A STUDY TO IDENTIFY THE FACTOR THAT CAUSES PROJECT DELAY IN CONSTRUCTION AT TERENGGANU

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I declared that the work in this thesis was carried out in accordance to with the regulation of Universisti Malaysia Pahang. It is original and the result of my own work, unless otherwise indicated or acknowledges as referenced work.

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DEDICATION

This study is dedicated especially to my parent, to my lecturers and all my friends who have been giving inspiration, strength and love of the infinite to me.

ACKNOWLEDGEMENT

I would like to express my sincere appreciation to my supervisor Datin Hajah Mazita binti Mokhtar for the guidance, assistance, criticism, and suggestions on this study. To those who had contributed assistance and advice in this study, either directly or indirectly, yet their names are not cited here, they deserve my greatest gratitude. Millions thanks to all. Last but not least, I would like to thank my family members and my friends, who had given a lot of encouragement and motivation to complete this study.

ABSTRACT

This survey was conducted to find the factors causing time overrun (delay) from the contractor perspective. The objective of this study was to identify the factors and in order to rank the most influence factor. Sets of questionnaires were developed and data was collected by hand distributed and email. The scope of study focused on the construction project in Terengganu. The respondent of this study obtain from contractors registered under G7 with CIDB. The result of this study showed that the higher rate in delay come from external factor. External factor consist three subjects such as weather condition, natural disaster and unavoidable disaster.

ABSTRAK

Kajian ini dijalankan untuk melihat faktor-faktor yang menyebabkan masa ditakluki (kelewatan) dari perspektif kontraktor. Objektif kajian ini adalah untuk mengenal pasti faktor dan untuk peringkat faktor pengaruh paling. Set soal selidik telah dibangunkan dan data dikumpulkan dengan tangan diedarkan dan e-mel. Skop kajian tertumpu kepada projek pembinaan di Terengganu. Responden kajian ini mendapatkan daripada kontraktor yang berdaftar di bawah G7 dengan CIDB. Hasil kajian ini menunjukkan bahawa kadar yang lebih tinggi dalam kelewatan datang dari faktor luaran. Faktor luaran terdiri tiga mata pelajaran seperti keadaan cuaca, bencana alam dan bencana yang tidak dapat dielakkan.

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CHAPTER 1

1.0 INTRODUCTION

1.0 Introduction

This chapter consists of sub-topics of background of study, problem statement, research objective, research question, scope of the study, significant of the study, expected result, definition terms and study outline. All of the sub-topics are described about the significant factors causing time overrun in construction industry.

1.1 Background of Study

Construction is the one of the largest industry. Construction is a high hazard industry that comprises a wide range of activities involving construction, alteration and repair. Construction is the process of preparing and forming the building, and also building sytems. Construction have their own life cycle, starts with planning phase and

go through into design phase, construction phase and project closure. From a single activity, large scale construction is a feat of human multitasking. A project team comes together to create a unique development on a particular site under circumstances that will never be repeated. For the successful project, effective planning is essential. Construction activities are derived from the local economic activities in Malaysia. One of the key characteristics of the construction projects is executing the scope of work in a specific amount of time and project time overrun may have bad consiquences for the project performing organization such as cost overrun and damage of company reputation. (Taher & Pandey, 2013)

According to Kazaz, Ulubeyli, and Tuncbilekli (2012), delays in construction can cause a number of changes in a project such as late completion, lost productivity, acceleration, increased costs, and contract termination. The issues of time overrun or delay continuously since many years. Delay in project means that the non-completion of project within the specific duration as agreed in contract. Time overrun is common problem in many construction ptoject, which considerable losses to project parties. Construction delays are often the result of miscommunication between contractors, subcontractors, and property owner.

According to Riazi, Riazi, and Lamari (2013), construction project delay has been a major setback in the last decades and is an even more serious issue in developing nations and according to them at Malaysia, delay is one of the most significant problems with major concern is given to public sector projects as it has a direct relationship with the public.

As a conclusion, project time overrun is the issue that important to discuss because underachieving time performance has led to many problems including loss of reputation and revenue for the government. However, for this study focus more about the significant factors that causes to project time overrun.

1.2 Problem statement

The Malaysian construction industry is generally classified into two categories namely, general construction and special trade. Recent study show that there are many reason why delays in construction project are one of the biggest problems facing by the construction industry. The delays in construction projects have significant financial and social impact to all parties involved in the project.

The issue of time overrun in construction industry is frequently reported by many researcher from different contries, and similarity with Malaysia. The problem becomes critical topic in construction industry, only several project are completed on the estimated time. One of the critical problems faced by the government sector is the frequent and lengthly delays in such project. Understanding the causes of construction delay may help to find the main causes and the significance in order to minimise and avoid time overrun.(Shebob, Dawood, & Xu, 2011).

In the study of Yusof, Mohammad, and Mat Derus (2010), the main conclusions of the research are that delays due to nominated sub-contractor or supplier are the most significant causes of excusable delays. Meanwhile delays due to architect instruction, delay in late information given by architect and also delays due to failure of employer to provided access to site are the most significant causes of excusable compensable delays in the building projects.

A study conducted by Endut et. al. (2010), Malaysia showed that only 20.5% of the public projects 33.35% of the private sector projects were completed within the time while in a survey among construction practitioners of central and southern part of Malaysia, 89% of respondent mentioned that they are facing the problem of time overrun in their projects.

Besides that, according to Othman.A and Ismail.S (2013), studied the project construction delay which is focus in Kedah was carried out the main causes of delay were delays in subcontractors work, ineffective planning and scheduling, delay in approval shop drawing and difficulties in financing project. This is because of inexperienced and incompetent subcontractor to carry out the work.

Therefore, Jabatan Kerja Raya stated in "Laporan Status Projek Dalam RMKe10 Bil 06/2012" only 50 percent project has delivered on time within the budget (Jabatan Kerja Raya, 2012). Until June 2012 only 62 project from 125 has done, The project should have been completed for the year 2012 is the 360 project including 25 projects that should have been completed for 2011. This is because the project the late of advertise to contractor and it will efected to project progress. The figure 1.0 has show the statistic of contract delay, 2012 :

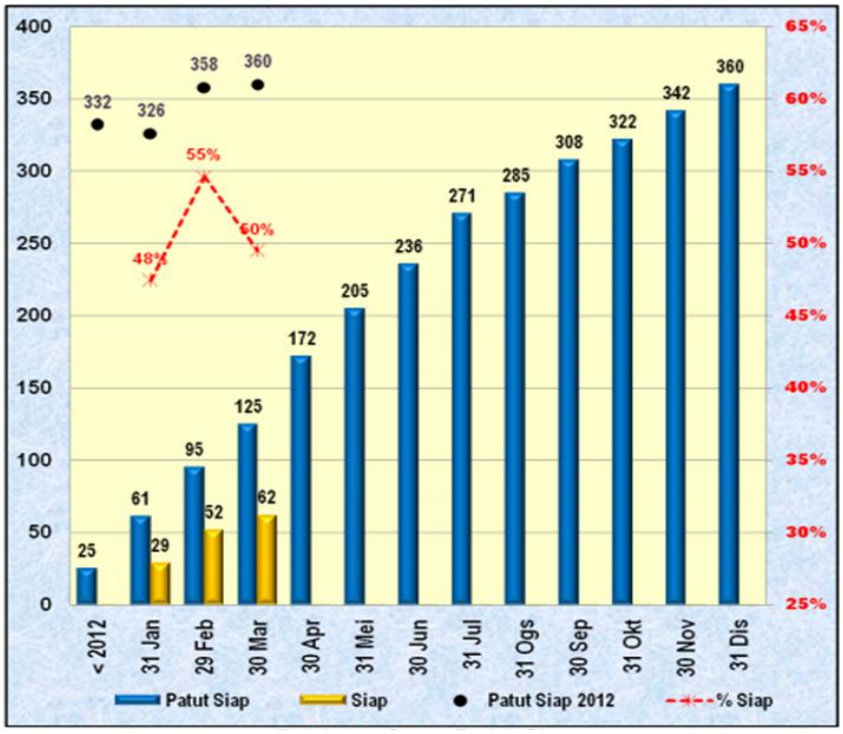

Figure 1.0 Statistic of Contract Delay, 2012

By referring to the all statement above, important to conducting the study about the significant factor caused time overrun. Besides that, by preventing the caused of delay, it will be a big help to our construction industry. The contractor and project manager can manage their project in the future.

