and hotels. Specialty architects and engineers are often hired for designing a particular type of building. This market segment has few competitors because of the high costs and greater sophistication of institutional and commercial buildings as compared to residential construction projects.

Lastly is industrial construction which is only a small part of the whole construction industry nevertheless it is a very important part of the industry. These projects are generally owned by big, for-profit industrial corporations such as manufacturing, power generation, medicine, petroleum, etc. (Grace, 2010).

2.3 Review of Construction Issues across the World

Realistic ‘construction time’ has become increasingly important because it often serves as a crucial benchmark for assessing the performance of a project and the efficiency of the contractor (Kumaraswamy and Chan, 2002). This study aims to identify the uncertainties and to foresee potential problems likely to confront the current and future projects, helping project teams to be proactive in managing their projects in which potential problems are fully anticipated (Long et al., 2004).

Research literature from all around the world has been collated and consolidated for the better understanding and to conceive the overall picture of the issues. This critical review is presented in five sections; Firstly Identification of Factors and Category, Secondly the Research Methodology adopted in earlier studies (reorganizing and tabulating the data from literature), Thirdly Analysis of Data, Fourthly Results and discussions and Fifthly Conclusions.

2.4 Identification of Factors and Category

The factors identified in the research articles are collated and grouped into 18 categories. The set of factors studied by different authors are collected and presented in Table 1. Different authors focus on selected categories for study and analysis. Table 1 tabulates the type of effect studied by different authors and the respective category as classified in their studies. From the review it is observed that certain factors have been categorized under different Groups by different authors.

Category No.	Category	No. of causes / factors / problems	Type of Effect Studied	References
1	Financier	4 3	Time delay Time delay	Long et.al 2004 Assaf et.al. 1995
2	Project	6 5	Time delay Time overrun	Assaf and Hejji 2006 Chan & Kumaraswamy 1997
3	Project Attributes	8	Time and cost overrun	Long et.al 2004

Category No.	Category	No. of causes / factors / problems	Type of Effect Studied	References
4	Owner / Client	10 10 5 4 4	Time and cost overrun Time and cost overrun Time delay Time delay Time overrun	Assaf and Hejji 2006 Long et.al 2004 Alaghbari et.al. 2007 Odeh & Battaineh 2002 Chan & Kumaraswamy 1997
5	Contractor	13 17 12 6 4	Time and cost overrun Time and cost overrun Time delay Time and cost overrun Time overrun	Assaf and Hejji 2006 Long et.al 2004 Alaghbari et.al. 2007 Odeh & Battaineh 2002 Chan & Kumaraswamy 1997
6	Consultant	7 7 6 4	Time and cost overrun Time and cost overrun Time delay Time and cost overrun	Assaf and Hejji 2006 Long et.al 2004 Alaghbari et.al. 2007 Odeh & Battaineh 2002
7	Design	8 3	Time and cost overrun Time overrun	Assaf and Hejji 2006 Chan & Kumaraswamy 1997
8	Coordination	7	Time and cost overrun	Long et.al 2004
9	Materials	7 2 4 5	Time and cost overrun Time and cost overrun Time overrun Time and cost overrun	Assaf and Hejji 2006 Odeh & Battaineh 2002 Chan & Kumaraswamy 1997 Assaf et.al. 1995
10	Plant / Equipment	5 1 4 5	Time and cost overrun Time delay Time overrun Time and cost overrun	Assaf and Hejji 2006 Odeh & Battaineh 2002 Chan & Kumaraswamy 1997 Assaf et.al. 1995

Category No.	Category	No. of causes / factors / problems	Type of Effect Studied	References
11	Labour / Manpower	5	Time and cost overrun	Assaf and Hejji 2006
		2	Time and cost overrun	Odeh & Battaineh 2002
		4	Time overrun	Chan & Kumaraswamy 1997
		3	Time and cost overrun	Assaf et.al. 1995
12	Environment	9	Time and cost overrun	Long, et.al 2004
		4	Time and cost overrun	Assaf et.al. 1995
13	Contract	2	Time & cost disputes	Odeh & Battaineh 2002
14	Contractual relationships	3	Time & cost effects	Odeh & Battaineh, 2002
		14	Time delay	Assaf et.al. 1995
15	External	12	Time and cost overrun	Assaf and Hejji 2006
		4	Time delay	Odeh & Battaineh 2002
		2	Time overrun	Chan & Kumaraswamy 1997
		8	Time delay	Alaghbari et.al. 2007
16	Changes	7	Time delay	Assaf et.al. 1995
17	Scheduling & Controlling	11	Time delay	Assaf et.al. 1995
18	Government relations	4	Time delay	Assaf et.al. 1995

Table 1 Factors and Categories

Table 1: Type of effect studied

2.5 Site issues on construction project

From the studied, the causes and the impact of site issues on the construction problems are identified. The studies were divided into two parts: (1) Studies on causes site issues and (2) Studies on impact of site issues.

2.6 Studies on causes of site issues:

16 major factors that caused delays and cost overruns in Nigeria were identified. A questionnaire survey was carried out with contractors, consultants and client organizations in Nigeria. They presented that the causes of delay and cost overruns in Nigerian construction projects were attributed to finance and payment arrangements, poor contract management, shortages in materials, inaccurate estimation, and overall price fluctuations (Mansfield, 1994).

In Saudi, 56 main causes of delay in large building construction projects and their relative importance were identified. Based on the contractors surveyed the most important delay factors were: preparation and approval of shop drawings, delays in contractor's progress, payment by owners and design changes. From the view of the architects and engineers the cash problems during construction, the relationship between subcontractors and the slow decision making process of the owner were the main causes of delay. However, the owners agreed that the design errors, labor shortages and inadequate labor skills were important delay factors. (Assaf, Alkhalil, & Al-Hazmi, 1995).