The summary of the issues are :

1. The issue of time overrun in construction industry is frequently reported by many researcher from different contries, and similarity with Malaysia. The problem becomes critical topic in construction industry. Understanding the causes of construction delay may help to find the main causes and the significance in order to minimise and avoid time overrun.

2. Jabatan Kerja Raya stated in “Laporan Status Projek Dalam RMKe10 Bil 06/2012” only 50 percent projects until June 2012 has delivered on time within the budget.

1.3 Research Objective

The research objectives of study are :

1. To identify the factors that causing to delay in construction project at Terengganu
2. To identify the main factor of construction delay at Terengganu

1.4 Research Questions

1. What are the factors that causing to construction delay?
2. What is the main factor of construction delay?

1.5 Scope of Study

The scope of this study will be focusing on the construction project in Terengganu. This study is needed to evaluate the level of respondent understanding by questionnaire survey. The questionnaire will be distribute to the management team include site engineer, project manager and supervisor are selected as the respondent. For this study, data is carry out through questionainre. This study focused on identify the factors that contribute to project delay and in order to know the main factor.

1.6 Significant of Study

Through this study, the factors of project delay will be identify. This research was done for the purpose to fullfil several of significant which considered important as reference to the parties that will involve in construction especially the contractor. In addition, the significant of the study is to improve the problems with finding.

1.7 Expected Result

In conclusion, expected result from this study must be consistent with the objective. The main objective of the study is to know the factors causing delay in construction, the expected result from this study is to achieve the first objective. The first objective is important because it also answer the second objective which is to know the main the factor that occur to delay in construction at Terengganu.

1.8 Definition Term

1.8.1 Time Overrun

When an infrastructure project is planned, the time was estimated from start until project complete. An expected date of completion is also announced. The actual date of completion is invariably different from the expected date. Time overrun is defined as the time difference between the actual and the initially planned.

1.8.2 Project

Project mean an individual or collaborative enterprise that is carefully planned and designed to achieve a particular aim. Project is a planned set of interrelated tasks to be executed over a fixed period and within certain cost and other limitation.

1.8.3 Construction

Construction is the process of making something, especially buildings. Construction is the act or process of constructing. Construction is the process of preparing for and forming buildings and building systems. Construction start with planning, design, financing, executing and closing.

There are nine types of construction :

1. Residential building construction
2. Light commercial construction
3. Multi-family construction
4. Health-Care construction
5. Environmental construction
6. Industrial construction
7. Commercial building construction
8. Institutional construction
9. Heavy civil construction

1.8.4 Construction Industry

Sector of national economy engaged in preparation of land and construction, alteration, and repair of buildings, structure and other real property. Construction industry devided to three categories :

1. **Building Construction Industry**

   All general and operative builders primarily engaged in the construction of residential, farm, industrial, commercial, or other buildings.

2. **Heavy Construction Industry**

   All general contractors primarily engaged in heavy construction other than building, such as ahighways and streets, bridges, sewers, railroads, irrigation projects, and flood control projects and marine construction. This includes special trade contractors primarily engaged in activities not normally performed on buildings, such as highway grading or underwater rock removal.

3. **Special Trade Construction Industry**

   All special trade contractors who undertake activities of atype that are specialized either to building construction, including work on mobile homes, or both building

and nonbuilding projects. This includes projects such as painting, electrical work and plumbing. This does not include activities specialized for heavy construction.

1.8.5 Contractor

Independent entity that agrees to furnish certain number or quantity of good, material, equipmen, personnel, and services that meet or exceed stated requirements or specifications. The term construction contractor applies to contractor and sub-contractor. Contractor is a person who contracts to supply certain materials or do certain work.

1.9 Study Outline

The research report consists five chapters where the contents of each chapter are summarized as follows :

Chapter 1 : Introduction to the study. It provide overview to the whole report.

Chapter 2 : Literature review are the findings from previous study or researcher. The sources came from journal, technical paper and books.

Chapter 3 : Research methodology describe the how the research going to collect data and information. If want to use qualitative or quantitative. In this study, quantitative method is use.

Chapter 4 : Research finding and analysis is about the detail how the data collected will be analyze. The findings also were highlight.

Chapter 5 : Conclussion and recommendation is to conclude whether the objective of research are achieved or not, after that the recommendation for further studies.

CHAPTER 2

2.0 LITERATURE REVIEW

2.1 Introduction

In the previous chapter, the overview of this study was explained about and problem was identified. Through the chapter, the elaborations of the topic are clearly described. A literature review is a select analysis of existing research which is relevant with the aim of this study. The study also will provide about what the entire older researchers that have done doing the research related with this topic. This study is about the construction issues with project time overrun that faces on the construction companies.

2.2 Project Time Overrun

Based on Indhu and Ajai (2014), delay as referred in construction is prolonged construction period and disruptions of events that disturb the construction programme. Delays and disruptions are among the challenges faced in the course of executing

construction projects. Delays as well as disruptions are sources of potential risks that current studies are looking into ways to manage.

According to Taher and Pandey (2013), time overrun can occur in every phase of construction project and one of the key caracteristic of the construction projects is executing the scope of work in a specific amount of time. Time overrun may have bad consequences for the project performing organization such as cost overrun. The worry of not finishing the project on time is not the most important concern to project manager.

Financial is the highest factors causing delay in construction project in Ghana and materials problems are the second followed by scheduling and controlling factors. The importance is everybody and everything connected with construction is adversely affected by lack of sufficient cash flow. The project is not only delayed but the morale of workers decrease because of non-payment or irregular payment. The challenge to construction managers is to identify ways to eliminate or reduce financial crisis during construction process. construction delay is a critical function in construction project and also one of the biggest problems construction firms face in Libya. Delays and cost overruns reduce the efficiency of available economic resources, limit the growth potential and reduce competitiveness of the economy. (Fugar & Agyakwah-baah, 2010)

2.3 Classification of Project Time Overrrun (Delay)

Construction time overrun in residential and light construction are often the result of miscommunication between contractors, subcontractors, and property owners. Before analyzing construction delays, a clear understanding of the general types of delays is necessary. According to the study conducted by Ahmed S.M et al (2003), there are two type of time overrun which are non-excusable and excusable compensable as presented in figure 2.1 :