(Ogunlana &, Promkuntong, 1996) conducted a study on construction delays in Thailand. They found that the problems faced by the construction industry in developing economies like Thailand could be: (a) shortages or inadequacies in industry infrastructure (mainly supply of resources); (b) caused by clients and consultants and (c) caused by contractor's incompetence/inadequacies. They recommended that there should be concerted effort by economy managers and construction industry associations to provide the necessary infrastructure for efficient project management

A survey was conducted to determine and evaluate the relative importance of the significant factors causing delays in Hong Kong construction projects. From the survey, it has been analyzed and ranked main reasons for delays and classified them into two groups: (a) the role of the parties in the local construction industry (i.e. whether client, consultants or contractors) and (b) the type of projects. Results indicated that five major causes of delays were: poor site management and supervision, unforeseen ground conditions, low speed of decision making involving all project teams, client initiated variations and necessary variations of works (Chan & Kumaraswamy, 1997).

Besides that, (Odeyinka & Yusif, 1997) have addressed the causes of delays in building projects in Nigeria. They classified the causes of delay as project participants and extraneous factors. Client-related delays included variation in orders, slow decision-

making and cash flow problems. Contractor related delays identified were: financial difficulties, material management problems, planning and scheduling problems, inadequate site inspection, equipment management problems and shortage of manpower. Extraneous causes of delay identified were: inclement weather, acts of nature, labor disputes and strikes.

A quantitative analysis on construction delays in Jordan has been carried out by (Al-Momani, 2005) and from the result of his study indicated that the main causes of delay in construction of public projects were related to designers, user changes, weather, site conditions, late deliveries, economic conditions and increase in quantity. Similarly, A survey aimed at identifying the most important causes of delays in construction projects with traditional type of contracts from the viewpoint of construction contractors and consultants also has been conducted. Results of the survey indicated that contractors and consultants agreed that owner interference, inadequate contractor experience, financing and payments, labor productivity, slow decision making, improper planning, and subcontractors were among the top ten most important factor as pointed out by Odeh & Battaineh, (2002).

In addition, (Frimpong, Oluwoye & Crawford, 2003) conducted a survey to identify and evaluate the relative importance of significant factors contributing to delay and cost overruns in Ghana groundwater construction projects. A questionnaire with 26 factors was carefully designed from preliminary investigations conducted in groundwater drilling projects between 1970 and 1999 in Ghana. The questionnaire was directed towards three groups in both public and private organizations: owners of the groundwater projects, consulting offices, and contractors working in the groundwater works. The questionnaire was distributed to a random sample of 55 owners, 40 contractors and 30 consultants. The result of the study revealed the main causes of delay and cost overruns in construction of groundwater projects: monthly payment difficulties from agencies; poor contractor management; material procurement; poor technical performance; and escalation of material prices.

2.7 Studies on impact of site issues:

(Aibinu & Jagboro, 2002) studied and evaluated the effects of construction delays on project delivery in Nigerian construction industry. They found that the six effects of construction delay were: time overrun, cost overrun, dispute, arbitration and litigation and total abandonment. The questionnaires were sent to three groups of construction practitioners: quantity surveyors, architects and engineers, and contractors.

A survey to investigate material and equipment procurement delays in highway projects has been conducted in Nepal. Delay in the delivery of materials and equipment to construction sites is often a contributory cause to cost overruns in construction projects in developing countries. An assessment of the causes of the delays and the magnitude of their impact on project costs were also made. The survey method was used in conducting this research involving 22 highway projects. The main causes of material and equipment procurement delays were found to be (in rank order) organizational weaknesses, suppliers' defaults, governmental regulations and transportation delays. However, the actual impact of these delays on project costs was found to be on average, only about 0.5% of the total budgeted cost of the projects. Among materials, delays in the supply of aggregates and equipment were found to occur most frequently (Manavazhia & Adhikarib, 2002).

Strategies of compressing construction durations of various types of building projects on the basis of the lessons learned has been explored from Hong Kong based surveys and other research findings. The literature from different countries on the factors affecting construction durations, reasons for project delays and existing statistical models for duration forecasts were reviewed. A regression-based model developed from Hong Kong public housing construction project data was used for predicting the durations of the primary work packages in the building process and the overall completion period. And finally, a survey was conducted by the researchers to explore the construction time performance of projects in three building sub-sectors (i.e. public housing, public non-residential and private sector). Based on the factors

identified as significant from the above research, specific technological and managerial strategies for reducing construction periods in particular building sub-sectors were formulated in order to improve the construction time performance of Hong Kong building projects (Chan & Kumaraswamy, 2002). According to Terry (2003), studied the standard methods currently available for assessing extension of time delays on major projects, and issues around such assessment. He used network causal mapping and system dynamics approach to study the impact of delays on a project.

Based on the above studies, it can be inferred that the earlier studies concentrated on either the causes or the effects. However, some studies have alluded to the probable link between the causes and effects of delays without a systematic analysis. (Manavizha & Adhikarib, 2002) linked the material-related causes to the probable cost overruns in construction projects in Nepal. (Assaf & Al-Hejji, 1995) linked the contractor-related and labor-related causes to the probable time overruns in construction projects in Saudi Arabia. (Odeh & Battaineh, 2002) linked the contract-linked causes to the probable disputes occurring in construction projects in Jordan. (Chan & Kumaraswamy, 1997) linked the consultant- related and client-related causes to the probable time overruns in construction projects in Hong Kong. (Mansfield et al. & Frimpong et al, 1994) linked the client-related, consultant-related, and material-related factors to the probable cost and time overruns. In this research, we take an integrated approach and attempt to link the causes and the effects of delays in Malaysian construction industry through a systematic analysis.