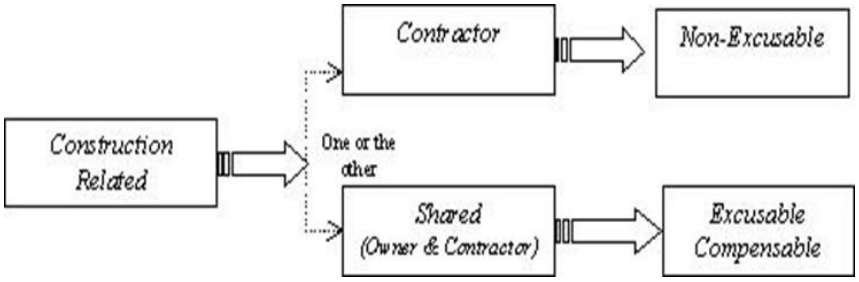

Figure 2.1 :

Flow Diagram for Construction Related Delays (Ahmed S.M et al, 2003)

According to Terry Williams (2003) discovered that there are a unit 3 basic ways that to classify time overrun :

I. Excusable delay with compensation
II. Excusable delay while not compensation
III. Non-excusable delay

Refer to the researchers basically, they are have same ideas of type which are excusable and non-excusable. Excusable non-compensable delays are delays caused by factors that are not foreseeable, beyond the contractor's reasonable control and not attributable to the contractor's fault or negligence. Compensable excusable delays these are compensable delays are excusable delays, suspensions, or interruptions to all or part of the work caused by an act or failure to act by the owner resulting from owner's breach of an obligation, stated or implied, in the contract. Concurrent delays occur when both owner and the contractor are responsible for the delay. Excusable delays are any classified into excusable with compensation and excusable while not compensation.

2.3.1 Excusable Delay

Excusable delay are delays that are unforseeable and beyond the control of contractor. The delay is allows the extension of time for a particular project which is having delay. This excusable delay can be saperated into two different parts which are excusable delay with compensation and excusable delay without compensation.

2.3.1.1 Excusable delay with compensation

This type are caused by the clients actions or inactions. This type of delay that will entitle the contractor to additional time, additional compensation, or both. In a delay situation, contractor have a right to time extension moreover as financial compensation as a result of the delays. Delay could be the result of owner-directed changes, different site conditions, design revisions, and suspention of performance. In other word, it happend out of contractor control but within owner and its agent. Normally, a compensable delay is caused by the government and the owner. There are many other ways could be delayed, such as direct change in scope, suspension of work or may be caused by any of the constructive changes and the owner's failure to disclose important information to the contractor.

2.3.1.2 Excusable delay without compensation

Excusable while not compensation are delays wherever wether consumer or contractor is considered accountable. This delay is enable to the extend time to end construction while not offer any compensation to the contractor. The issues faced of this delay is :

1. Protest from the labor
2. Anticipated whether condition
3. Sudden currently delivery instrumentality
4. Sudden currently delivery material

On the other hand, is typically delay including unusually severe weather condition, labor strikes or fire. That is weather which is not anticipated at that time of year in that part of the country. This is beyond any parties control in the construction process. Which is the contractor would be entitled to additional time, but not additional money.

2.3.2 Non-Excusable delay

This delay cause by avoid the contract agreement by contractor and it had been establish by construction contract. This case are events that are within the contractors control or are foreseeable, in which the contractor own actions and inactions. The problems can result from the fault of the contractor, his subcontractors, material men, or suppliers. These are some example :

1. underestimates of productivity
2. improper project planning and scheduling
3. poor site management and supervision
4. wrong construction method
5. equipment breakdowns
6. unreliable subcontractors or suppliers

Non-excusable delay is the type of delay that contractor never want to hear. This is delay fully caused by them and may trigger the owner's assessment of liquidated damages. The contractor work with no entitlement to claim for extension of time or delay damages until they completed the project. The owner could conceivably be able to recover delay damages from the contractor. The amount of the recovery is generally determined from liquidated damage provisions included in the contract.

2.4 Liquidated Damages

Traditionally, liquidated damages is a payment made to the client by the contractor as aresult from the loss of profit faced by the client when project delay in construction. Client deverses the right to make the compensation as to recover their loss caused by contractor.

In construction contracts liquidated damages are usually inserted to encourage compliance with time provisions, in particular, completion of the work and payment on time. In regard to completion of the work, a typical clause will provide that if the work is not completed by the extended date for completion, liquidated damages, at the daily rate provided by the schedule, shall become due and payable. (Twyford, 2007)

2.5 Factor effecting Time Overrun

Studies based on time overrun in construction project have been extensively done by various parties including academicians, researchers, and goverment. Time overrun or delays in construction projects have been a research topic for decades. Time overrun occurs when the contract date is exceeded or when the execution of the project extends beyond the date, which the parties had agreed upon for the delivery of that project. There are many reasons why time overruns occur.

2.5.1 Factor Time Overrun in construction at International Project

The factor such as delay in agreement of design drawings and confirmation of tested materials, utility works concerning to public organization, economic crisis such as price inflation of materials, and shortage of required equipment were the most critical factors in the Libyan construction. From the views of owners, the most critical factors were low skill of manpower, delay in delivering site project to contractor and modification of new work to the project and change in material specification. (Shebob et al. 2011)

According to Indhu and Ajai (2014), a common risk to project is failure to start work on time. Very long delays can be caused by variations, legal or planning difficulties, shortage of information, lack of funds or other resources, and other reasons which may lead to delay of the site possession. Delay caused by contractors attributes most often is classified into five main items whice are failure to evaluate the site or design, management problem, inadequate resources, poor workmanship, and subcontractor failures. Other causes of delay are attributed to improper management of materials and loaded by lack of an explicit and detailed model of the project materials management process and due to lack of management where less attention is paid to resources allocation.

Financial status of contractor, payments delay by the owner and poor communication between the construction parties are the main factor. Owner should pay progress payments on time and the managerial skills of the construction parties should be improved by conducting workhops and training courses. (Mahamid, 2013)

Financial problem of contractor is the most importance cause. Inefficient site management is certainly another key factors affecting time performance of most construction projects in India. This is perhaps due to lack of formal training among the site professionals who usually develop their supervisory skills by experience. The finding support by RII where material shortage was one of the key factors affecting time delay and result also show that slow decision from owner are the reason the overall delay. (Doloi, Sawhney, Iyer, & Rentala, 2012)

Refer to Alnuaimi and Mohsin, (2013) , the study was conducted at Muscat,Oman to commercial building founded more than 40 percent time incresed from the planned time. another finding was that the causes of delay are changing with the time in a pattern, change in scope, lack of management team and new legal instruction rules. One of the reasons is the problem in contractor experience which indicates embedded diaqualification of owner.

According to Assaf and Al-hejji (2006), 73 causes delay were identified through research in construction projects in Saudi Arabia. Owners specified that causes of delay are related to contractor and labors. Study indicated that owners and consultants realize that awarding to the lowest bidder is the highest frequent factor of delay, while contractors considered severe causes of delay are related to owner.

2.5.2 Factor Time Overrun in construction at Malaysia

According to Othman.A and Ismail.S (2013) , the serve in construction project particularly in government projects in the State of Kedah. The study was identify that the main causes of delay from sub-contractors work, ineffective planning and scheduling, delay in approval shop drawing and sample materials and dificulties in financing project. delay gives rise to distruption of work and loss of productivity, late completion of project, increased time related cost, third party claims and abandonment or termination of contract. There are many causes, which must be identified in order to control delay in the early stages of the project. Delay could be a result of low performance of contractor during construction, inadequacies or defaults in early planning and design, poor owner administration and involvement in construction, problem supervision, restriction in government laws and regulations or obstructions at the site.