2.8 Summary

Site issues also related to effect of delays in the construction project and it is very rare to see that a construction projects is completed on time. The survey results indicated that the majority of delay factors are relevant to client factor. From survey it is concluded for dipping in delay client must have strong economical ability and financial arrangement for project, correctly time decision. Client must give proper time and priority on their construction project and tacking appropriately time verdict. Most factors related to consultant it is due to not understanding the client necessities, not having proper project information, absence of some detail in drawing etc. It is examine from survey due to contractor that mostly delay occur because of deficient in obtaining up-to-date equipments, unwarranted material used in construction. It is necessary that excellent material is used in construction due to which cause of dispute occur in construction. Providence of material is also most significant causes due to which delay occur in construction so it is essential that material must be in time. External factor like change in government, regulation and location also factors delay occurs. (Haseeb, M., Xinhai-Lu, Bibi, Maloof-ud-Dylan, Rabbani, W. 2011).

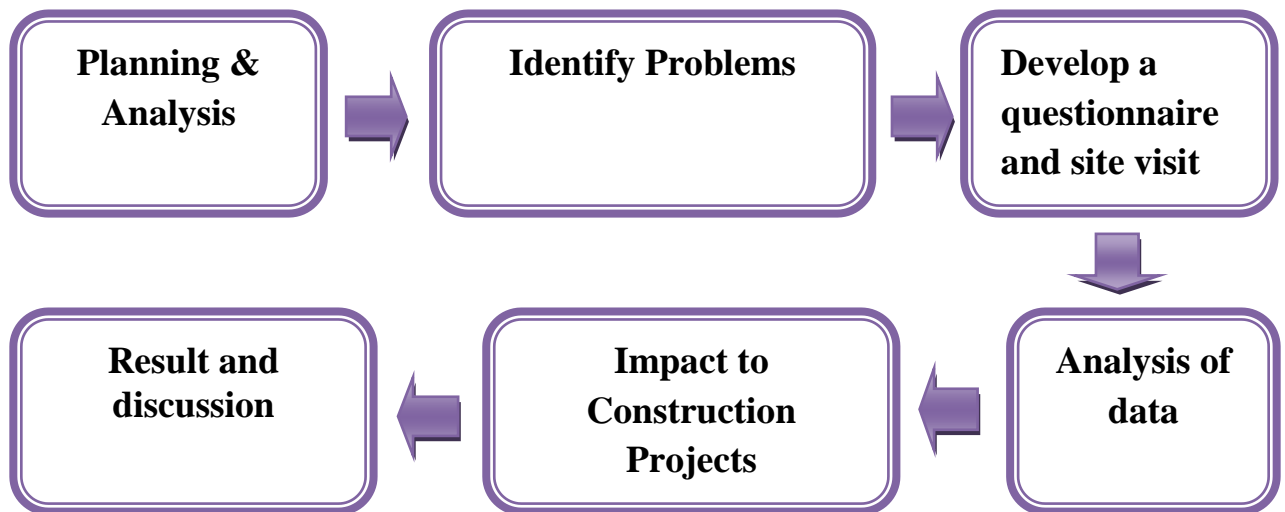
CHAPTER 3

METHODOLOGY

3.1 Research of Methodology

The essence of this chapter is to define the entire method adopted in this research work. It describes the procedure followed in realizing the goals and objectives in this research. To get the data about site issues from the construction site, discussion with main contractor and consultant is needed to get the ideas regarding the problems of site issues and the solution on how to solve it. To identify all the site issues and solution for the problems, the location of the project site, cost of project, implementation of the work, machinery and work equipment use, construction project management and fault analysis need to be considered. There are 6 phases to complete this project.

Figure below shows the methodology of this project:



3.2 Project Activities

3.2.1 Area of the study

In the research, this study will be focus on site issues in construction projects based on project of particular companies which focus to residential construction, building construction, institutional and commercial construction and the impact of site issues to this construction progress. The questionnaire survey will be distributed to 50 respondents from clients, contractors and consultant to get the data.

3.2.2 Survey Questionnaire

Questionnaires are a common method of gathering data (Sharp, Peters and Howard, 2002). Survey research, which relies on questioning, is a systematic way of collecting data from a number of respondents according to Krysik and Finn (2010), Tayie (2005) states that, the flexibility of survey has made it become one of the most widely used methods of media research. The purpose of approach, questionnaire design, sampling, and the way to analyze and interpret data has to be considered before a survey is conducted (Tayie, 2005).

According to Krysik and Finn (2010), survey research is a popular method of gathering data in social work research. It relies on questioning and is a systematic way of collecting data from a number of respondents. They stated that survey can be used to determine what respondents know, believe, or feel or how they say they behave. Other than that, some surveys also ask respondents to describe what they have done or how they felt in the past, or to speculate about their future intentions (Krysik and Finn, 2010).

3.2.3 Questionnaire Design

The questionnaire will divide into three sections. Section A will request background information about the respondents. The respondents are requested to answer question pertaining the location of their company based in, the type of their organization, their profession in construction industry, their working experience in construction industry and the primary type of projects which they are involved in. Section B of the questionnaire is asking about the causes that may lead to site issues in construction progress and Section C is asking about the impacts of site issues.

The survey questionnaire is designed with two option which online survey and hardcopy in order to ease the respondents to answer the survey. Moreover, the online survey will save the respondent's time and thus they will be less reluctant to participate in this survey questionnaire.

SECTION A : GENERAL INFORMATION

Name of Company/Organization :

Name :

Position :

Years of working experience :

Types of projects :

No. of projects involved :

Gender : Male Female

Age :

Figure 1: Section A

For each statement below please tick (/) on the appropriate number to indicate whether it is:

1- EXTREMELY DISAGREE 2- STRONGLY DISAGREE 3 - DISAGREE
4- AGREE 5- MODERATELY AGREE 6 - STRONGLY AGREE 7- EXTREMELY AGREE

SECTION B : CAUSES OF SITE ISSUES IN CONSTRUCTION PROJECTS

1. Site issues relevant to contractor's improper planning

1	2	3	4	5	6	7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. Site issues relevant to contractor's poor site management

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

3. Site issues relevant to inadequate contractor experience

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

4. Site issues relevant to client's finance and payments for completed work

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

5. Site issues relevant to problems with subcontractors

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

6. Site issues relevant to shortage in material

...