According to Memon and Nawabshah (2014), overrun in time is caused due to several factor, their study is focus on contractor perspective in Malaysia. This study found 30 common factors of time overrun. From the study, the major factors of time overrun are comes from frequent design changes, change in scope of the project, financial difficulties of owner, delays in decisions making and unforeseen ground condition are. From these results, it can be noted that owner related issues are the important in causing time overrun problem. Hence, it is very important that the owners need to improve their contract management system.

According to Ismail, Rahman, and Memon, (2010) ,the issues of overrun in construction are very common worldwide including Malaysia. The study classify the overrun factors into phases of project life cycle. Total 35 factors were identified, based on this classification it shows that most of the factors occured in construction phased. The factors that occur because lack of communication between parties and change in the scope of the project.

According to Ismail et al. (2013) in their study at MARA construction, time and cost overrun is a common issue that frequently happens in the construction. There are many factors have been identified, such as delay in progress payment by owner, poor site management and supervision, lack of experience, shortage of materials and change in scope of the project. in addition, the issue related to time and cost overrun is Kuala Lumpur International Airport 2, where targeted to open in september 2011, but it opening was moved to june 2013. This problem happens due to frequent design changes in construction.

Hamzah et al. (2012) founded 34 causes of the construction delay in their study on to identify the causes of construction delay in Malaysia. The study show that the influence of human attitudes, mentality, skill and behavior are the big impacts to the construction. Their study also stated that failure to achieve targeted time, budgeted cost and specified quality can result in various unexpected negative effects on the project. Meanwhile tthe study said, “sick project” is the project that is experiencing delays in the construction period where gaps between actual work progresses compared to the work scheduled is more than 30 percent.

According to Azlan, Smith, Pitt, and Chan (2010) ,it is common issues with project time overrun faced in Klang Valley. The study focus on contractor perception about project tiem overrun. Seven factors that contribute to delay were identified through literature review, namely contractors financial difficulties, construction mistakes and defective work, labour shortage, coordination problems, shortage of tools and equipment, material shortage and poor site management. Of those factors, the three most

important factors were found to be labour shortage, contractors‟ financial difficulties and construction mistakes and defective works.

Malaysian construction industry is identified as being fragmented, having high dependency on unskilled foreign labour, poor application of technology and problems on the implementation of policy. Delays are always measured as expensive to all parties concerned in projects and very often it will result in clash, claims, total desertion and much difficult for feasibility and also it slows the growth of construction sector.

The summary of previous studies of the causes of delay in construction project :

Researchers	**Country**	**Major causes of delay**
Shebob, A.1, Dawood, N. and Xu, Q. (2011)	Libya	- Slow supervision in making decisions - Shortage of required materials - Changes in scope - Incomplete design documents - Weather conditions on job site - Financial problems - Delay in contractor claim
Ibrahim Mahamid (2013)	Palestine	- Payment delays by the owner - Financial problem by contractor - Political situation - Poor communication between parties - Lack of equipment efficiency
Enas Fathi Taher, R.K. Pandey (2013)	India	- Slow decision making by client - Weather conditions - Economic condition - Delay in contractor claims - Shortage material in market - Shortage of manpower
Azlan Shah Ali et al. (2010)	Kuala Lumpur, Malaysia	- Contractors financial difficulties - Contractor mistake and defective work - Labour shortage - Shortage of tools and equipments - Material shortage
Aftab Hameed Memon, et al. (2010)	Johor, Malaysia	- Contractor poor site management and supervision - Inadequate contractor experience - Change in scope

2.5.3 Classification in Group of Factor Time Overrun

According to the past researcher, the common factor occur in construction are placed into six major categories as stated in Table 2.1 :

Table 2.1 : Factors of Construction Time Overrun

Factors of Construction Time Overrun	
CLIENT	
1	Delay in progress payments by owner
2	Change orders by owner during construction
3	Poor communication and coordination
CONTRACTOR	
1	Ineffective planning and scheduling of project
2	Difficulties in financing project
3	Conflict with client
CONSULTANT	
1	Lack of advance engineering design software
2	Poor communication and coordination
3	Inadequate experience of consultant
LABOR	
1	Nationality of labor (working permit)
2	Labor shortage (labor supply)
3	Low productivity level of labor
MATERIAL AND EQUIPMENT	
1	Late delivery of material and equipment
2	Shortage of equipment and material
3	Material and equipment damage
EXTERNAL FACTOR	
1	Weather condition
2	Natural disasters (earthquake, flood, etc)
3	Unavoidable disasters (haze, pollution)

2.6 Conclusion

By reviewing the literature review delay occur in every construction project. some project only consist a few days behind the schedule, some are delayed over a year. So, it is essential to fine the actual causes of delay in order to minimize and avoid it in any construction project.

This study is more to the common problems faced by the contractor. The following are just a few problems faced by the contractor:

a. Lack of expertise and experiences
b. Material price escalation
c. Financial Problems
d. Materials supply networking
e. Lack of skilled workers
f. Lack of construction materials and machineries
g. Inefficient and ineffective planning and management
h. Communication problems
i. Late and non-payment

CHAPTER 3

3.0 RESEARCH METHODOLOGY

3.1 Introduction

This chapter is an essential stage to determine successful of achieving the aim and objective of a research. The overall objective of this chapter is to describe the stages in the research methodology used in this study. Research methodology is the design of research, means the way to perform the research. This chapter is important as it described the methodology which is designed in achieving the research objective that to identify the factors that contribute to project time overrun and to rank the common factors that contribute to project time overrun among contractors. It also explain about population and sampling technique, data collection techniques, questionnaires and about statistical analysis technique.

In this study, the focus is on the literature review and the questionnaire survey targeted at Terengganu. Futhermore, statistical methods will be use to analyze the data collection from questionnaire survey. The literature review was done through internet, construction and engineering journals. By referring to the previous literature, the information from the causes of contruction delays would be used to develop the questionnaire survey in order to collect data from the targeted respondent.

3.2 Research Design

In this research, the respondents are from civil engineering contractor. It is important to determine who are as respondents of the study, the contractor will choose because they are the party responsible to construct and develop the project. The flowchart is use to the clear understanding on how the study will be conduct. Figure 3.1 illustrate the flowchart of methodology regard to research.