Figure 2: Section B

--	--	--	--	--	--	--

7. Site issues relevant to labor supply

--	--	--	--	--	--	--

8. Site issues relevant to equipment availability and failure

--	--	--	--	--	--	--

9. Site issues relevant to lack of communication between parties

--	--	--	--	--	--	--

10. Site issues relevant to mistakes during the construction stage

--	--	--	--	--	--	--

11. Other : (Please specify, if any)

--	--	--	--	--	--	--

Figure 3: Section B

SECTION C : IMPACT OF SITE ISSUES ON CONSTRUCTION PROJECTS

1. Time overrun

(Client-related and contractor-related factors have impact on the time overrun)

1	2	3	4	5	6	7

2. Cost overrun

(Contract-related factors such as change orders (changes in the deliverables and requirements) and mistakes and discrepancies in the contract document result in cost overrun.)

--	--	--	--	--	--	--

3. Disputes

(Client-related, contract-related, contract relationship related, and external factors have impact on the disputes that arise during the course of the project)

--	--	--	--	--	--	--

4. Arbitration

(Client-related and contract relationship-related factors escalate disputes to be settled by arbitration process.)

--	--	--	--	--	--	--

5. Litigation

(Client-related, labor-related, contract-related, contract relationship-related, and external factors escalate disputes to be settled by the litigation process.)

--	--	--	--	--	--	--

6. Total abandonment

(Client-related, consultant-related, labor-related, contract-related, and external factors contribute to the total abandonment of the projects)

--	--	--	--	--	--	--

7. Other : (Please specify, if any)

--	--	--	--	--	--	--

Figure 4: Section C

3.3 Analysis data

3.3.1 Data Analysis Method

Statistical Package for Social Sciences (SPSS) is the software which designed to carry out the data analysis with comprehensive statistical tests. The collected data from the survey questionnaire will be analyzed by using SPSS in order to carry out the data analysis in this research.

3.3.2 Descriptive Statistic Method

Descriptive statistic method is the simplest method of analysis. This method provides a general view of the results and it will either analyze the responses in percentages or will contain actual numbers (Naoum, 2007). In this research, Section A (background information) will be analyzed by using this descriptive statistic method.

3.3.3 Cronbach's Alpha Coefficient

The purpose of reliability test is to measure of how well each individual item in a scale correlates with the sum of remaining items. It measures consistency reliability among individual variables in a scale. The Cronbach's alpha coefficient is used to indicate the internal consistency reliability. The Cronbach's alpha is greater than or equal to 0.700 indicates that the strength data is normally distributed and it shall be accepted.

3.3.4 Relative Importance Index

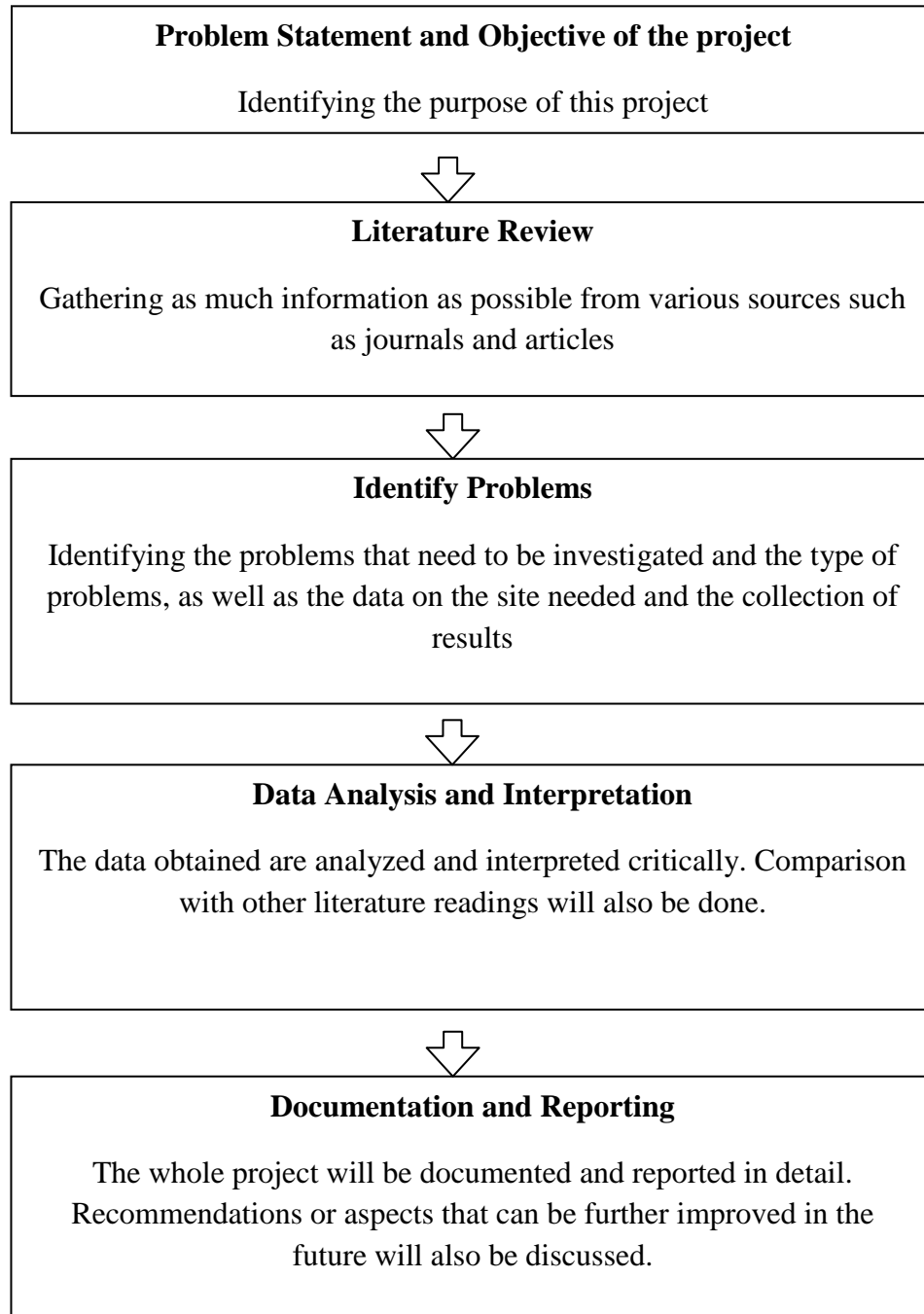
The data from Section B and C in questionnaire survey will be analysis by using Relative Importance Index (RII). It will be use to determine the relative importance of the various causes and effects of site issues. The seven-point scale ranged from 1 (extremely disagree) to 7 (extremely agree) was adopted and transformed to relative importance indices (RII) for each factor as follows:

$$RII = \frac{\sum w}{A \times N}$$

where W is the weighting given to each factor by the respondents (ranging from 1 to 7), A is the highest weight (i.e.7 in this case), and N is the total number of respondents. The RII value had a range from 0 to 1 (0 not inclusive), higher the value of RII, more important was the cause or effect of site issues. The RII was used to rank (R) the different causes. These rankings made it possible to cross-compare the relative importance of the factors as perceived by the three groups of respondents (i.e. clients, consultants and contractors). Each individual cause's RII perceived by all respondents were used to assess the general and overall rankings in order to give an overall picture of the causes of site issues in Malaysian construction industry. The same procedure was adopted for ranking the effects. The indices (RII) were then used to determine the rank of each item (impact). These rankings made it possible to cross compare the relative importance of the items as perceived by the three groups of respondents. The weighted average for each item for the three groups of respondents was determined and ranks (R) were assigned to each item representing the perception of the three groups.

3.3 Key Milestone

Several key milestones for this research project must be achieved in order to meet the objective of this project:



CHAPTER 4

RESULTS AND DISCUSSIONS

4.1 Introduction

The purpose of this chapter is to interpret, analyze and summarize the result of research based on the results obtained from survey questionnaires. A total of 30 out of 50 questionnaires were returned for this research. In other words, there is 60% of the construction companies replied. The main objective of the questionnaire is to obtain the data from construction companies regarding the causes and impacts of site issues in construction industry. The analysis is carried out based on the 30 returned questionnaires have been collected and discussions based on the results were made.

4.2 Respondents' Demographics

This section is to assess the respondent's information, which includes the location of their company, type of their organization, their profession or role in the project, their experience involved in construction industry and the primary type of projects they involved in.

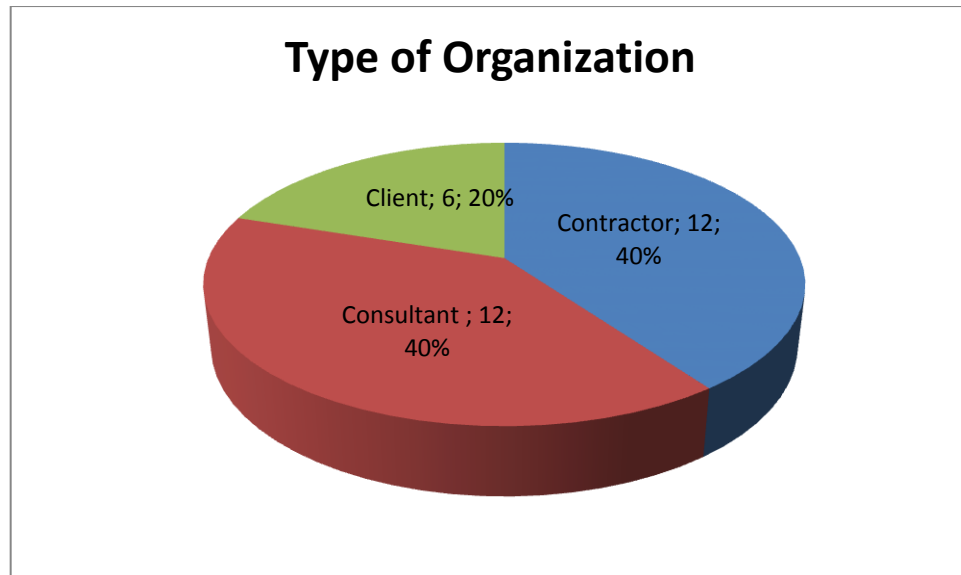


Figure 5 : Type of Organization

The pie chart above shows that the 30 sets of returned questionnaires consist of three main types of organisation, which includes consultant, contractor and client. According to the result, most of the respondents were consultant firms and contractor firms, which is each of firms are 40% (12 out of 30). Then, it followed by the client firms, which is 20% (6 out of 30).

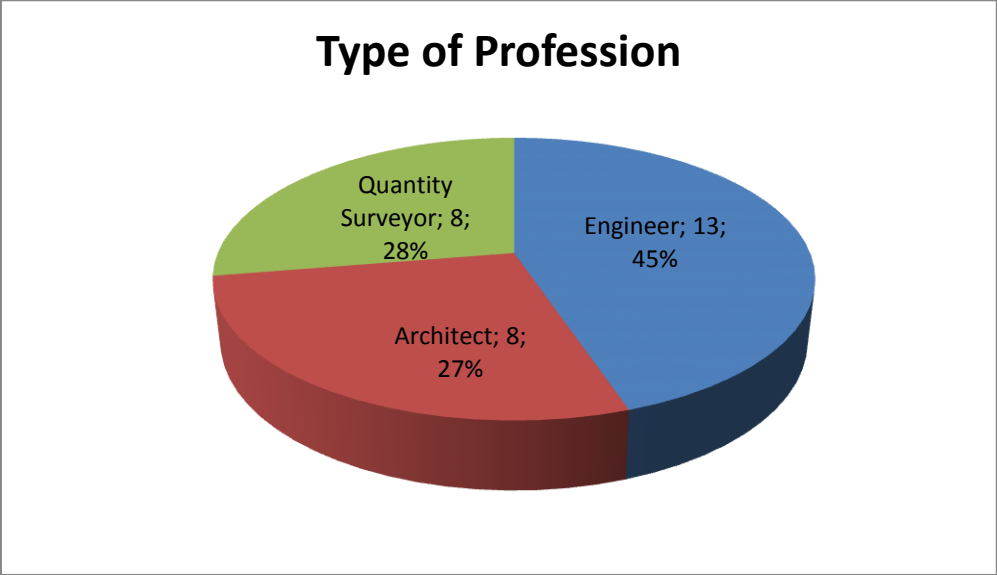


Figure 6 : Types of Profession

The data analysis was demonstrating the respondent profession involving in construction project. Based on 30 returned questionnaires, the greatest number of the respondent profession is engineer which is total 13 respondents (45%). Apart from that, there is total 8 respondents (28%) are working as quantity surveyor in construction project and it was followed by the architect, which is also total 8 respondents (27%).

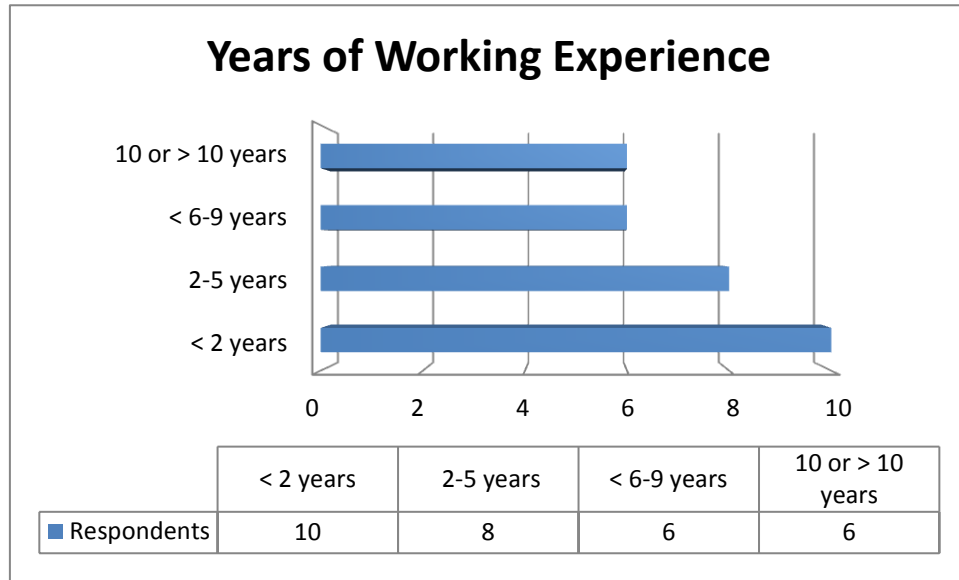


Figure 7: Years of Working Experience

Based on 30 returned questionnaires, the result indicating the greatest number of respondents working experience in construction project is at the range of less than 2 years which is 33% (10 out of 30). On the other hand, there is 20% respondent is falling in the range of working experience between 10 or > 10 years (6 out of 30). Additionally, 27% of respondents has working experience range of between 2 to 5 years (8 out of 30) and 20% of respondents has working experience at the range of < 6-9 years (6 out of 30).

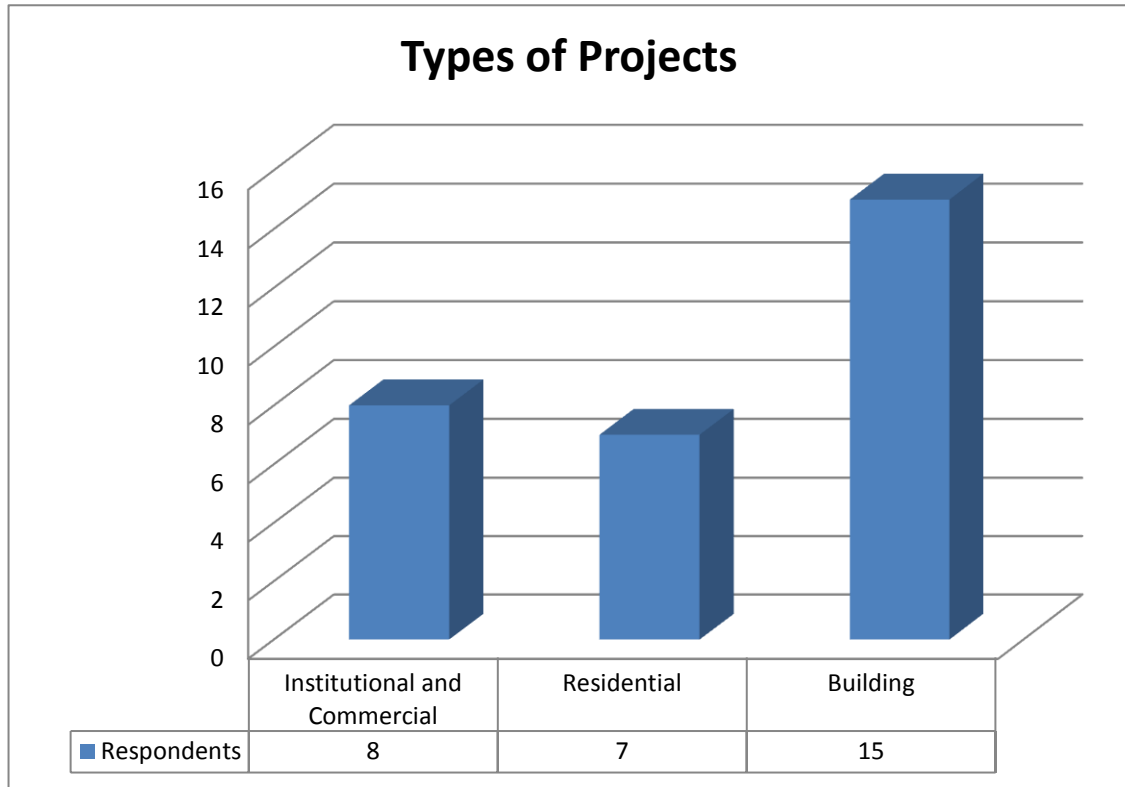


Figure 8: Types of Projects

In order to facilitate the respondents to select primary type of projects that they have involved, there are 3 types of project has been identified during the design of questionnaire, which includes Institutional and Commercial, Residential and Building constructions.