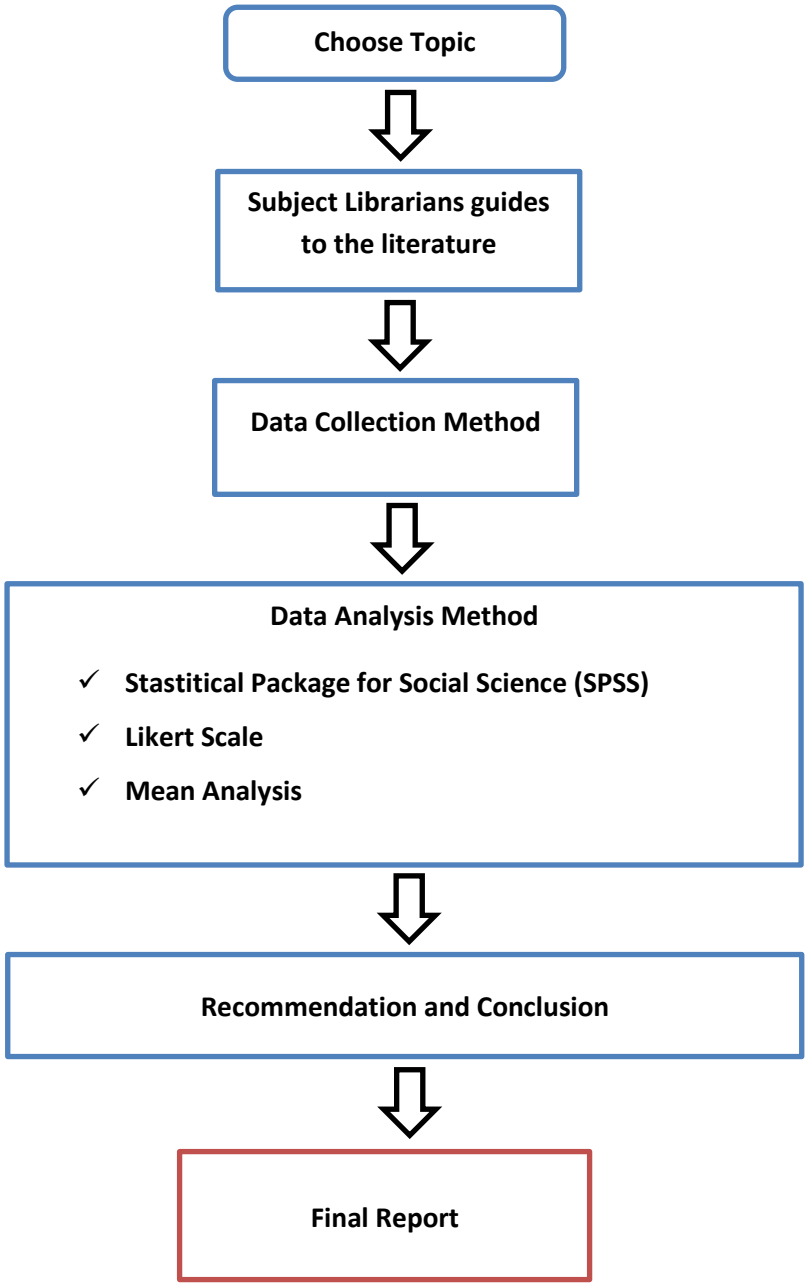

Figure 3.1: Flowchart of methodology

3.2 Research Method

Research method is the technique to conduct a scientific research. Research method also can be define as the study type, question, research independent and dependent variable, research question, hypothesis, and data collection method. Research method can be divided into two methods which is qualitative design and quantitative design. Qualitative method is research that uses the information or data obtained by observation, interview, analysis document or any manner to obtain complete data.

For this research quantitative method will be use. Quantitative method can be referring as a technique investigated via statistical, mathematical or numerical data. Quantitative research method are also research techniques which information dealing with numbers and anything that is measurable.

The advantage of using quantitative because is relatively less time consuming because can use statistical software and also require little time duration to answer questionnaire form in more convenient to the respondent due to limited time they have. The data information required can be obtained directly from questionnaire and the respondent just need to mark the appropriate answer.

In general, this study was used questionnaires by the respondent from the contractor Grade 7 companies which registered with Construction Industry Development Board (CIDB) at Terengganu. The medium for collecting data will be use by email and printed questions.

3.2.1 Questionnaire Design

Questionnaire survey is develop to get the opinion and understanding from the respondents experiences regarding to the construction time overrun problem. The questionnaire translates the research objectives into spesific questions which are causes or factors of construction time overrun and to rank the factors

The questionnaire are classified into 2 sections :

1. Section A : Demographic
2. Section B : Factor time overrun in construction

3.2.1.1 Demographic

The demographic variables is used in this analysis will include

1. Education Level
2. Work Experience
3. Experience in Construction
4. State the number of construction project that involved by respondent
5. Type of project involved in delay

3.2.1.2 Factor Time Overrun

In this section focus on to identify the common factors of time overrun faced by the respondent. The list of time overrun that founded from literature review will be listed. The respondent need to identify the appropriate answer.

Six groups of causes for delay in construction project which are :

a) Client
b) Contractor
c) Consultant
d) Material and Equipment
e) Labor
f) External factor

The questionnaire is mainly based on Likert scale of ordinal measures from 1 to 5 according to level of contributing :

(1) Never
(2) Rare
(3) Sometime
(4) Mostly
(5) Always

From this section, the result also answer the second objective. The second objective is to rank the most factor that impact project time overrun in construction. The sources of the questionnaire is from Kang Sik Wei, (2010).

3.3 Population and The Sampling Technique

Data which is obtained from the questionnaires will be used to analyzed with an appropriate method which may result in the successful of the research. Data collection from the different type of questionnaire would be analyzed and answered to the objective of the study.

Population is the specific group that researcher trying to get information. Polulation also known as a large collection of individuals or objects known to have similar characteristics. However, due to the large sizes of populations, researcher often cannot test every individual in the population because time consuming.

A sampling is a part of stastitical practice concerned with the selection of a subset of individual observation within a population of individuals intended to yield some knowledge about the population of concern, especially for the porposes of making predictions based on statistical inference. In sampling, there are two types of design which are probability and non-probability sampling. Probability means that averyone in a given population has an equal chance of being surveyed for a particular piece of research. Non probability sampling is where the respondents were chosen because of their criteria. There are four basic methods of probability sampling which are random sampling, systematic sampling, stratified sampling and cluster sampling.

Simple random sampling will be use in this process of selection the respondents because every element in the population has a known and has equal chance to be selected. To be more specific, the respondent for this study is identified as G7 contractors in Terengganu. Therefore, only civil engineering G7 contractors companies at Kuala Terengganu that registered with CIDB are selected and the list is retrieved from CIDB website.

Table from Krejcie and Morgan (1970) is used in this research. There are no calculations are needed to use in technique determining the sample size by using published table, thus can direct obtain required sample size by table below. Population size of this study is 113 which is fall in between the population size of 110 until 120 that provided the sample size between 86 to 92 under category of ±5 percent questionnaires are needed to generate the outcomes of this study.

In this study, Krejcie and Morgan's table is used to calculate the sample. The sample as stated in table 3.1 :

Table for Determining Sample Size from a Given Population

N	*S*	*N*	*S*	*N*	*S*
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note.—*N* is population size.
S is sample size.

Table 3.1 :

Table determining sample size for a given population (Krejcie & Morgan, 1970)

3.4 Data Analysis

Data analysis step is very important to give the result of the study. By this analysis, the conclusion of the project can be made to determine either the objective of study is achived or not. In this study analysis, all the result data from table are analyzed using frequency analysis and everage index. For this study the type of data analysis is using SPSS. The data from Likert scale study and Mean Analysis will be analyze using SPSS. The summary of the study then presented with the conclusion of the study.

3.4.1 SPSS

SPSS is the window base program that can be used to perform data entry and analysis and to create tables, charts and graphs. SPSS is one of the most popular statistical packages which can perform highly complex data manipulation and analysis with simple instruction. SPSS has scores of statistical and mathematical function, scores statistical procedures, and a very flexible data handling capability.

The following is a brief overview of some of the functionalities of SPSS :

- Data transformation
- Data examination
- Descriptive Statistics
- Reliability Tests
- Correlation
- T-tests
- ANOVA
- Regression
- Mean Analysis
- Likert Scale

3.4.2 Likert Scale

A likert scale measures the extent to which a person agrees or disagrees with the question. The most common scale is 1 to 5. In each question, a statement is presented in which a respondent must answer in a multiple choice type format.

The advantageous side of the Likert Scale is that are most universal method for survey collection, therefore the method are easily understood. The responses are easily quantifiable and subjective. Likert surveys are also quick, efficient and inexpensive methods for data collection.