According to the result, the most primary project type that they have involved is building project, which are total 15 respondents out of 30 (50%). On top of that, there are total 8 respondents out of 30 selected institutional and commercial projects (27%) and it was followed by the residential, which is a total 7 respondent out of 30 (23%).

4.3 Reliability Test Analysis

According to Abramson, J. & Abramson, Z. H.,(2008), Cronbach's Alpha was carried out to measure of internal consistency or reliability among individual items in a scale. Cronbach's Alpha which equal or greater than 0.700 often regarded as satisfactory, it also indicating that the items may be measures of much the same attribute. However, a value in excess of 0.800 is preferable, and 0.900 or 0.950 is desirable

Reliability Statistics		
Factors	Cronbach's alpha	N of items
Causes of site issues	0.737	10
Impact of site issues	0.798	6

Table 2: Reliability Test Result

The Cronbach's Alpha for the "Impact of Site Issues" is 0.798 which indicated a highest level of internal consistency or reliability among the total 2 groups of variables. Then, it is followed by the "Impact of Site Issues" which has scored 0.737 in the Cronbach's Alpha.. Concisely, the 3 categories of variables are reliable since all of the Cronbach's Alpha are greater than 0.700.

4.4 Relative Importance Index Analysis

Ranking of causes (based on overall)

Causes of site issues	Percentage of respondents scoring							RII	Rank
	1	2	3	4	5	6	7		
Contractor's improper planning	0	6.7	23.3	20.0	26.7	20.0	3.3	0.6286	9
Contractor's poor site management	0	3.3	13.3	23.3	36.7	20	0	0.6333	8
Inadequate contractor experience	0	6.7	17.7	30.0	30.0	10.0	3.3	0.5952	10
Client's finance and payments for completed work	0	6.7	10.0	20.0	30.0	20.0	10.0	0.6619	4
Problems with subcontractors	0	0	0	50.0	30.0	16.7	0	0.6381	7
Shortage in material	0	3.3	13.3	26.7	16.7	26.7	6.7	0.6619	3
Labor supply	0	0	0	30	40.0	20.0	6.7	0.7095	1
Equipment availability and failure	0	0	6.7	33.3	23.3	30.0	3.3	0.6726	2
Lack of communication between parties	0	0	6.7	33.3	30	16.7	10.0	0.6381	6
Mistakes during the construction stage	0	0	13.3	40.0	23.3	20.0	0	0.6428	5

Table 3: Ranking of causes

The primary data collected from the section B of the questionnaire was analyzed from the perspective of clients, consultants and contractors. Each individual cause's RII perceived by all respondents was computed for overall analysis. The relative importance index, RII, was computed for each cause to identify the most significant causes. The causes were ranked based on RII values. From the ranking assigned to each cause of delays, the most important causes of site issues in Malaysian construction industry were able to identify. Based on the ranking, the five most important causes of site issues as perceived by clients, contractors and consultants were: (1) labor supply (RII = 0.7095); (2) equipment availability and failure (RII = 0.6762); (3) shortage in material (RII = 0.6619); (4) client's finance and payments for completed work (RII = 0.6619) and (5) mistakes during the construction stage (RII = 0.6428).

Ranking of impact (based on overall)

Impact of site issues	Percentage of respondents scoring							RII	Rank
	1	2	3	4	5	6	7		
Time overrun	0	0	0	13.3	36.7	23.3	20.0	0.7143	1
Cost overrun	0	0	3.3	26.7	30.0	13.3	20.0	0.6952	2
Disputes	0	6.7	26.7	26.7	20.0	10.0	3.3	0.5480	3
Arbitration	0	3.3	30.0	40.0	6.7	10.0	3.3	0.5095	4
Litigation	3.3	26.7	30.0	16.7	13.3	6.7	0	0.4429	5
Total abandonment	16.7	20.0	26.7	13.3	6.7	6.7	3.3	0.4000	6

Table 4: Ranking of impact

The primary data collected from the section C of the questionnaire was analyzed from the perspective of clients, consultants and contractors. The calculation of RII and ranking were done as explained in the previous section. Based on the ranking, the important impact of site issues as perceived by clients, consultants and contractors were: time overrun (RII = 0.7143), cost overrun (RII = 0.6952), dispute (RII = 0.5480), arbitration (RII = 0.5905), litigation (RII = 0.4429), and total abandonment (RII = 0.400).

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

The author investigated the causes and impact of site issues in the Malaysian construction industry. A questionnaire was designed and distributed among the three major groups of participants (clients, consultants and contractors). The author identified main impact of site issues and ten most important causes were: (1) contractor's improper planning, (2) contractor's poor site management, (3) inadequate contractor experience, (4) inadequate client's finance and payments for completed work, (5) problems with subcontractors, (6) shortage in material, (7) labor supply, (8) equipment availability and failure, (9) lack of communication between parties, and (10) mistakes during the construction stage. The author identified main impact site issues and they were: (1) time overrun, (2) cost overrun, (3) disputes, (4) arbitration, (5) litigation, and (6) total abandonment. As an important contribution, the author also studied the empirical relationships between the causes and impact of site issues. The author isolated the causes of site issues for each of the six impacts. The author believe that the results of this study can be of immense help to the practitioners (clients, contractors and consultants) and academicians. The practitioners can better understand the dynamics of project management and make efforts to reduce the incidences of site issues. There are some recommendations for further study to be identified after conducted this research, which are:

- i) Since the site issues are inevitably for almost every project in construction industry, the ways or efforts to be adopted by each of the construction participants can be investigated in further study, in order to find out the possible ways to reduce the impacts of site issues brought by the causes.
- ii) For further study, the alternative impacts which were not investigated in details in this research study can be conducted, in order to provide a smoother process of solution for this issue. At the same time, the study of solution for site issues in detail may helps construction participants to understand each type of site issues and the solutions to overcome the problems.