Likert scale primarily used in questionnaires to obtain participants preferences or degree of agreement with a statement or set of statements. Respondents asked to indicate their level of agreement with a given statement by way of an ordinal scale. (Bengal, 2012)

The study is use Likert Scale because it suitable to achieve the first objective which is to find the factor that contribute to project time overrun in construction. The respondent can choose anyone scale from 1 until 5 to answer the questions.

Source: Likert Scale

3.4.3 Mean Analysis

Descriptive statistics are available with SPSS which are provided by frequencies, mean, median, mode, range, variance and standard daviations. The formula of getting average or mean will be use in section B and section C the result that are obtain from targeted respondents from Likert Scale. Mean is average or sum of the values that devided by number of observations. Mean is the one acceptable measure of central tendency for interval data thus the mean of each factor is use to rank in order to produce the most influence factor.

All of the answer need to be sum up and devided with the numbers of questions. The formula to find average is also known as mean is as follow :

Mean = Sum of all the observed values ÷ number of observations

OR

$$\boldsymbol{\mu = \frac{\sum x}{n}}$$

μ = the mean value of x

Σ x = the sum of all observed values

n = the number of observations in the data set

CHAPTER 4

4.0 RESEARCH FINDING AND ANALYSIS

4.1 Introduction

This chapter will discuss about the finding from the respondent to the questionnaires. The results are presented using statistical package for social science (SPSS) analysis. The questionnaire of this study is to find the factor that cause to project time overrun and to rank the cause. The average mean from SPSS is use to rank the factors in order to produce the most influenced factor.

4.2 Questionnaire Distribution

The targeted respondents of this study are G7 companies which registered with CIDB that located in Terengganu. As determined in chapter 3, the populations of study

are 89 and they are from the construction work only. The questionnaire was completed answer by experienced contractor.

4.3 Return Rate of Questionnaires

The questionnaire of this study has been distributed to respondent by delivered personally and by email. Refer to theory Morgan & Krejcie my respondent at least 89. Based on the return rate only 59 (66.3%) is consider as usable and 3 (3.4%) is usable because of the data is not complete. Meanwhile, 27 (30.3%) is not collected. According to Cavana et al (2001), return rate of questionnaire should receive at least 30%, in this study the return rate is 66.3% and is acceptable.

	N	Percent (%)
Total Questionnaires	89	100
Collected (Usable)	59	66.3
Collected (Unusable)	3	3.4
Uncollected	27	30.3

Table 4.1 Survey return rate (n=89)

4.4 Demographic respondent's profile

This section is about the result on the demographic of respondents. Demographic it is significant of respondent background. For this research, have five items was asked in demographic which are education background, experience in construction, how many project that involved, have been faced with delay or not, and what kind of project they are faced with time overrun. Demographic analysis is carried out through descriptive statistic based on 59 respondents. The frequencies and percentages for each item will be present.

4.4.1 Background of Respondents based on Education Level

Based on the table and figure below, it was found that the majority of the respondents of this study is have degree education background, 66.1% (n=39). The second higher is 20.3% (n=12) possess an education level of diploma. Follow by master background which is 8% (n=6) and only 2 person in my respondent with certificate. Survey for education level will determine the respondent knowledge and experience. From the result degree is highest one, respondent of this study are considered have high knowledge about construction.

	Frequency	Percent (%)
Phd	0	0
Master	6	10.2
Degree	39	66.1
Diploma	12	20.3
SPM and below	2	3.4
Total	**59**	**100.0**

Table 4.2 Respondent Education Level (n=59)

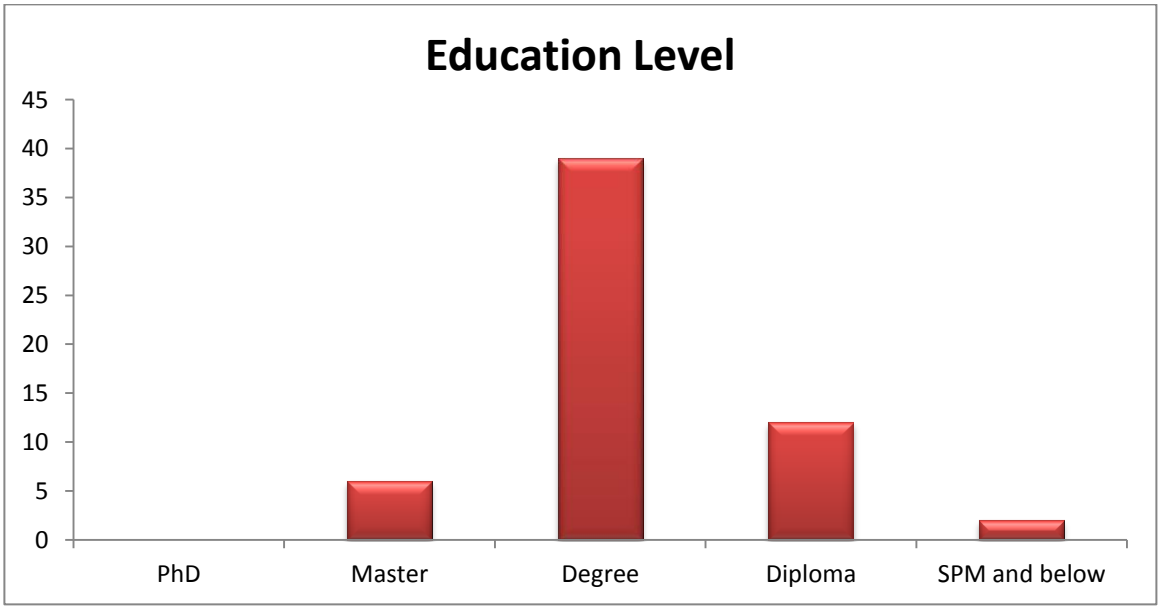

Figure 4.1 Frequency of Education Level

4.4.2 Work Experience in Construction

The second demography is the duration of involvement in construction, where the respondents should choose four different choices such as work over than 10 years, 6 until 10 years, 2 until 5 years and the last one is below than 2 years. For this study, the highest level is 6 to 10 years of experience in construction (n=23) and the lower percent is 10 years and above (n=9). This range of experience show that majority of the respondent is knowledgeable about construction.

	Frequency	Percent (%)
10 years and above	9	15.3
6-10 years	23	39.0
2-5 years	16	27.1
Below than 2 years	11	18.6
Total	**59**	**100.0**

Table 4.3 Work Experience in Construction (n=59)

Figure 4.2 Years of work experience in construction

4.4.3 Number of Project Involved by Respondent

The third question in demography is the number of project that respondent involve in construction. The highest percent of overall respondent is 10-15 projects (32%) and the lowers percent is 1-5 projects (6.7%). The respondent has managed more than 10 projects. They are having highly skill and good in motivation that can support the study.