REFERENCES:

- Abdul Rahim Abdul Hamid, W. Z. (2003). *Hazards At Construction Sites*. Department of Structures and Materials, Faculty of Civil Engineering, UTM.
- Abdul Rahman Ayub & Janidah Eman. (2006). Identification of Challenges faced by Bumiputra Contractors & Roles of Local Government in ensuring a successful completion of a Project. Sabah.
- Abramson, J. and Abramson Z. H. (2008). *Research Methods in Community Medicine: Surveys, Epidemiological Research, Programme Evaluation, Clinical Trials* (6th ed.). England: John Wiley & Sons Ltd.
- Aibinu AA, Jagboro GO. The effects of construction delays on project delivery in Nigerian construction industry. *Int J Project Manage* 2002;20:593–9.
- Ajanlekoko JO. Controlling cost in the construction industry. *Lagos QS Digest*, Lagos 1987;1(1):8–12.
- Akinsola AO. Neural network model for predicting building projects' contingency. In: Conference: proceedings of association of researchers in construction management, ARCOM 96, Sheffield Hallam University, England, 11–13 September 1996. p. 507–16.
- Alkass S, Mazerolle M, Harris F. Construction delay analysis techniques. *Construction Manage Econ* 1996;14(5):375–94.
- Al-Momani A. Construction delay: a quantitative analysis. *Int J Project Manage* 2000;20:51–9.
- Assaf SA, Al-Hejji S. Causes of delay in large construction projects. *Int J Project Manage* 2006;24(4):349–57.
- Assaf SA, Alkhalil M, Al-Hazmi M. Causes of delay in large building construction projects. *J Manage Eng*, ASCE 1995;11(2):45–50.
- Bob Muir, P. (2005). *Challenges Facing Today's Construction Manager*.

- Chan DWM, Kumaraswamy MM. A comparative study of causes of time overruns in Hong Kong construction projects. *Int J Project Manage* 1997;15(1):55–63.
- Chan DWM, Kumaraswamy MM. Compressing construction durations: lessons learned from Hong Kong building projects. *Int J Project Manage* 2002;20:23–35.
- Frimpong Y, Oluwoye J, Crawford L. Causes of delay and cost overruns construction of groundwater projects in a developing countries; Ghana as a case study. *Int J Project Manage* 2003;21:321–6.
- Jeanette Watson, J. L. (December 2005). Top Ten Problems At Construction Sites. In *The Outfall*. Country of Sacramento, Department of Water Resources, Storm Water Quality Program.
- John McLean, A. (2011). *Construction Problem Resolution*. Retrieved from John McLean Architect: <http://www.johnmcleanarchitect.net/buildingAdvice.22.html>
- Krysiak, J. L. & Finn, J. (2010). *Research for Effective Social Work Practice* (2nd ed.). New York: Routledge.
- Kometa ST, Olomolaiye PO, Harris FC. Attributes of UK construction clients influencing project consultants' performance. *Construction Manage Econ* 1994;12:433–43.
- Long, N.D., Ogunlana, S., Quang, T. and Lam, K.C. (2004) 'Large construction projects in developing countries: a case study from Vietnam', *International Journal of Project Management*, 22, 553-561
- M., G. F. (2010, March 15). *Types of Construction Projects*. Retrieved from Ezine Articles: <http://ezinearticles.com/?Types-of-Construction-Projects&id=3935207>
- MALBEX, 2005. Market watch – construction industry, Kuala Lumpur Exhibition Center Report. p. 1–8.
- Manavazhia MR, Adhikarib DK. Material and equipment procurement delays in highway projects in Nepal. *Int J Project Manage* 2002;20:627–32.
- Mansfield NR. Causes of delay and cost overruns in Nigerian construction projects. *Int J Project Manage* 1994;12(4):254–60.

- M.Haseeb, X.-L. B.-u.-D. (2011). Problems of Projects And Effects of Delays In The Construction Industry Of Pakistan. *Australian Journal of Business and Management Research* , 41-50.
- Mhaskar, M.Z. (n.d.). Environmental Impacts of Construction Activity & Site Control Practises.
- Murali Sambasivan, Y. W. (2007). Cause and effects of delays in Malaysian construction industry. *International Journal of Project Management* , 517-526.
- Naoum, S. G. (2007). *Dissertation research and Writing for Construction Student* (2nd ed.). UK: Elsevier.
- Springer, J. G. (November 2003). Common Problems in Construction Projects and How to Avoid Them.
- Odeh AM, Battaineh HT. Causes of construction delay: traditional contracts. *Int J Project Manage* 2002;20:67–73.
- Odeyinka HA, Yusif A. The causes and effects of construction delays on completion cost of housing project in Nigeria. *J Financial Manage Property Construction* 1997;2(3):31–44.
- Ogunlana SO, Promkuntong K. Construction delays in a fast growing economy: comparing Thailand with other economies. *Int J Project Manage* 1996;14(1):37–45.
- Sekaran Uma. *Research methods for business: a skill building approach*. 3rd ed. New York: John Wiley; 2000.
- Tayie, S. (2005). *Research Methods and Writing Research Proposals*. Cairo: Centre for Advancement of Postgraduate Studies and Research in Engineering Sciences, Cairo University.
- Terry Williams. Assessing extension of time delays on major projects. *Int J Project Manage* 2003;21:19–26.