	Frequency	Percent (%)
15 projects and above	7	11.9
10-15 projects	24	40.7
6-10 projects	23	39.0
1-5 projects	5	8.5
Total	**59**	**100.0**

Table 4.4 Number of project involve (n=59)

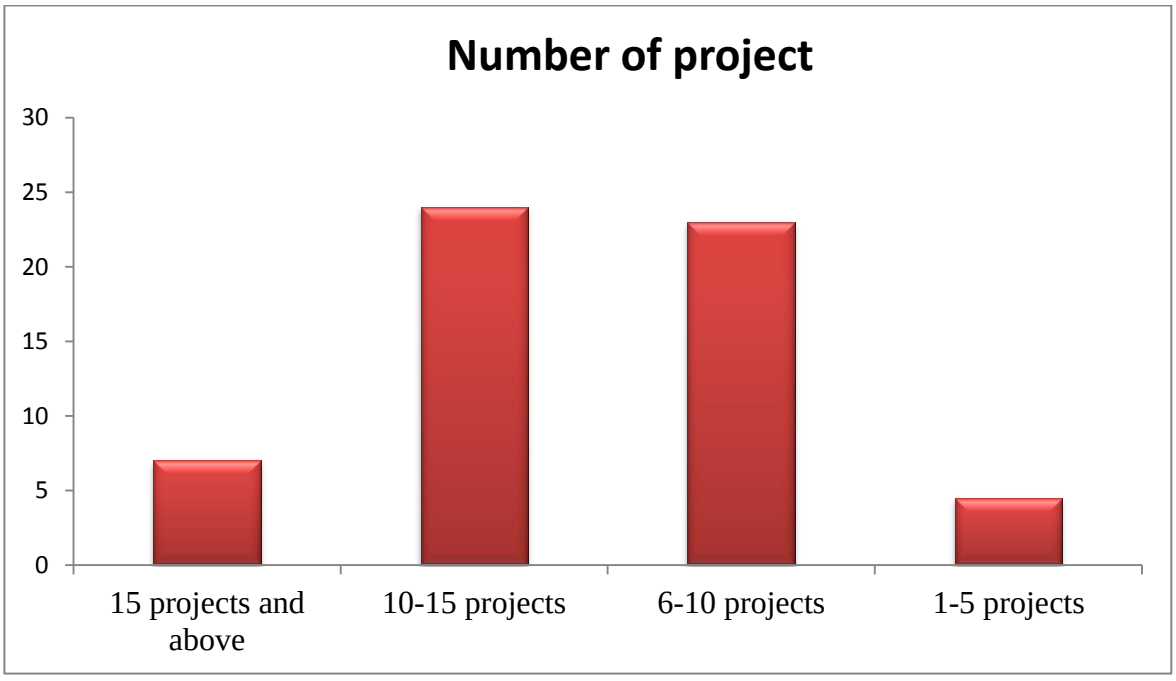

Figure 4.3 Number of project respondent involved

4.4.4 The number of how many respondents faced with project delay

The table and figure below show the respondent faced with project time overrun is over than half, which is 52 of contractors out of 59 is choosing YES. The rest is only 7 contractors that do not faced with project delay.

	Frequency	Percent (%)
YES	52	88.1
NO	7	11.9
Total	**59**	**100.0**

Table 4.5 Number of respondent faced in delay (n=59)

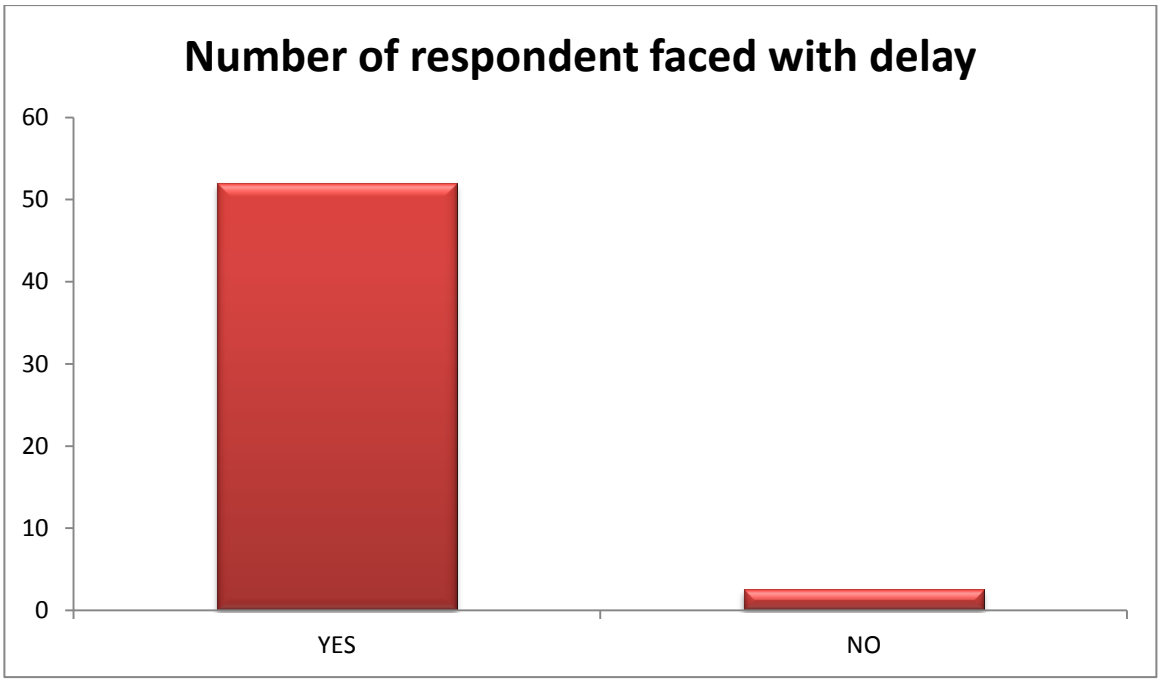

Figure 4.4 Number of respondent face with project delay

4.4.5 The number of project faced with delay

The table and figure below show the results of the different type of project that almost faced with delay in construction. As referring to the table and diagram below, 25 contractors agree that housing estate is the first stage frequently delays with score 42.4%. Housing estate is a group of homes as a single development, usually built by a single contractor. The smallest number is the public facilities project with only 4 contractors chooses it.

	Frequency	Percent (%)
School	14	23.7
Public facilities	4	6.8
Hospital	16	27.1
Housing Estate	25	42.4
Total	**59**	**100.00**

Table 4.6 Number of project frequent delay (n=59)

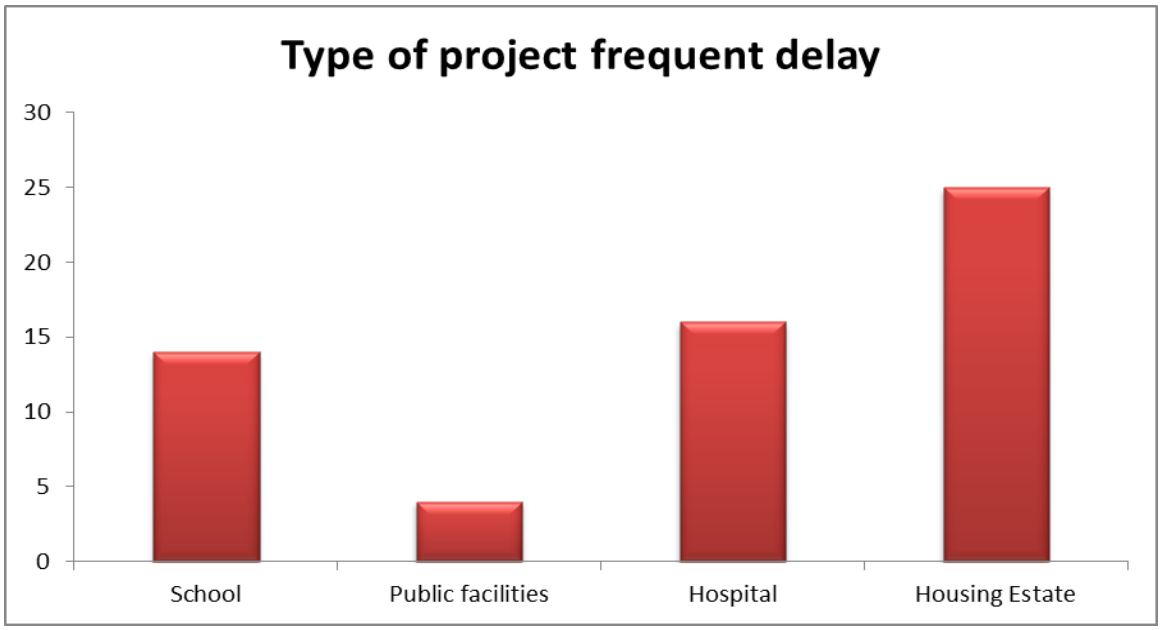

Figure 4.5 The number of project delay by type

4.5 Descriptive analysis: **The different categories of factors caused time overrun in construction**

The factors of time overrun in construction at Terengganu are categorized into six groups such as contractor, owner, consultant, labor, material and equipment, and external factors. Table 4.7 was shown the results of all groups influencing time overrun according to the mean of each group.

Item No.	Items	N	Mean	Std. Deviation
1	**FACTORS BY CONTRACTOR**			
	Planning and scheduling problem	59	3.42	0.81
	Conflict with owner	59	3.22	0.93
	Difficulties in financing project	59	3.36	0.87
2	**PROBLEMS BY CLIENT**			
	Delay in progress payments by owner	59	3.47	0.92
	Change orders by owner during construction	59	3.32	0.80
	Poor communication and coordination	59	3.14	0.88
3	**PROBLEMS BY CONSULTANT**			
	Poor communication and coordination	59	3.03	0.79
	Inadequate experience of consultant	59	3.29	0.67
	Lack advance engineering design software	59	3.34	0.86
4	**PROBLEMS BY LABOR**			
	Nationality of labor (working permit)	59	3.03	0.81
	Labor shortage (labor supply)	59	3.17	0.72
	Low productivity level of labor	59	3.10	0.52
5	**MATERIAL AND EQUIPMENT**			
	Late delivery of material and equipment	59	3.31	0.70
	Shortage of equipment and material especially in market	59	3.41	0.65
	Material and equipment damages	59	3.34	0.69
6	**EXTERNAL FACTOR**			
	Weather condition	59	3.71	0.91
	Natural disasters (flood, etc)	59	3.27	0.85
	Unavoidable disasters (haze, pollution)	59	3.36	0.87
	Total Mean		**59.29**	

Table 4.7 Time overrun factors for project delivery (n=59)

Factors	**Average Mean**	**Rank**
External Factor	3.45	1
Material and Equipment Factor	3.35	2
Contractor Factor	3.33	3
Client Factor	3.22	4
Consultant Factor	3.31	5
Labor Factor	3.10	6

Table 4.8 Ranking Time overrun factors for project delivery (n=59)

From the previous research, according to Memon (2014), there are three (3) major factor causing time overrun in Malaysia construction project. The factors are frequent change in design, change in scope of the project. This is contradic with this research finding which are the three major fator causing time overrun in construction at Terengganu is are external factor, material and equipment factor, and contractor factor.

CHAPTER 5

5.0 CONCLUSION AND RECOMMENDATION

This chapter discusses the conclusion and recommendation of the research to support the findings of the study. The discussion of this research included demographic information about the sample and the result from descriptive.

5.1 Conclusion

Based on the result, this study was built two objectives. The first objective is to find the factor of time overrun in construction from contractor's perspective. The second objective is to rank the factors. From the finding in entire research objective, the result for research question is also made.

5.1.1 Research Question One: What are the factors that contribute to project delay?

The first objective is to find the common factor that caused time overrun (delay) in construction project. This objective has been successfully achieved. Based on the result in objective one that obtained from questionnaire, six category factors of time overrun was identify. All the factors includes: contractor factor, client factor, consultant factor, labor factor, material and equipment factor, and external factor.

5.1.2 Research Question Two: What is the highest score of factor that causing to project time overrun?

The second objective is to rank the factors that causing to project time overrun (delay). This objective of study has been successfully identified. From the first objective six factor was identified which are contractor factor, client factor, consultant factor, labor factor, material and equipment factor, and external factor. From the answers in questionnaire, the highest score that causing to project time overrun is external factor. Have three common problems under external factor which are weather condition, natural disasters (flood), and unavoidable disaster (haze, pollution).

5.2 Recommendation

There are some recommendations for future research. The recommendation is useful as reference because it can improve the accuracy of the answer and also improve the value of the study.

The first recommendation is not limit the method such as questionnaire only. Questionnaire method is used because of time is limited due to the respondent are contractors, they have a lot of work and always busy with work. The other biased is when the time is limited, the returned questionnaire able to not complete answer. The other researcher can use the method such as interview and questionnaire for control the biased.

Time overrun management is important aspect in construction industry because it is can measure the work performance. The second recommendation is expand the category of population. This study is only focus on contractor perspective. The similar study should expand the category of population for more accurate answer, it is because to avoid the biases in answering the questionnaire.

This chapter consists of sub-topics of background of study, problem statement, research objective, research question, scope of the study, significant of the study, expected result, definition terms and study outline. All of the sub-topics are described about the significant factors causing time overrun in construction industry.

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THE SIGNIFICANT FACTORS CAUSING PROJECT TIME OVERRUN

SECTION A :Tick (/) on the answer in the related box.

1 . Education :

PhD ☐ Master ☐

Degree ☐ Diploma ☐

Certificate (SPM) ☐ Others :.....

2 . Work Experience

> 10 years ☐ 6-10 years ☐

2-5 years ☐ < 2 years ☐

3. Experience in Construction:

> 10 years ☐ 6-10 years ☐

2-5 years ☐ < 2 years ☐

4. State the number of construction project that involved by respondent :

1-5 projects ☐

6-10 projects ☐

10-15 projects ☐

> 15 projects ☐

5. Have you been faced with project time overrun (delay)?

YES ☐ NO ☐

6. State the type of building which involved the most frequent for delay :

School ☐ Hospital ☐

Public facilities ☐ Housing Estate ☐

Others ☐

Please specify :.....

SECTION B : Please answer the following questions :

Tick (/) on the answer according to this scale :

Never	Rare	Sometime	Mostly	Always
1	2	3	4	5

Factors of Construction Time Overrun						
1. Have you been faced with?		**1**	**2**	**3**	**4**	**5**
1	Ineffective planning and scheduling of project					
2	Difficulties in financing project					
3	Conflict with client					
2. Have your Client?		**1**	**2**	**3**	**4**	**5**
1	Delay in progress payments					
2	Change orders during construction					
3	Poor in communication and coordination					
3. Have your Consultant?		**1**	**2**	**3**	**4**	**5**
1	Lack in using advance engineering design software					
2	Poor in communication and coordination					
3	Inadequate experience in construction					
4. Have your Labor?						
1	Nationality problem (working permit)					
2	Labor shortage (labor supply)					
3	Labor low productivity					
5. Have the Material and Equipment?						
1	Late delivery of material and equipment					
2	Shortage of equipment and material in market					
3	Material and equipment damage					
6. External Factor						
1	Weather condition (temperature, wind,cloud)					
2	Natural disasters (earthquake, flood, etc)					
3	Unavoidable disasters (haze, pollution)					